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THE CHECK-LIST APPROACH
IN THEORY AND PRACTICE

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Executive Summary

Between 1976 and 1984 the level of money supply, typically M3, was being used as the major indicator to private sector agents of the stance of monetary policy. In late January 1985 the Reserve Bank abandoned this approach and instead adopted a check-list approach. Although the Government's description of its approach has subsequently changed, in spirit the approach can be interpreted as the same as that first introduced in January 1985.

A stochastic macroeconomic model of a closed economy is introduced. The properties of the check-list are discussed and a stylized check-list is represented by an interest rate rule. An optimal check-list can then be chosen by minimising squared deviations in output from a full employment level.

Optimal check-lists under both a real demand shock and a financial shock are derived. Under a real demand shock the check-list can be represented by an interest rate rule which depends on a range of economic variables. Under a financial shock, the model of the closed economy that has been presented, a form of interest rate targeting is appropriate, with the interest rate held at some specified level.

Some extensions to the basic model such as simultaneous shocks to several sectors, covariance in the shocks and serial correlation of the shocks are examined. The implications for the check-list of increased uncertainty about the structure of the economy (including the lag structure) and about the sources of shocks are addressed. Extensions to an open economy framework and implications associated with the degree of information available to private sector agents are discussed. Time-inconsistency may arise if the check-list is chosen to minimise a multi-period loss function. A series of policy principles concerning the operation of the check-list are then elicited.

On the basis of the theoretical analysis it is argued that some form of interest rate/exchange rate targeting would have been an appropriate outcome at various stages since
implementation of the check-list approach. Revisions to policy would seem to be the consequences of unexpected changes in the monetary authority's assessment of the state of the world rather than a conscious attempt by the monetary authority to mislead market participants (as would be the case with the adoption of a time-inconsistent policy). The alternative to the check-list involving the definition and targeting of an appropriate monetary aggregate would only be an acceptable policy option if the degree of volatility and uncertainty currently apparent in the financial sector could be significantly reduced.

The paper concludes with a summary of the theoretical literature.

1. IMPLEMENTATION OF THE CHECK-LIST APPROACH

Australian monetary policy in the second half of the 1980's has been characterised by the adoption of the check-list approach. Following a brief summary of the implementation of this approach, this chapter employs a stochastic modelling framework to present a stylized representation of the check-list as an optimal interest rate rule which is chosen to minimise an appropriately chosen loss function. The methods adopted in this chapter allow an extensive discussion of properties of the check-list. Also the stylized check-list allows some specific policy questions to be addressed.

In the Australian context, there are three macroeconomic policy instruments available to policy makers. These are: wages policy, fiscal policy and monetary policy. The determination of wages policy in this country is strongly influenced by the presence of institutionalised rigidities. While it may not be difficult for a Government to introduce deficit financed expansions in Government expenditure, reductions in Government spending programs that have already been put in place require protracted negotiations within the Government; this can only be achieved at some cost. Also, changes in tax policy must proceed with considerable lags. Accordingly, neither wages policy nor fiscal policy can be used to respond quickly to unexpected changes in the economy. This leaves monetary policy as the only policy instrument available to the Government in the short-run.

In Australia, between 1976 and 1984, it was Government practice to announce in the Budget Speeches a planned range for the rate of increase in the money supply. This announced rate of growth of money was chosen consistent with Government forecasts and planned budgetary policy. Thus, during this period, the level of the money supply, typically M3, was being used as the major indicator to private sector agents of the stance of monetary policy.

Changes to the Australian financial system, including the removal of nearly all direct regulation of the financial system over the course of the 1980's, increased uncertainty
throughout the economy and made interpretation of growth figures for the traditional monetary aggregates increasingly difficult. As a consequence, from January 1985 onwards the Reserve Bank abandoned targeting of monetary aggregates and, instead, adopted a "check-list" approach to monetary policy. Essentially, this required the analysis and interpretation of a larger number of economic variables in the determination of the stance of monetary policy.

It is particularly appropriate for the monetary authority to base monetary policy on the signals contained in a range of economic variables in a world of uncertainty, when the economy is subject to a range of unanticipated shocks and when some contemporaneous variables are also unobservable. Monetary policy based on the signals contained in a range of economic variables can be used to achieve short-run objectives, such as minimising unemployment or achieving price stability. Then, if the monetary policy stance does not fully achieve desired objectives, subsequent monetary policy can be adjusted to compensate for previous undesired outcomes. The usefulness of any one variable in providing signals to the monetary authority about the state of the economy will vary as the source of shocks and the structure of the economy changes.

To trace the evolution in thinking by Australian Governments and their policy advisors it is useful to examine recent Government and Reserve Bank discussions of monetary policy. Such discussions are contained in the Reserve Bank's Annual Reports and Budget Statement No. 2, which is circulated each year following the Treasurer's delivery of the Budget Speech to Parliament. These recent policy assessments by Australian policy makers have coincided with the implementation and continued use of the check-list in determining the stance of monetary policy.

The early 1980's saw a process of financial deregulation1 which was also accompanied by changes in financial practices; this included increasing re-intermediation from non-bank financial intermediaries and led to increasing uncertainties in the interpretation of movements in particular money supply aggregates such as M3. While a conditional monetary projection was announced in the 1984 Budget Speech, one of the first indications of a possible change of approach to determining monetary policy was contained in the Reserve Bank's Annual Report, released in 1984. This Report noted that the "uncertainties illustrate some of the problems of monetary targeting and argue strongly against too simple a reliance on a single aggregate". While acknowledging that an announced monetary projection would be useful as an indicator of the Government's intentions, the Report went on to say that policy makers would have "to be conscious of signals coming from a number of monetary aggregates as well as from interest rates and the exchange rate" (Reserve Bank of Australia, 1984, p.5).

This was followed, in late January 1985, with the Government's decision to suspend the 1984-85 conditional projection for M3. Instead the Treasurer announced the introduction of the check-list approach.

Specific references to a "check-list" of monetary indicators can be seen in the recent Reserve Bank Annual Reports (1985, 1986), and Government Budget Statements (1986, 1987). Typically the official view of this check-list involved an assessment of a range of current and prospective financial conditions and developments in the economy generally. "Under [the check-list] approach, particular attention is paid to monetary and credit aggregates, interest rates, the exchange rate and balance of payments, economic activity and restrictions on almost all bank interest rates and on bank lending (December 1980, August 1984, April 1985, April 1986); the emergence of a tender system for the sale of new issues of Commonwealth securities (August 1982); the floating of the Australian dollar and the removal of most exchange controls (December 1983); the entry of new banks and other financial intermediaries (from early 1985); the abolition of the Statutory Reserve Deposits requirement of trading banks (August, 1988)."
inflation, without any individual indicator receiving overriding emphasis” (Commonwealth of Australia, 1986, pp.51-52).

The best description of the purposes of monetary policy, generally, and of the checklist in particular can be found in the Reserve Bank Act 1959 which states that Reserve Bank policy should be “directed to the greatest advantage of the people of Australia”. The ultimate objectives of Bank policy are defined as

"(a) the stability of the currency of Australia
(b) the maintenance of full employment in Australia, and
(c) the economic prosperity and welfare of the people of Australia”.

(Attorney-General’s Department, 1980, Section 10 (2)).

Reserve Bank Annual Reports for 1987 and 1988 did not make any explicit reference to the “check-list” but referred to monetary policy being based on a range of economic indicators. The 1988 Budget Statement did not explain how monetary policy was to be determined but instead defined monetary policy by reference to the following objectives: the restraint of domestic demand and the containment of cost and price pressures. This Budget Statement concluded that: “Because it is a more flexible policy instrument, monetary policy is often called on for the initial response to external or internal shocks while other policy adjustments are made and work their way through the system” (Commonwealth of Australia, 1988, P.53).

In this chapter, the checklist is interpreted as an interest rate rule which depends on a range of economic variables and is designed to minimise the consequences of unexpected shocks to the economy. While recent descriptions of the Government’s monetary policy settings might be seen as a change from the checklist approach, they are consistent with the interpretation of the checklist presented in later sections of this chapter. Although the

Government’s description of its approach has changed, in spirit the approach can be interpreted as the same as that first introduced in January 1985. 2

2. A SIMPLE STOCHASTIC MACRO MODEL

In order to examine the properties of the checklist in a formal framework, it is useful to consider the model of a small closed economy which is subject to unexpected shocks. For expository simplicity it is assumed that the expected rate of inflation is zero so that the nominal interest rate and the real interest rate are identical. The model can be summarized as follows:

\[
Y_t = \alpha_0 + \alpha_1 Y_{t-1} - \alpha_2 R_t + u_t \quad \alpha_0 > 0, \ 0 < \alpha_1 < 1, \ \alpha_2 > 0 \quad (1a)
\]

\[
M_t - P_t = \beta_1 Y_{t-1} - \beta_2 R_t + v_t \quad \beta_1 > 0, \ \beta_2 > 0 \quad (1b)
\]

\[
P_t - P_{t-1} = \gamma(Y_t - Y^*) \quad \gamma > 0 \quad (1c)
\]

where

\[Y_t = \text{real domestic output at time } t.\]
\[Y^* = \text{full-employment output.}\]
\[P_t = \text{price of domestic output at time } t, \text{expressed in logarithms.}\]
\[R_t = \text{nominal domestic interest rate at time } t.\]
\[M_t = \text{nominal supply of base money at time } t, \text{expressed in logarithms.}\]
\[u_t, v_t = \text{shocks to the economy of a magnitude that is unknown when monetary policy is being determined. At time } t-1 \text{ these shocks are distributed with zero mean and known variance.}\]

The model presents a simple IS/LM framework augmented by a Phillips Curve.

2 Note that a “check-list” or indicator approach to monetary policy is not a peculiarly Australian phenomenon. Similar approaches have been adopted in the United States and proposed as a means of international policy co-ordination.
Equation (1a) describes the domestic goods market (IS curve), with $c_1$ representing the marginal propensity to consume and the demand for domestic output being negatively related to real (in this model, also nominal) interest rates. Equation (1b) defines a standard demand for money equation (LM curve) with the demand for money increasing with increased output and reduced domestic interest rates. The Phillips curve (equation 1c) implies that inflation will increase in the short-term as unemployment levels are reduced.\(^3\)

The first two sectors of the economy can be subject to unexpected shocks, with $v_t$ representing a real demand shock (shock to IS curve) and $v_t$ representing a financial shock (shock to LM curve).

The monetary authority can influence the time-path of the economy by manipulating the domestic interest rate. The level of base money is then allowed to adjust so as to keep the money market in equilibrium. To close the model it is therefore necessary to define a monetary policy rule which determines the path of nominal interest rates. This is done in the next section.

3. DEFINITION OF THE CHECK-LIST

The monetary check-list was described in Section 1 of this chapter. Making use of that description, the check-list can be characterized by the following properties:

(i) the check-list provides a framework within which monetary policy can be determined;

(ii) the check-list makes use of the information contained in a large number of endogenous variables within the economy;

(iii) the purpose of the check-list is to maintain some acceptable level of aggregate economic well-being.

\(^3\) Since the expected rate of inflation is assumed equal to zero, equation (1c) can also be interpreted as a special case of an inflation-augmented Phillips Curve.

The monetary authority will have access to a wide range of information about prospective values, as well as the past and present values of various economic variables, such as output, inflation, interest rates, the exchange rate and the balance of payments. Information about variables that cannot be influenced by Government decisions, such as commodity prices and foreign economic developments will also be available to the monetary authority. In the real world, all this information will be incorporated into the check-list and employed in the determination of the monetary policy stance.

For the purposes of the theoretical exposition contained in this paper it will be assumed that, in determining the stance of monetary policy, the monetary authority only has access to the value of the contemporaneous supply of base money, represented by the variable, $M_t$ as well as the information contained in all lagged variables. A check-list with properties (i) and (ii) defined above can then be reduced to an interest rate rule of the form:\(^4\)

$$R_t = \mu_0 + \mu_1 M_{t-1} + \mu_2 P_{t-1}$$

To incorporate property (iii) into the definition of the check-list it is necessary to define an appropriate level of aggregate economic well-being. If the objective of the policy-maker is exclusively the attainment of full-employment then a measure of economic well-being can be represented by the loss function:

$$L_t = E^{t-1} (Y_t - Y)^2$$

where the operator, $E^{t-1}$, represents expectations conditional on information about values taken by all variables at time $t-1$.

This is an ad-hoc loss function which defines full-employment as the desirable policy

\(^4\) Terms involving lagged values of other economic variables could also be included. In the model considered here such additional lagged variables would be redundant.
objective and expresses any deviations (whether positive or negative) from full employment as a loss; the value taken by the loss function increases with deviations from this full employment equilibrium.

Throughout the rest of this chapter, it is assumed that the parameters $\mu_0, \mu_1, \mu_2$ in the check-list, represented by equation (2), are chosen so as to minimise the loss function given by equation (3). The resultant policy rule provides a stylized representation of the 'best' check-list that satisfies properties (i) - (iii) defined above.5

4. CHOOSING AN OPTIMAL CHECK LIST

The structure of the optimal check-list will depend on where shocks are expected to occur. In particular, for the model presented in this chapter, the choice of parameters, $\mu_0, \mu_1, \mu_2$, in the check-list will depend on the anticipated source of shocks in the economy. In order to demonstrate this proposition, it is sufficient to consider the polar cases when shocks impinge on only one sector at a time. These polar cases occur when: there is a dominant real demand shock (shock to only IS curve, so that $u_i = 0, v_i = 0$); and there is a dominant financial sector shock (shock to LM curve, so that $u_i = 0, v_i = 0$).

4.1 DOMINANT REAL DEMAND SHOCK

When there is a dominant real demand shock then the full-employment objective can best be achieved by an interest rate rule (check-list) which eliminates the effect of the shock on output and which drives output to its full-employment level. This can be achieved if output is determined in those sectors that do not face any unanticipated shocks. Thus the interest rate rule (equation 2) should be determined so that the money market (equation 1b) and the Phillips Curve (equation 1c) drive output to its full-employment level. Equations

(1b, 1c, 2) can then be solved to yield:

$$(\gamma + \beta_1) (Y_1 - Y^*) = (\beta_2 \mu_0 - \beta_1 Y^*) + (\beta_2 \mu_1 + 1) M_1 + (\beta_2 \mu_2 - 1) P_t-1$$

(4)

The loss function given by equation (3) takes a minimum at $Y_1 = Y^*$ and this can be achieved by choosing the following parameters in the interest rate rule (check list):

$$\mu_0 = \frac{\beta_1 Y^*}{\beta_2}$$

(5a)

$$\mu_1 = \frac{1}{\beta_2}$$

(5b)

$$\mu_2 = \frac{1}{\beta_2}$$

(5c)

Hence, the optimal interest rate rule is given by:

$$R_t = \frac{\beta_1 Y^*}{\beta_2} - \frac{1}{\beta_2} M_t + \frac{1}{\beta_2} P_{t-1}$$

(6)

In the presence of only real demand shocks, this interest rate rule drives output to its full employment level, so that the effect of the real demand shock on output is completely eliminated and the loss function takes a value of zero.

4.2 DOMINANT FINANCIAL SHOCK

When there is only a shock to the financial sector, the full-employment objective will be achieved by an interest rate rule which completely eliminates the impact of a financial sector shock on output. Then the interest rate rule (equation 2) can be determined in conjunction with real demand (equation 1a) so that output is driven to its full-employment level and any effects of financial sector shocks on output are eliminated.

In this methodology, equation (1a) reduces to:

---

5 Clearly the definition of 'best' depends in the choice of loss function given by equation (3). Another choice of loss function would result in a different 'best' check-list.
\[ \alpha_2 R_t = \alpha_0 - (1 - \alpha_1) Y_t \quad (7) \]

and the interest rate rule that minimises the loss function is given by:

\[ R_t = \frac{\alpha_0}{\alpha_2} \cdot \frac{1 - \alpha_1}{\alpha_2} \gamma^* \quad (8) \]

The interest rate rules (check-lists) derived in the two polar cases discussed above are summarised in Table 1.

<table>
<thead>
<tr>
<th>REAL DEMAND SHOCK</th>
<th>[ R_t = \frac{\beta_1}{\beta_2} \gamma^* - \frac{1}{\beta_2} M_t + \frac{1}{\beta_2} P_{t-1} ]</th>
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<tr>
<td>( u_t \neq 0 )</td>
<td>( v_t = 0 )</td>
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<th>FINANCIAL SHOCK</th>
<th>[ R_t = \frac{\alpha_0}{\alpha_2} \cdot \frac{1 - \alpha_1}{\alpha_2} \gamma^* ]</th>
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<tbody>
<tr>
<td>( u_t = 0 )</td>
<td>( v_t \neq 0 )</td>
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When all shocks act on real demand, the interest rate will respond to information contained in the contemporaneous money supply and in lagged prices. When all shocks emanate from the financial sector, a form of interest rate targeting, where the interest rate is set to a specified level independent of endogenous variables in the economy, is appropriate.

5. A DIAGRAMMATIC APPROACH

Diagrams can be used to demonstrate the manner in which the check-list operates. Figure 1 presents the IS curve (equation 1a), the LM curve (equation 1b) and the Phillips Curve (PH) (equation 1c) as curves in \( Y - P \) space. In addition to \( Y_t \) and \( P_t \) these curves also depend on \( \gamma^* \), \( R_t \), \( M_t \) and \( P_{t-1} \) as marked on the diagram. Previous period prices are predetermined by history. If the level of the interest rate is also fixed at an appropriate level, \( R^* \), then the intersection of the IS and PH curves will determine the equilibrium levels for prices and output, \( P_t \) and \( Y_t \). The base money supply, \( M_t \), will then adjust so that the three curves intersect at the same point, thus clearing the money market.

The optimal interest rate rules used here to represent the check-list, operate by changing the slopes of the three curves in such a way that the effects of unexpected shocks are minimised. The manner in which the interest rate rule operates is illustrated in Figure 2, which examines the impact of an unexpected shock to real demand (a shock to the IS curve).

Under a fixed interest rate rule, \( R_t = R^* \) and the positions of the Phillips Curve (PH curve) and the IS curve are predetermined by history; all adjustment will have to occur through the LM curve. Figure 2a assumes that the economy is initially at equilibrium \( E_1 \). A positive real demand shock then moves the IS curve to IS'. As a consequence \( M_t \) increases endogenously so as to clear the market, thus moving the LM curve to LM'. A new equilibrium given by \( E_2 \) is reached. But output will not be at its full-employment level where \( Y_t = \gamma^* \), and the loss function will not be minimised.

The equilibrium under an optimal interest rate rule (or check-list) is given by \( E_3 \) in Figure 2b. Substituting the optimal interest rate rule from the first row of Table 1 into equation (1b) yields a new LM curve given by:

\[ P_t - P_{t-1} = -\beta_1 (Y_t - Y^*) \quad (9a) \]

Noting that the Phillips curve satisfies:

\[ P_t - P_{t-1} = \gamma (Y_t - Y^*) \quad (9b) \]
FIGURE 1
MODEL EQUILIBRIUM UNDER FIXED INTEREST RATE

FIGURE 2
MODEL ADJUSTMENT FOLLOWING REAL DEMAND SHOCK

FIGURE 2A: FIXED INTEREST RATE RULE

FIGURE 2B: OPTIMAL CHECK-LIST
and that $\beta_1 > 0, \gamma > 0$, it is clear that simultaneous equilibrium in the financial sector (the LM curve) and price sector (the PH curve) can only be achieved if

$$P_t = P_{t-1} \quad (10a)$$
$$Y_t = Y^* \quad (10b)$$

Accordingly, equilibrium in these two markets ensures that output is at its full-employment level and that the loss function is minimised.

This demonstrates that, if it was known in advance that there was going to be a shock to only the real demand sector of the economy, moving the IS curve towards IS', then the check-list could be chosen to ensure that irrespective of the magnitude of the shock, the full-employment equilibrium, $E_3$, where all markets clear simultaneously, would be maintained. Under the check-list, the full-employment equilibrium will be achieved by appropriate adjustments in the interest rate rule and base money supply so as to ensure equilibrium in all markets.

In a similar manner, when the only shock comes from the financial sector, the check-list will fix the interest rate and, hence, the IS curve, so as to maintain a full-employment equilibrium.

6. EXTENSIONS TO THE BASIC MODEL

The analysis presented above is based on a rudimentary model of a stochastic economy where unanticipated shocks impinge on only one sector at a time. The check-list is represented by an interest rate rule chosen to minimise a simple one-period loss function. Some ways in which the analysis can be extended are discussed below.

Clearly, from the above analysis which assumes that shocks occur in only one sector at a time, the interest rate rule (check-list) will be very different depending on the source of shocks in the economy. Of course shocks may emanate simultaneously from more than one sector; shocks in one sector may also lead to shocks in other sectors (we then say that there is covariance in the shocks); and shocks may be sustained for more than one period (then the shocks are serially correlated). The general conclusions of the above analysis still remain valid under these scenarios: the precise structure of the check-list must depend on the policy-maker's interpretation of the nature and sources of shocks in the economy.

So far the analysis has assumed that the policy-maker knows the precise structure of the economy (represented in the analysis of this chapter by assuming that the policy maker knows all the coefficients in the model) and that the policy maker knows the relative magnitude of shocks from different sectors. If these parameters are not known with certainty then the policy-maker will have to make some assessment of the distributions of these parameters and base determination of the appropriate structure for the check-list on this assessment.

The consequences of uncertainties in a range of economic parameters has been addressed in the Rules versus Discretion debate that began in the 1960's. It can be demonstrated that uncertainty about the coefficients in the model creates a case for more modest use of activist policy so that the $\mu_1$ coefficients in the interest rate rule will be closer to zero than if coefficients in the model were known with certainty. Uncertainty about the relative magnitudes (variances) of different shocks means that the policy-maker will not be as effective in achieving his policy objectives. In the extreme case incorrect perceptions about the source of shocks can mean that the policy-maker does more harm than good by increasing rather than decreasing the loss associated with his policy objectives.

Dynamics provide another important extension to the modelling framework. The model presented above has a very simple lag structure. In reality, the monetary transmission mechanism is a complex process starting with the adjustment of short-term interest rates and having an impact on other variables in the economy only gradually. If the true lag structure was known with certainty then an appropriate interest rate rule could be derived in a similar fashion to the above.

In practice, uncertainty about the source of shocks and precise lag structures means that the implications of intervention must be constantly reassessed by the monetary authority. Such re-assessment will involve some adjustment of the check-list for previous
undesired outcomes. In the interest rate rule used above to represent the check-list this adjustment is represented by including a term involving lagged prices.

In principle the approach to the check-list adopted in this chapter can be applied to much larger models of the economy. The check-list would then be defined as a function of all endogenous variables, either from contemporaneous periods or from previous time periods. Of course, as such models become larger, it becomes increasingly difficult to derive analytic solutions for the check-list; the model does not have to be very large before solution for an optimal check-list can only be derived using numerical simulation techniques.

One important extension is to consider the case of an open economy with perfect capital mobility and flexible exchange rates. By extending the basic model, a simple model of a small open economy with flexible exchange rates can be derived. This extension involves the addition of a variable, $S_t$, representing the logarithm of the exchange rate. If the monetary authority knows the contemporaneous value of the exchange rate, then the check-list can be represented by an interest rate rule of the form:

$$R_t = \eta_0 + \eta_1 M_t + \eta_2 S_t + \eta_3 P_{t-1}$$

(11)

In general, it will be the case that the parameters $\eta_0$, $\eta_1$, $\eta_2$, and $\eta_3$ are non-zero so that the interest rate responds to information contained in the contemporaneous money supply, the contemporaneous exchange rate and lagged prices. When shocks to the financial sector are much larger than shocks to other sectors, then $\eta_1 = 0$ in the interest rate rule and the check-list will involve maintaining a specified relationship between the contemporaneous interest rate, exchange rate and lagged prices. Such a check-list, which will tend to adjust the interest rate so as to offset contemporaneous changes in the exchange rate, will have similar consequences as would some form of interest rate or exchange rate targeting.

Another way in which models can vary is in the amount of information that is employed by different agents in the economy in making their decisions. In an extreme example, which assumes that private agents in the economy form expectations using the same information as does the monetary authority in determining the parameters in the check-list, then monetary policy may have no real effects. When expectations are defined as in that example and with the objective criterion defined by equation (3), a check-list is no more effective than a fixed interest rate rule (or than any other interest rate rule for that matter). In more general (and more likely) cases when private agents base their decisions on less information than is used by the monetary authority (the case of asymmetric information) then there will be an interest rate rule which minimises the chosen loss function.

Monetary policy can be used so as to respond to short-run shocks to the economy, while allowing other policy instruments, such as fiscal policy, to determine the long-run path of the economy. Under such a scenario, a one-period loss function such as that presented in equation (3), may be an appropriate simplified representation of the monetary authority’s decision process. However, monetary policy may also be designed to take into account uncertainties that are likely to arise over a longer horizon of more than one period. For example, using the model represented by equations (1a-1c) it is possible to examine the consequences of a check-list which minimises a multi-period loss function of the form

$$L^* = \sum_{t=0}^{T} \frac{E(Y_t - Y^*)^2}{(1 + \delta)^t}$$

(12)

where $\delta (>0)$ represents an appropriate discount rate.\footnote{It is also possible to include other variables such as prices, inflation and a measure of external balance, in the loss function.}

A special problem arises when private agents in the economy have forward-looking expectations and the policy-maker determines the check-list by planning over several periods. Then, the monetary authority may have an incentive to announce commitment to one policy response but then subsequently to renege on this commitment. This is known as
time-inconsistency. For example, the monetary authority could announce a planned level of interest rates for some period in the future; and could then finance government debt by selling fixed interest rate bonds to private agents, committing these agents to receive a fixed nominal return over a specified period. Then the monetary authority could unexpectedly adopt an expansionary monetary policy, driving up inflation and market interest rates, and wiping out the value of the government debt at the expense of private agents. Clearly, the monetary authority could achieve short-run gains through the adoption of a time-inconsistent policy. However, if such an approach were adopted, it would be very difficult to convince private sector agents to buy fixed interest government bonds again. A time-inconsistent policy is successful only because the policy maker is able to trick other agents in the economy into making decisions that they would not otherwise have made. If such a policy is repeated sufficiently often then the policy maker will lose all credibility and other approaches will then have to be adopted.

A check-list may also be the outcome from a time-inconsistent optimisation problem. Then, the monetary authority may be tempted to announce one path for interest rates but then change policy without warning. Whether the interest rate rule is likely to be time-inconsistent will depend on the nature of expectations and the form of the objective function.

7. IMPLICATIONS FOR POLICY

In this section, the earlier theoretical analysis is used to draw implications for real world policy. While the model presented above is rudimentary it is possible to use this model to analyse the operation of the check-list.

From the analysis of earlier sections, several principles can be elicited concerning the operation of an optimal check-list.

(a) The coefficients given to different variables in the check-list will differ, depending on the monetary authority’s assessment of the source and magnitude of shocks in the economy.

(b) When the monetary authority believes the economy is subject only to financial shocks (comprising shocks to the LM curve), some form of interest rate/exchange rate targeting, where the interest rate and/or the exchange rate are maintained at constant levels, will be appropriate.

(c) In other cases, the optimal check-list may relate interest rates to the money supply as well as to other economic variables which are known to the monetary authority and contain information about contemporaneous and past shocks.

The check-list can also be examined in more complex modelling frameworks. The check-list can be chosen consistent with a pre-planned growth path for the economy; in principle, any path can be chosen provided it is feasible in the absence of shocks. The consequences of more elaborate loss functions, based on several variables in the economy, can be examined. Alternative assumptions can be made about the amount of information available to private agents in the economy. Provided private agents make use of less information than the monetary authority, the following additional principles will apply:

(d) Private sector agents may be assisted by knowledge about the pre-planned path for the economy, the monetary authority’s stabilisation objectives, and the structure of the economy.

(e) Under many expectations scenarios private sector agents do not need to know the source of shocks or the precise structure of the check-list. The monetary authority can make its own assessment of likely future shocks, providing it implements policy in accord with the information made available to the private sector according to (d).

(f) While monetary policy can be chosen with the objective of stabilising certain aggregates, the pursuit of a specific stabilisation objective will typically mean
that other variables, not contained in the stabilisation objective, become more volatile.

(g) Even when full weight is given to one variable in the stabilisation objective, it may not be possible to completely eliminate the effects of shocks on the path of this variable.

8. INTERPRETATION OF RECENT EVENTS

The above analysis allows the examination of a specific proposition about recent Australian monetary policy: it has been asserted by some commentators that over significant periods since January 1985, the Reserve Bank has reoriented monetary policy toward a de facto exchange rate target zone.

Hogan and Nguyen (1987) summarise a series of historical episodes where some form of exchange rate targeting seems to have occurred. Following a fall in the Australian dollar during 1985, short term interest rates had increased to record high levels by the end of 1985; some market commentators formed a perception that the Government had embarked at that time on a defence of the Australian dollar in order to put a floor of around US 70c under the currency. The Reserve Bank appears to have intervened in the foreign exchange market, establishing a floor under the Australian dollar in both July 1986 and January 1987. It has also been suggested that, in mid-1987, the Reserve Bank appeared to be targeting the tradeweighted index.

Over this period, the Reserve Bank strenuously denied that it was following any form of exchange rate targeting. A specific denial was even made in the 1986 Reserve Bank Annual Report which stated: "Commentators sometimes profess to know or to judge that the Bank does in fact, have a target for some item in the 'checklist' e.g. the exchange rate. Although exchange rates (and the balance of payments) are important indicators for deciding policy, the Bank has not sought to establish any particular exchange rate or to go past its

well-documented practice of testing and smoothing transactions in the market" (Reserve Bank of Australia, 1986, p.12). However, discussion in this chapter suggests that adjustment of interest rates to offset large movements in the exchange rate (or some form of exchange rate/interest rate targeting) would be particularly appropriate if large shocks were coming from the financial sector. Studies by officers from the Reserve Bank show that there were large financial sector shocks during the relevant period. There is, therefore, evidence that some form of interest rate/exchange rate targeting could have been appropriate for an optimal check-list over the relevant period.

Interpretation of the analysis presented in the earlier sections of this chapter also shows that the choice of an appropriate check-list will depend on the policy maker's assessment of structure of the economy and the source of unexpected shocks in the economy. Accordingly, if the policy maker's assessment of the state of the world should change then the form of the check-list is likely to change. Another possible reason for policy revisions, canvassed above, is that the Government may have adopted a time-inconsistent policy: the Government may have chosen to adopt a policy which it has subsequently had an incentive to renege upon; in other words, an optimal outcome for the Government may have been achieved by tricking individuals into making decisions that they would not otherwise have made.

Examination of economic events since the introduction of the check-list approach to monetary policy in January 1985 shows that there have been significant uncertainties generated by: financial de-regulation, movements in the terms of trade, variability in market sentiment concerning the exchange rate and the Stock Market Crash of October 1987. Different issues have tended to dominate policy settings at different times. On occasions,

7 Recent tests for stability of the Australian demand for money equation (Stevens, Thorp and Anderson, 1987, Blundell-Wignall and Thorp, 1987) provide evidence that previously robust money demand relationships tended to break down in the 1980s.
different stances for monetary policy, than were announced at budget time, have had to be
adopted. Such revisions seem to be the consequence of unexpected changes in the monetary
authority’s assessment of the state of the world rather than a conscious attempt by the
monetary authority to mislead market participants (as would be the case with the adoption of
a time-inconsistent policy).

An alternative to the check-list approach would be the definition and targeting of an
appropriate monetary aggregate. The appropriate definition of such an aggregate would
depend on the source of shocks in the economy. If the source of shocks changed then so
would the weightings given to different components in the monetary aggregate. Clearly,
definition and targeting of an appropriate monetary aggregate is another approach that could
be adopted in Australia. Such an approach could only be adopted if the degree of volatility
and uncertainty currently apparent in the financial sector could be significantly reduced.

9. GUIDE TO THEORETICAL LITERATURE

In this chapter, the check-list has been represented as an optimal interest rate rule. On
the other hand, the theoretical literature has tended to examine optimal money supply rules
rather than optimal interest rate rules. In the theoretical framework presented above, the two
approaches are equivalent since the interest rate rule given by equation (2) can be re-written
in the form of a money supply rule as follows:

\[ M_t = \frac{\mu_0}{\mu_1} + \frac{1}{\mu_1} R_t - \frac{\mu_2}{\mu_1} P_{t-1} \]

(13)

Accordingly, this guide to the theoretical literature can be restricted to a discussion of
studies on optimal money supply rules.

Optimal monetary policy rules in a stochastic framework were first analysed in a
seminal paper by Poole (1970). He assumed that the monetary authorities may operate
through either interest rate changes or money supply changes and showed that the optimal
money supply rule depends on the magnitude and source of shocks. The interpretation of
the check-list presented in Section 3 of this paper was first contained in Stemp (1987). That
interpretation has subsequently been developed by Jonson (1987) and Stemp (1988b). In
particular, Stemp (1988b) analysed the check-list approach in an open economy framework
and discussed many of the policy implications contained in Section 7. Fair (1988) uses
stochastic simulation techniques to examine the optimal choice of monetary policy in a large
scale econometric model of the US economy.

The implications of different expectations scenarios and the dissemination of
information between public and private sector agents has been extensively examined in the
theoretical literature. Typically, the Poole-type results are obtained when there is an
asymmetry of information between the public and private sector (Barro, 1976; Woglom,
1979; Turnovsky, 1980; Canzoneri, Henderson and Rogoff, 1983; Dotsey and King,
1986). By employing its information advantage over private agents the monetary authority
is then able to move towards achieving its policy objectives. This conclusion breaks down
in some models where all market expectations are formed rationally and where no variables
evolve sluggishly (Sargent and Wallace, 1975; Dotsey and King, 1983). The robustness of
optimal money supply rules under different expectations scenarios has been examined by
Stemp (1988a).

Optimal money supply rules have also been examined in a stochastic framework
where shocks persist for more than one period (Hegji, 1986; Daniel, 1986). While there are
some changes to the optimal money supply rule under sustained shocks, the optimal policy
response will, in general, continue to involve the Poole-type results.

Analysis of monetary policy in a stochastic framework is usually determined using an
objective criterion introduced by Barro (1976), which minimises the squared deviations of
output (and/or prices) about some full information level. An alternative objective criterion,
discussed by Sargent and Wallace (1976), minimises squared deviations about some pre-
planned path. Under this criterion, previous divergence from the pre-announced path must be incorporated in current period policy, so the optimal money supply rule will include feedback terms involving lagged variables.

Stemp (1989) examines the implications of an asymmetric objective criterion which employs a loss function giving different weight to deviations about the pre-planned path depending on the sign of the deviation. He shows that, in many cases, optimal money supply rules, which have similar properties to those derived under the symmetric objective criterion will be optimal under the asymmetric objective criterion.

Major arguments against activist monetary policy were first raised by Friedman (1953, 1969) leading into the Rules versus Discretion debate of the 1960's and 1970's. The main issues in this debate are summarised in Argy (1988).


The choice of alternative monetary aggregates has been examined by Barnett (1982) and Roper and Turnovsky (1980), among others. Horne and Monadjemi (1985) extend this approach to Australia.

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