

# ECONOMIC SHOCKS AND THE FIXED VERSUS FLOATING EXCHANGE RATE QUESTION

*This article, prepared by Simon Chapple, considers one aspect of the question of the appropriate exchange rate regime. The views expressed here do not necessarily represent those of the Reserve Bank of New Zealand.*

## Abstract

The choice between operating a fixed and a floating exchange rate regime depends on a number of factors. One important consideration is which of the two exchange rate systems causes the minimum change in real output when the economy is hit by 'shocks', that is unexpected changes in economic variables. An obvious example of shocks which had an important impact on New Zealand were the oil price rises of 1973 and 1979. Note, however, that stability of real output may not be a desirable criteria under all circumstances: in the face of some permanent shocks it may be more appropriate for real output and expenditure to adjust.

A number of economists have constructed theories to deal with the question of which exchange rate system performs best in reducing changes in real output when the economy is subject to shocks. These theories have shown that this choice depends on a number of factors such as: whether the majority of shocks originate domestically or overseas, whether the majority of the shocks are nominal (shocks to the monetary sector or the price level) or real (shocks to the real economy or relative prices), and the assumed response of the economy to these shocks.

The article shows that while this literature does not lead us to any definitive conclusions regarding which exchange rate best insulates output from shocks, it does indicate that neither a fixed nor a flexible rate will be appropriate under all circumstances.

## Introduction

Over the past few years the relative merits of fixed versus floating exchange rates have been an important area of public debate. Increasingly governments world-wide have become disenchanted with anti-cyclical stabilisation policies and have attempted to find a solution to their economic woes by providing a stable set of policy rules which will provide a reduction in uncertainty and a stable institutional environment for investment. Obviously one of the many policy rule choices facing governments is that between operating a fixed or a floating exchange rate regime. Relevant considerations regarding this choice include judging which policy is likely to provide the most accurate price signals to the tradeable goods sector over time; whether government is prepared to bear any costs involved in defending a rate that the foreign exchange market does not consider appropriate; which regime best supports the government's monetary stance; and so on. Another important factor that governments must take into account when making this decision is the comparative insulating properties of the alternative exchange regimes when the economy is subject to random shocks. This article aims to summarise some of what economists have said recently in technical literature on this last question.<sup>1</sup> It starts

<sup>1</sup> Only the strand of exchange rate literature that deals with random shocks is dealt with here. If readers are interested in other aspects of the choice of exchange rate regime for New Zealand, they can refer to Chapters 8 and 9 of *Financial Policy Reform*, RBNZ, 1986. Both chapters have also been published as *Bulletin* articles, in the May and July 1985 issues respectively.

with a definition and classification of random shocks that may impact on the economy.

## What is a Random Shock?

Formally, a random shock is an unpredictable impulse which causes the economy to deviate from its original equilibrium path. For example, a classic case is that of the oil shocks of the nineteen seventies, where oil prices rose due to the actions of the OPEC cartel. However, most economic shocks are neither as large nor as visible as the oil shock. When discussing the question of shocks and exchange rates, economists normally assume that over time random shocks are 'serially uncorrelated'. All that this means is that each shock is statistically independent from previous ones. If for example an exporter knew that a shock increasing her sales this month would mean another shock keeping her sales high in the next, the shocks would not be serially uncorrelated, and would be to some extent predictable.

A better understanding of random shocks may first be gained by classifying various shocks and then giving some examples which might be relevant in a New Zealand context.

Table 1 presents one method by which random shocks may be classified. Shocks may be real, impacting initially on variables like real consumption, exports and so on, or they may be nominal, first affecting variables like prices and the amount of money in the economy. Shocks may originate domestically or they may come from offshore. Table 1 classifies random shocks into three types: shocks to spending (by consumers, investors, government and the foreign sector), to the monetary sector, and to prices. Each of these types is broken down further into domestic and foreign shocks.

An example of a random expenditure shock would be an unanticipated rise in investment due to a shift in business expectations. A money demand shock may arise if people increase their precautionary

Table 1  
Types of Random Shock

Expenditure Shock	Domestic Foreign	Real
Monetary Shock	Domestic money demand Domestic money supply Foreign money demand Foreign money supply	Nominal
Price Shock	Domestic price shock Foreign price shock	Nominal

demand for money due to a sudden increase in uncertainty. Shocks to the money supply could result if the relationship between the money base and the relevant monetary aggregate varied in an unexpected fashion. Finally, an example of a price shock would occur if an unexpected climatic change resulted in low food production and therefore high food prices.

Shocks may also be transitory or permanent. For example, a transitory shock would result if there was an increase in money demand because of a temporary loss of confidence in other financial assets, which quickly eased, returning interest rates to their old levels. An example of a permanent shock is a lasting change in foreign tastes which affects demand for our exports, such as a switch from wool to synthetic carpets. This article largely deals with transitory rather than permanent shocks.

Having described the nature of a random economic shock and after giving some examples of such phenomena, we move on to deal in broad terms with the nature of theoretical models that various economists have proposed to deal with the question of choice of exchange rate regime in an economy subject to such shocks.

### Literature on Shocks and Exchange Rates: What Can It Tell Us?

The theoretical models that economists have constructed to deal with the question of exchange rates and shocks are abstractions, simplifying the world to concentrate on its more important aspects. The most common models are equilibrium models, which assume an initial position of full employment. The behaviour of equilibrium models can be likened to that of a pendulum. When the pendulum is not moving and hanging vertically the economy is in stationary full employment equilibrium. Nothing unexpected is happening and no shocks buffet the system. A hammer striking the pendulum is analogous to a random

shock, providing an impulse moving it away from equilibrium, and causing a series of diminishing oscillations as the pendulum returns to its equilibrium point.

This simple analogy makes clear the restrictive nature of equilibrium models in dealing with shocks and exchange rates. Basically equilibrium models compare a stable pre-shock state with the new post-shock equilibrium: they do not describe well any dynamic disequilibrium processes between points of equilibrium. In addition, to extend our metaphor further, if shocks are too great the pendulum may come completely off its axis: this type of failure to converge to equilibrium is not dealt with in such models. Furthermore, if shocks are so frequent that the pendulum is in continuous movement, an equilibrium concept may not have any operational meaning. Finally, equilibrium models assume that if the system is not subject to outside shocks it is inherently stable.

Keeping these qualifications in mind, we move on to look at the literature on equilibrium models of shocks and exchange rates. The modern literature on exchange rates and shocks was initiated by Fischer<sup>2</sup> who considers shocks to domestic money demand, foreign prices and domestic real income and their impact on real consumption and prices in a small open economy with no investment, government spending, or capital mobility. Fischer's model indicates that if disturbances are real, a fixed exchange rate provides both stable consumption and prices. If disturbances are nominal, fixed rates provide stable prices and variable consumption while floating rates provide variable prices and stable consumption. If one accepts Fischer's assumptions, the choice between a fixed and a floating rate depends on two factors. First, whether one thinks initial shocks tend to be nominal or real. Second, whether one thinks that stability of prices or stability of real consumption is more important.

<sup>2</sup> S. Fischer (1976), 'Stability and Exchange Rate Systems in a Monetarist Model of the Balance of Payments'. In R. Aliber: *The Politician Economy of Monetary Reform*. Allanel, New Jersey, pp. 59-73.

In 1983, using a variant of Fischer's model, the Reserve Bank undertook some simulation exercises on shocks and exchange rates using the Bank's econometric model of the New Zealand economy.<sup>3</sup> The work attempted to make Fischer's model more realistic by incorporating inventories and non-instantaneous adjustment of domestic prices to world prices. In contrast with Fischer's results, this work showed that a fixed rate is preferable in reducing consumption variances under nominal shocks, while a floating exchange rate performs better under real shocks. The results hinge on the slow price adjustment in the Bank's econometric model. This is the stage at which relevant work stood in the New Zealand context until the removal of exchange controls in 1985.

International capital mobility implies that Fischer's work and the Bank's simulation exercises are out of date since assuming zero capital mobility is no longer valid. To obtain guidance on choice of an exchange rate to minimise the impact of shocks we must turn to the literature that incorporates capital mobility. Note that in what follows, the focus is on which exchange rate regime minimises real output changes under random shocks: under permanent shocks, other criteria may be appropriate, and it may be desirable for real output and expenditure to adapt to such shocks.

### Introducing Capital Mobility

The work on capital mobility, exchange rates and shocks was begun by Turnovsky.<sup>4</sup> Again a small open economy is assumed but capital is considered to be mobile to some extent between countries. Turnovsky considers only the first period effects of shocks on real output. Using Turnovsky's model we consider two

<sup>3</sup> D. Carey and A. Grimes, 'Stability and Exchange Rate Systems: A Reconsideration of the Core Model'. Paper presented at the August 1983 Conference of the New Zealand Association of Economists.

<sup>4</sup> S. Turnovsky (1976), 'The Relative Stability of Alternative Exchange Rate Systems in the Presence of Random Disturbances'. *Journal of Money, Credit and Banking*. Volume 8, pp. 29-50.

representative cases: first a domestic expenditure shock and second a foreign price shock.

Consider a random fall in domestic investment, due to an unanticipated shift in business profit expectations, which reduces real domestic output. This fall in output contracts transactions demands for money, causing domestic interest rates to fall. Lower domestic interest rates mean that moving money offshore becomes more desirable, so the capital account of the balance of payments worsens. Lower domestic output also means that less imports are demanded, so the balance of trade improves. Under such circumstances, which exchange rate regime performs better in stabilising output?

The answer to this question depends on which influence on the balance of payments dominates. If the trade balance effect is stronger, i.e. the propensity to import is high and capital mobility relatively low, the shock's impact means that there is an increase in demand for domestic currency reflecting the trade balance effect. Under a fixed exchange rate money flows into the New Zealand economy, increasing the money supply, lowering interest rates further and expanding the economy. Under a float, on the other hand, higher demand for domestic currency would cause an appreciation, which lowers exports and further contracts the economy. Thus if the trade effect dominates, a fixed exchange rate is better for stabilising real output. If the capital account effect dominates, that is if capital flows freely in response to the fall of domestic interest rates relative to foreign interest rates and/or the propensity to import is low, then money will flow out of the economy. Under a fixed rate this results in a drop in the money supply and a rise in interest rates, which further reduces output. If the exchange rate is floating, the outflow of money would cause a depreciation, expanding exports and output. Thus if the capital account dominates, a float will be preferable in stabilising the economy.

A random rise in foreign prices (non-oil, for simplicity) raises output

**Table 2**  
Summary of Turnovsky's Results —  
Exchange Rate Giving Most Stable Real Output

Type of Shock	Low Capital Mobility	High Capital Mobility
<b>Domestic</b>		
Expenditure Shock	fixed	fixed/floating
Monetary Shock	fixed	fixed
Price Shock	floating	fixed
<b>Foreign</b>		
Price Shock	floating	floating
Trade Shock	floating	floating

under both regimes, since domestic goods become cheaper relative to overseas goods. The output rise pushes up the transactions demand for money, raising interest rates. Since the foreign price rise causes exports to rise and imports to fall, and higher interest rates cause money to flow in, the trade and capital accounts both improve. If the exchange rate is fixed the resulting inflow of money pushes interest rates down again and output up further. If the exchange rate is floating the higher demand for domestic currency caused by increased exports and higher domestic interest rates causes an appreciation, which tends to stabilise output. So, for the case of a rise in foreign prices, a floating regime is preferable in stabilising real domestic output.

Table 2 summarises Turnovsky's results, showing which exchange rate provides the most stabilising force on domestic output under conditions of both high and low capital mobility with various shocks. Using Turnovsky's model, Fischer's conclusions regarding the appropriate exchange rate under domestic monetary shocks are reversed, while the appropriate regime under domestic real shocks depends on whether capital flows or trade flows dominate the balance of payments.

The results achieved by Turnovsky show that models with more realistic assumptions than the ones in Fischer's simple case can point to quite different policy conclusions. An application of Turnovsky's conclusions to New Zealand suggests the following tentative conclusions. One would tend to place New Zealand in the high capital mobility category. Given this, a

fixed exchange rate appears to perform unambiguously better in stabilising real output under domestic monetary and domestic price shocks, but a floating rate appears unambiguously better under foreign shocks. Looking at real domestic expenditure shocks, even with high capital mobility it is conceivable that a fixed rate may be preferable in stabilising real output if the propensity to import is sufficiently large. Certainly import propensities in small open economies like New Zealand tends to be large, but it is not clear in the absence of a more careful empirical examination whether it is large enough for the above to hold. Hence, the preferable regime in the face of real expenditure shocks must be considered indeterminate a priori.

### Introducing Wage Indexation

In many countries, including New Zealand, formal or informal wage indexation in the face of price increases has been a common occurrence. The degree of wages indexation is the extent to which nominal wages increase with prices, thus giving real wage stickiness. Marston<sup>5</sup> considers both domestic and foreign monetary and aggregate demand shocks in a small open economy with perfect capital mobility. Wages are taken as being indexed to a general price level, which is a weighted average of domestic output price and foreign prices converted to domestic currency. While wage indexation to this general price level is the relevant consideration

<sup>5</sup> R. Marston (1982), 'Wages, Relative Prices and the Choice Between Fixed and Flexible Exchange Rates', *Canadian Journal of Economics*, Volume 15, pp. 87-103.

for workers, it is real product wages, that is money wages divided by domestic output prices, that matter for employment and output decisions. We examine two representative cases: first a domestic monetary shock under full domestic indexation; second a foreign aggregate demand shock with zero indexation in the domestic economy and full foreign indexation.

Consider a random increase in the domestic money supply. Under a flexible rate, a depreciation occurs as money flows out in response to lower interest rates. The depreciation causes aggregate demand to rise. However, with full indexation, wages rise reflecting higher tradeable goods prices. Since wages rise similarly in the traded and non-traded sectors of the economy, this results in total domestic output increasing in price by the amount of the exchange rate change (not just output in the traded goods sector). Thus there is no overall change in real output. Under a fixed rate with perfect capital mobility the money supply increase merely results in an outflow of capital with output constant. Thus full indexation makes the choice of exchange rate immaterial for the behaviour of real output, but a flexible rate results in some additional price variance due to the effect of currency depreciation. Under complete foreign indexation the impact of a foreign aggregate demand disturbance is to raise foreign prices and interest rates. There is no impact on foreign output as full indexation holds foreign real wages constant. Under a fixed exchange rate, the foreign price disturbance causes domestic output and prices to rise. With a float there are two opposing forces operating on the exchange rate. The higher foreign interest rate puts downward pressure on the exchange rate as domestic investors wish to hold more of their money offshore.<sup>6</sup> On the other hand,

<sup>6</sup> This assumes that purchasing power parity does not hold; i.e. the domestic currency does not appreciate to reflect the relative change between domestic and foreign prices. Otherwise higher foreign interest rates would not attract domestic money.

the rise in domestic output raises domestic transactions demands for money, interest rates rise and this puts upward pressure on the exchange rate. The more responsive is domestic output to the rise in world prices the more likely the latter effect will dominate and a stabilising appreciation will then occur.

In general then, once indexation and relative prices are introduced into the scheme of things, the choice of exchange rate regime depends not only on the type of shock which predominates but also on domestic and foreign indexation and the responsiveness of domestic output to changes in relative domestic and foreign prices.

### Conclusion

There are a number of aspects of the fixed versus floating exchange rate question. This article has considered only one particular aspect, the relative performance of exchange rate regimes in stabilising real output under various types of random shocks. Note too that the comparison made here was between a pure floating rate and a pure fixed rate. The range of possibilities between these two options, that is the literature on the optimal degree of exchange rate flexibility, was not canvassed. In our discussion of random shocks and exchange rates we have shown that the choice between fixed and floating exchange rates according to the above criteria depends first on assumptions made in particular economic models, and second on which type of shock most frequently affects the economy.

On the first of these points, these results have been shown to be highly sensitive to alternative assumptions. In addition, as soon as one moves into the realm of disequilibrium models which start from the assumption of less than full employment, the results of these equilibrium models can be easily upset. Equilibrium models assume that

devaluation is in the first instance expansionary. However, the disequilibrium model developed by Krugman and Taylor<sup>7</sup>, for example, demonstrates that this may not be so. A devaluation raises the profit share in export and import substituting sectors. If savings out of profits exceed those from wages, and price-cost margins in the domestic sector are unresponsive to demand, then planned savings rise and output may in fact fall. While the Krugman-Taylor result is only illustrative, it does indicate that one should be extremely wary in drawing generalised conclusions from a very narrow range of untested models.

Relating to the second point, choice of the appropriate regime has been shown to depend on the relative frequency of different types of shock. It is difficult to judge which type of shock is likely to be most prevalent in the New Zealand setting. One could study our past economic history and perhaps identify one type of shock as having been important in the past. However, just because one type of shock has dominated previously, it does not necessarily mean that it will continue to do so in the future. Unpredictability, after all, is in the very nature of such disturbances.

On the positive side, what can be learned from such theories? Despite the limitations of such models, they do illustrate that neither a fixed nor a flexible exchange rate will be necessarily suitable at all times and under all circumstances, even by the narrow criterion of domestic output stability considered here. Under certain conditions a fixed rate may be preferable to a flexible rate in stabilising real output under random shocks of various kinds, and the reverse may be true under alternative conditions.

<sup>7</sup> P. Krugman and L. Taylor (1978) 'The Contractionary Effects of a Devaluation'. *Journal of International Economics*. Volume 8, pp. 445-456.