Financial deregulation and macroeconomic adjustment: the case of Australia

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and
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ABSTRACT

During the 1980s, Australia moved from having one of the most heavily controlled banking and financial sectors to having one of the least controlled. The reasons for such an extensive and swift change in the operation of the financial sector are discussed, as well as the implications for the operation of monetary policy. These developments have had major implications for the way in which exogenous disturbances are transmitted to the macroeconomy, affecting financial variables immediately and, over a more prolonged period, non-financial variables. Considerable debate has taken place in Australia as to the beneficial consequences of such extensive deregulation for that economy, which is characterised as being very open but small by world standards. As a contribution to this debate the paper presents a theoretical macroeconomic framework applicable to such a small open economy, focusing upon the importance and role of the financial sector in the transmission of exogenous shocks to the macroeconomy. Two versions of the model are presented: that where the financial sector is heavily regulated (pre-1983 in Australia) and that where it is deregulated (post 1983). Comparisons are made between the adjustment of the macroeconomy for each of these versions, for a variety of exogenous shocks using a numerical simulation procedure. The results derived suggest that in general macroeconomic adjustment tends to be less turbulent, and steady-state equilibrium achieved more rapidly, with a deregulated financial sector, lending support to the viewpoint that such a policy has assisted the economy in adjusting to the turbulent developments of the 1980s and early 1990s.
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INTRODUCTION

During the 1980s, Australia moved from having one of the most heavily controlled banking and financial systems in the world to having one of the least controlled. This development occurred very rapidly and affected the determination of such crucial financial variables as the interest rate and the exchange rate, and resulted in the virtual elimination of controls over capital flows and the entrance of a number of foreign banks to provide competition for the domestic banks. Whilst financial market deregulation was part of a world-wide process which Australia would have found hard to resist, there were a number of additional reasons including pressure from domestic private sector banks as well as the government itself. Such developments not only had a major impact upon the operation of the financial sector (such as the extent and nature of the link between borrowers and lenders, changes in the relative significance of banks to non bank financial institutions, effects upon liability management etc.), but also upon the operation and implementation of monetary policy and the resulting wider implications for the Australian economy as a whole.

The main objective of this paper is to examine the wider macroeconomic implications of financial deregulation for a small open economy such as Australia’s. In particular, the paper contrasts the adjustment process in an economy with financial deregulation with that where the financial sector is heavily regulated, arising from a variety of exogenous disturbances.

The paper proceeds as follows. In the following section, a brief overview of developments in Australia’s financial sector during the 1980s and early 1990s is presented. The key financial variables affected are identified and their role in transmitting the effects of exogenous disturbances to the broader macroeconomy
emphasised. The major changes in the financial sector which Australia has experienced are then incorporated within the context of a theoretical macroeconomic model. Two possible financial market circumstances are emphasised, that where it is heavily regulated and that where it is completed deregulated. A numerical simulation analysis of the model is then conducted for a variety of disturbances assuming a regulated (pre 1982) or deregulated (post 1982) financial sector, and the resulting adjustment process compared. Some important conclusions can be derived in regard to the appropriateness or otherwise of the deregulatory measures implemented in Australia during the 1980s. A summary of the major conclusions derivable from this paper is then presented.

DEREGULATION OF AUSTRALIA'S FINANCIAL SECTOR — AN OVERVIEW OF DEVELOPMENTS

Until the end of the 1970s the monetary authorities, in the conduct of monetary policy, exercised strict control over the financial institutions and particularly so that of the banks. On the other hand the authorities did not severely restrict the activities of non bank financial institutions such as finance companies, building societies, credit unions and so on. This asymmetry of regulation on banks and non bank financial institutions resulted in the decreased significance of the regulated banks, undermining the effectiveness of monetary policy and enhancing the significance of non bank financial institutions. Such a development was also undermining the efficiency of resource allocation because of the restrictions on competition between financial institutions. The Australian banks were beginning to believe that on balance the benefits from being regulated, such as the monopoly on dealings in the foreign exchange market, were rapidly being offset by the loss of competitiveness induced by them. In addition the government
was beginning to question the effectiveness of the regulations for the conduct of its monetary policy.

The Australian economy experienced prosperity during the 1960s, but the 1970s saw a deteriorating performance on a number of fronts which contributed to the pressure for financial deregulation. Harper (1986) provides a number of reasons behind the pressure for financial deregulation during the 1970s

1. the onset of high and variable rates of inflation contributed to increased pressure from savers for higher returns which the banks, because of controls on their deposit interest rates, were unable to respond competitively to. The non bank financial institutions were able to offer more attractive interest rates to depositors and hence gained business from the banks,

2. there was a substantial increase in the Public Sector Borrowing Requirement which resulted in the government becoming a major competitor for private sector funds, which in turn put upward pressure on interest rates as the government was required to offer attractive returns on its liabilities (e.g. Australian Savings Bonds). Other funding could be achieved by the government selling bonds to the banks, which they were obliged to purchase and usually at an unattractive yield.

3. advances in communications and data processing technology meant that the non bank financial institutions could provide equivalent services to that of the banks. The banks were finding it difficult to implement such technology because of agreements with the powerful banking unions,

4. the development of strong links between domestic and international financial markets, particularly as a result of foreign bank financing of developments in Australia’s resources sector (arising from the resources boom of the late 1970s and early 1980s). The effects of the development of international financial markets and financial innovation were
permeating into Australian financial markets, and such increased capital mobility is identified by Harper as being one of the key factors leading to the deregulation of the Australian financial sector.

These developments contributed to both private and public sector pressure for financial deregulation. Private sector pressure came from the banks who were losing market share to the non-bank financial institutions and were finding that their profits were declining. Such disintermediation had wider ramifications than its inefficiency effects upon resource allocation in the financial sector, as it was also contributing to inefficiencies in other sectors. Public sector pressure came from the government questioning the relevance of the regulatory controls for the effective implementation of monetary policy, which were focused upon the banks (trading banks) who were losing market share. The money supply control policy adopted in Australia in 1976 (conditional money targeting) to replace the traditional Keynesian type monetary policy, was not conducted effectively under the regulated financial system.

Against this background the Liberal-National party coalition government established the Committee of Inquiry into the Australian Financial System (the Campbell committee) in January 1979. The committee’s final report was tabled in the House of Representatives in November 1981, however by then a number of deregulatory measures had already been implemented. Since then both Liberal and Labor governments have rapidly advanced the deregulation of the Australian financial system. The financial deregulatory measures have focused upon three major areas; the banking sector, the government securities market and the foreign exchange market.

The expected benefits arising from deregulation of the financial system, can be summarised as follows:
(a) **Greater competitiveness within the banking industry**

The major deregulatory measures relating to banking activities which have been implemented since 1979, relate to that of interest rates, maturity of deposits, bank portfolios and entry to banking (both domestic and foreign). It was hoped that such measures would stimulate competition leading to a better variety and quality of service to customers and greater access to funds for housing, small business and, in particular, for the restructuring and re-equipment of Australian industry.

(b) **Greater effectiveness in the conduct of monetary policy**

The focus of monetary policy was placed upon the price of money (i.e. the interest rate) rather than its quantity. This was formally recognised in the abolition of conditional targeting in January 1995, to be replaced by the "checklist approach". Rather than attempting to control credit creation by banks alone, as under the old regulations, manipulating the interest rate would affect the cost of borrowing across the whole spectrum of financial intermediaries, and should be more effective in achieving the government's monetary policy objectives.

(c) **Greater competitiveness and efficiency in the operation of the financial system**

The granting of licences to 16 foreign banks in 1985 and the licensing of new domestic retail banks provided competition to the existing banks. Such developments provided Australian residents with greater access to world-wide financial services, and hence a wider range of cheaper financial services. Greater efficiency of the financial system would contribute to efficiency gains for virtually all industries, because: (1) their productivity is affected by the efficiency with which the financial system
allocates funds, and (2) they would benefit from a more efficient payments system.

(d) The marketing of government securities

The was to be conducted on a free market tender system rather than the previous tap system. It was expected to better assist, and ensure the necessary funding of, public sector deficits.

(e) Alleviate external imbalances and instability

The floating of the exchange rate, the removal of exchange controls and the entry of new foreign exchange dealers was expected to assist in the correction of Australia’s current account imbalance, stop the destabilising flows of speculative foreign and domestic funds, stabilise the exchange rate and contribute to the re-structuring of the Australian economy. In the 1970s and early part of the 1980s the need for, and effectiveness of, exchange controls came to be widely questioned. In addition the monetary authorities recognised the conflict between the money supply control policy and the foreign exchange policy. The first big step towards liberalisation of the foreign exchange market was in October 1983 when the Reserve Bank of Australia phased out direct involvement in the forward exchange market. The second big step was the government’s decision to float the Australian dollar and to abolish a major part of the then existing exchange controls in December 1983. The third big step was in June 1984 when 40 companies were authorised to deal in foreign exchange on the same terms as bank dealers. These three steps towards the liberalisation of the foreign exchange market made the Australian foreign exchange market wider, deeper and more flexible and increased the freedom of capital flows in to and out of Australia.
These benefits were expected to make the management of the total financial system more effective and to promote financial stability and equity (through the abolition of discriminatory controls), and to help finance the restructuring of the Australian economy away from its traditional reliance on primary commodity exports towards a more export oriented and import substituting manufacturing base.

According to Valentine (1991) the Campbell Committee's expectations about these were borne out by the events of the 1980s. These included its view that: monetary policy would become more effective; short term interest rate fluctuations would be much reduced; the competitiveness of banking would be increased; and credit rationing would disappear. However he also pointed out other developments which the committee did not anticipate: the slow rate of adjustment to deregulation; the extent to which a deficiency of domestic savings (caused partly by the interaction of inflation and the taxation system) would lead to an increase in offshore financing, contributing to the deterioration of the current account deficit; the very rapid expansion of credit and asset prices in the late 1980s; the very high level of losses from bad debts suffered by banks at the end of the 1980s.

Despite the relatively positive assessment of deregulation provided by Valentine (1990), other commentators have been more circumspect. For example, Tobin has expressed some doubt about the benefits of deregulation, claiming that several problems may arise from a deregulated financial system: higher turnover of claims relative to underlying quantity of real investment; much larger movements in financial prices than can be justified by changes in economic 'fundamentals'; rising resource cost with the cream of youth attracted into moving paper and paper prices.

Some authors have also expressed the viewpoint that deregulation has undesirable implications for stability, that it has increased instability and uncertainty in the economy, particularly
with regard to the exchange rate and interest rates, and encouraged high levels of risk taking by financial organisations. That is, concerns about the stability of domestic financial systems or industries relate to fears that declining profit margins resulting from increased competition from both domestic and international operators may stimulate greater risk taking, especially as a result of diversification into new areas of operation which are likely to require different management skills or to induce managerial diseconomies.

The application of monetary policy in such a deregulated financial system is very different from that in the pre-deregulation era. Previously the main channels of monetary policy transmission related to operations on bank liquidity in order to affect bank lending (i.e. to control the quantity of bank credit available) and to variations in the controlled levels of bank interest rates also resulting in credit rationing. In the post-deregulation era the two main channels of the transmission mechanism are the interest rate and the exchange rate. The Reserve Bank of Australia (RBA) can influence the interest rate through its buying and selling of government securities. It can create a shortage of cash in the system through bond sales which quickly affects the official cash rate. All other interest rates are related to this and will ultimately be affected in a similar direction. The higher interest rates will permeate throughout the whole financial system reducing the demand for money. The freeing of the exchange implies that such developments in the interest rate will quickly affect it and contribute another important route through which the monetary transmission mechanism operates.

A number of important implications for the operation of macroeconomic policy arise from this. A deliberately engineered contraction of cash by the authorities will result in a rise in interest rates, and this will quickly lead to an inflow of capital which will appreciate the exchange rate. Such developments will
result in reduced aggregate demand and downward pressure on inflation. However it has adverse consequences for the current account, which for Australia has been a major constraint on the operation of macroeconomic policy.

During the latter part of the 1980s Australia experienced considerable demand pressure, partly due to the credit boom initiated by financial deregulation itself, and the major thrust of macroeconomic policy to constrain it was through monetary policy. This resulted in a tightening of monetary policy and a rise in interest rates. With so many channels through which a tightening of monetary policy can flow to innumerable financial transactions, it was felt that the tightening of monetary policy would be felt more quickly and pervasively throughout the whole system in the post deregulatory era than before. However under the new system credit is usually available at some price to all potential borrowers, reducing the speed with which monetary policy affected aggregate demand. Hence a much greater rise in interest rates (or appreciation of the exchange rate) is needed in order to achieve a given effect in restraining demand (i.e. if demand for credit is price inelastic). This may account for the unexpected strength of aggregate demand in 1988/89 in the face of a progressive tightening of monetary policy, with several increases in the level of interest rates. The stronger exchange rate contributed to difficulties for export and import competing producers and considerable difficulties for a traditional Achilles heel of the Australian economy, the current account deficit.

EXOGENOUS SHOCKS AND MACROECONOMIC ADJUSTMENT WITH A REGULATED AND DEREGULATED FINANCIAL SECTOR

In this section a theoretical macroeconomic framework is developed, in order to identify differences in the adjustment process arising from exogenous shocks in the context of an
economy with and without a regulated financial sector. The starting point for this framework is the seminal work of Dornbusch (1976). This assumes a deterministic framework in which economic agents possess rational expectations, and is equivalent to the case of perfect foresight. Interestingly, and importantly, financial markets are assumed to be in continual equilibrium because of the ability of financial variables to adjust instantaneously, whilst non financial markets can remain in disequilibrium throughout the adjustment process because of the presumed stickiness of prices. Focus in the model is placed solely upon the demand side, and a small open economy with perfect capital mobility is assumed.

While this theoretical framework provides a useful starting point for the development of a model for Australia, it must be amended in a number of important ways in order for it to be representative of an economy such as Australia’s. The Dornbusch model focuses upon the short run and does not explicitly consider the role of the current account during the adjustment process. The model presented here emphasises the long-run nature of the adjustment process, in which the need for long-run equilibrium in the current account is explicitly incorporated as well as the wealth effects from the flow of foreign asset stock holdings which arise from current account developments. Secondly the model focuses upon both aggregate demand and supply. In the case of the latter output is not restricted to remaining at some natural level of output, appropriate in the context of a short run framework, rather output supply can vary through the process of capital stock accumulation. This again highlights the long-run nature of the adjustment process emphasised in the following analysis. Other extensions include a q theory of investment, emphasis on the important role of wealth effects during the adjustment process, the incorporation of additional financial assets and the introduction of both sticky price and quantity
adjustment of non financial variables.

Model equations

**Aggregate demand and supply**

1. \( y = cP + iP + g + t \) (Aggregate demand)
2. \( cP = \beta_1 y + \beta_2 wP \) (Consumption expenditure)
3. \( iP = k + \theta k \) (Investment expenditure)
4. \( k = \eta q \) (Net investment)
5. \( g = g \) (Government expenditure)
6. \( s = \lambda_1 k - \lambda_2 (w - p) \) (Aggregate supply)

**Wage/price nexus**

7. \( p = \alpha w + (1 - \alpha)(e + p^*) \) (Consumer price level)
8. \( w = \phi_1 + \phi_2 (y - s) + \phi_3 \pi \) (Augmented Phillips curve)
9. \( \pi = \pi \) (Inflationary expectations)

**Assets market**

10. \( m = p + \sigma_1 y - \sigma_2 r + \sigma_3 wP \) (Money market (LM))
11(a) \( e = r - r^* \) (Uncovered interest parity)
11(b) \( m = dce + \xi (r - r^* + \dot{f}) \) (Balance of payments)
12. \( R = \varepsilon_1 + \varepsilon_2 y - \varepsilon_3 k \) (Real profit)
13. \( q = \delta_3^{-1} (q - \delta_1 R + \delta_2 (r - \pi)) \) (Non-money financial assets)
14. \( wP = \gamma_1 (f + e - p) + \gamma_2 (m - p) + \gamma_3 (k + q) \) (Real wealth)
External sector

15. \[
    t = \mu_1(e + p^* - p) - \mu_2y + \mu_3y^*
    \quad \text{(Trade balance)}
\]

16. \[
    \dot{f} = \psi_1t + \psi_2r^*f - (1 - \psi_2)(e - p)
    \quad \text{(Current account)}
\]

Definitions

17. \[
    c = e - w
    \quad \text{(Real exchange rate)}
\]

18. \[
    \ell = m - w
    \quad \text{(Real money balances)}
\]

A summary of the meaning for each of these variables is contained in Table 1. Overall equilibrium in the model requires equilibrium in the product and assets markets, as well as for the external sector. The product market equations are discussed first of all.

Aggregate expenditure, or demand, is given by equation 1, which consists of private consumption and investment expenditure, government spending and the trade balance. Domestic output can be consumed domestically or exported and is assumed to be an imperfect substitute for the overseas produced equivalent.

Private consumption expenditure, equation 2, depends upon real income and private sector real wealth. Gross private investment expenditure, equation 3, consists of net investment plus replacement investment, where \( \theta \) represents the rate of depreciation of the existing physical capital stock. Equation 4 gives the net investment equation which is based upon the capital stock adjustment principle, in which the capital stock adjusts gradually to its new optimal level. Assuming costs of adjustment any gap between the desired capital stock and the actual capital stock is closed gradually by \( \eta \) per period. It is assumed that net investment adjusts positively to Tobin's q ratio, which is the ratio of the market valuation of the capital stock to its replacement cost. A rise in the q ratio creates an incentive to invest. Equation 5 shows that government expenditure is exogenously determined.
Aggregate supply, equation 6, is endogenously determined, being positively related to the physical capital stock and negatively related to the real wage. With the capital stock variable over the long run, capacity output is similarly variable even with a fixed real wage.

The wage-price nexus is given by equations 7–9, with emphasis placed upon the sticky, or slow, adjustment of nominal wages rather than prices unlike the Dornbusch model. Equation 7 indicates that the consumer price level is a weighted average of domestic nominal wages, and the domestic currency cost of the overseas imported equivalent of the domestic product. The adjustment of nominal wages is given by equation 8, a simple expectations augmented Phillips curve. Nominal wage adjustment arises from three possible sources: developments in wage fixing or bargaining processes, demand pressure in the labour market as reflected in the demand for output relative to its available supply and inflationary expectations. The determination of the latter is shown by equation 9, that is upon the domestic monetary growth rate.

Asset market equilibrium is contained in equations 10–14. The model implicitly contains four financial assets — money and three non money. The latter consists of domestic and foreign bonds, and domestic equities which represent claims to the ownership of the domestic capital stock. Only domestic residents can hold domestic bonds and equities. From the perspective of domestic residents the three non money financial assets are assumed to be perfect substitutes where there is a flexible exchange rate and perfect capital mobility (a financially deregulated economy), and arbitrage between them implies the same expected (instantaneous) real rate of return. This real rate of return must also be consistent with the proportion of money which economic agents hold in their portfolio of financial assets. However
Table 1  Summary of variables

\( y \) – output demand (log)  
\( cP \) – consumption expenditure (log)  
\( iP \) – investment expenditure (log)  
\( g \) – government expenditure (log)  
\( t \) – trade balance (log)  
\( wP \) – private sector real wealth (log)  
\( k \) – capital stock (log)  
\( q \) – Tobin’s q ratio (log)  
\( s \) – output supply (log)  
\( w \) – nominal wage (log)  
\( p \) – consumer price level (log)  
\( e \) – nominal exchange rate (log)  
\( p^* \) – world price of the imported good (log)  
\( \pi \) – inflationary expectations (log)  
\( m \) – nominal money stock (log)  
\( r \) – domestic nominal interest rate  
\( r^* \) – world interest rate  
\( R \) – real profit on capital services (log)  
\( f \) – foreign asset stock (log)  
\( y^* \) – world real income (log)  
\( c \) – real exchange rate (log)  
\( \ell \) – real money balances (log)  

A dot (·) above a variable signifies its rate of change.

where the exchange rate is controlled or fixed and there is imperfect capital mobility (a financially regulated economy), arbitrage will ensure the same instantaneous real rate of return on domestic financial assets but this can vary for some period of time from that on the foreign financial asset.

Portfolio balance is characterised by a conventional LM equation, equation 10, incorporating domestic real wealth.
Demand for money balances being a function of the price level, real income (transactions demand), the domestic nominal interest rate and domestic real wealth (asset demand).

Since domestic and foreign bonds are regarded as perfect substitutes in the financially deregulated economy, and from the perspective of domestic residents there is perfect capital mobility, such capital flows need to take into consideration expected changes in the exchange rate. Expected currency yields must be equalised and this is reflected in the uncovered interest parity condition given by equation 11(a). Deviations of the domestic nominal interest rate from the world nominal interest rate results in an instantaneous adjustment of the exchange rate, leading to offsetting expectations regarding the future adjustment of the nominal exchange rate. However in the financially regulated economy the exchange rate cannot change, and this will contribute to balance of payments surpluses or deficits with a resulting impact upon the domestic money stock. Hence in this case the appropriate equation is that of 11(b).

Equation 12 identifies the real return on capital services, which depends positively upon real income and negatively upon the capital stock in line with declining marginal productivity.

Equation 13 encapsulates equilibrium in financial markets. The return on all non money financial assets is assumed to be maintained continuously through arbitrage in the case of a financially deregulated economy, while in the case of the regulated financial economy only the returns on domestic financial assets are assumed to be equated continuously. Focus is placed in the following exposition upon the case of a financially deregulated economy where the expected return on equities, domestic bonds and foreign bonds must hold continuously. The expected real return on holding equities is given by:

\[ q' q + R / q \]
The expected return on equities depends upon the expected capital gain/loss from holding equity capital \((q/q)\) plus the real profit stream derived from the capital service \(R\) relative to \(q\).

Continual, and instantaneous, arbitrage between domestic bonds, foreign bonds and equity capital implies:

\[ \frac{q}{q} + \frac{R}{q} = r - \pi = r^* + \epsilon - \pi \]

Ignoring \(r^* + \epsilon - \pi\), since this must be equivalent to \(r - \pi\), and taking a log linear approximation, we can solve for \(q\):

\[ q = \delta_1 R - \delta_2 (r - \pi) + \delta_3 q \]

or re-arranging and solving for \(q\), we can obtain equation 13.

Real domestic private sector wealth is given by equation 14. It consists of three components. Firstly that arising from domestic holdings of foreign bonds, expressed in domestic currency terms and deflated by the domestic price level. Secondly holdings of real money balances and finally the real value of the domestic capital stock, owned entirely by agents in the domestic private sector, which consists of a physical quantity and its market valuation.

The external sector consists of the trade balance and the current account. Equation 15 identifies the trade balance, which depends positively upon the real exchange rate, domestic and foreign real income. The trade balance is an important component of the current account, developments in which are given by equation 16:

\[ f + e - p = \psi_1 t + \psi_2 (r^* f + e - p) \]

Re-arranging and expressing this in terms of changes in foreign bond holdings, we can obtain equation 16. This indicates that the accumulation of foreign bonds (or asset stocks), as reflected in the current account balance, depends upon the trade balance and real foreign interest income. In long-run steady state the current account balance must be zero, otherwise further wealth effects will arise requiring further macroeconomic adjustment.
Finally equations 17 and 18 define two variables used extensively throughout the paper, the real exchange rate (the nominal exchange rate deflated by domestic nominal wages) and real money balances (the nominal money stock deflated by domestic nominal wages) respectively. Such definitions are useful for expositional purposes.

In the following section the model is utilised to conduct a comparison of the adjustment process arising from a number of external shocks, assuming either a regulated or deregulated financial system.

NUMERICAL SIMULATION OF THE MODEL

In this section the model is utilised to conduct a number of numerical simulations. Its size and complexity prevents the derivation of analytically unambiguous results, hence resort to such a procedure is essential. The numerical results derived focus upon the following assumed exogenous shocks:

(a) an unanticipated and immediately implemented increase in the money stock by 1%,
(b) an unanticipated and immediately implemented increase in government spending by 1%,
(c) an unanticipated increase in the world price of the imported good by (1%).

For each shock, a comparison is made between the adjustment process arising in an economy with a deregulated and regulated financial sector. A regulated financial sector is assumed for present purposes to be one in which there is substantial control exercised over international capital mobility and the nominal exchange rate is effectively fixed. A deregulated financial sector is assumed to be one in which there is perfect capital mobility and the nominal exchange rate is perfectly flexible.
Steady state properties of the model

The model possesses a number of analytically unambiguous properties for its steady-state solution, which are as follows:
\[ w = m \text{ (regulated)} = e \text{ (deregulated)} = q = k = f = 0 \]
\[ r = r^* + m = R \]
\[ y = s \]
\[ q = 0 \]

However, the steady-state properties of the remaining variables of the model for the three specified shocks need to be identified through a numerical solution. Before such a numerical solution can be derived, identification of the numerical values of the parameters of the model need to be identified. The parameter values used are summarised in Table 2. Table 3 summarises the implications for the steady-state values of the key macroeconomic variables of the model, arising from each of the three exogenous shocks. Whilst these are very similar irrespective of whether the economy has a regulated or deregulated financial sector, the adjustment process to steady state, which is of particular interest from a policy perspective, is very different.

Dynamics of adjustment

The model must exhibit dynamic properties which are consistent with its underlying behavioural assumptions, thereby ensuring in the context of this rational expectation model a stable saddlepath consistent with the attainment of long-run equilibrium. In the deregulated version of the model there are five dynamic endogenous control variables — \( w \) (nominal wages), \( f \) (foreign asset stock), \( k \) (capital stock), \( q \) (Tobin’s q ratio) and \( e \) (nominal exchange rate), three of which \( w, f, \) and \( k \) are assumed to be predetermined non jump variables whilst \( q \) and \( e \), being
determined in financial markets, are non predetermined jump variables. In the regulated version of the model there are also assumed to be five dynamic endogenous control variables — w (nominal wages), f (foreign asset stock), k (capital stock), m (nominal money stock) and q (Tobin’s q ratio). The first four are assumed to be predetermined non jump variables, while q is the sole non-predicted non jump variable.

Table 2 Parameter Values

| $\beta_1 = 0.8$ | $\delta_2 = 0.5$ |
| $\beta_2 = 0.1$ | $\delta_3 = 0.5$ |
| $\theta = 0.2$ | $\gamma_1 = 1.0$ |
| $\eta = 0.7$ | $\gamma_2 = 1.0$ |
| $\lambda_1 = 0.5$ | $\gamma_3 = 1.0$ |
| $\lambda_2 = 0.5$ | $\mu_1 = 0.5$ |
| $\alpha = 0.7$ | $\mu_2 = 0.5$ |
| $\phi_2 = 0.7$ | $\mu_3 = 0.5$ |
| $\phi_3 = 1.0$ | $\psi_1 = 1.0$ |
| $\sigma_1 = 1.0$ | $\psi_2 = 1.0$ |
| $\sigma_2 = 0.5$ | $\epsilon_2 = 0.5$ |
| $\sigma_3 = 0.1$ | $\epsilon_3 = 0.5$ |
| $\delta_1 = 0.5$ | $\xi = 0.5$ |

Denoting the control variables by the vector $x$, a linear approximation of the model around its equilibrium solution can be written in the following form

$$\dot{x} = Ax' + Bz$$

where $z$ is a vector of exogenous variables, $x'$ denotes the deviation of $x$ around its equilibrium value and $\dot{x}$ is its time derivative. A and B are parameter matrices.
Table 3  Model steady-state properties (percentage deviation from base value)

<table>
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<tr>
<th>Variable</th>
<th>w</th>
<th>f</th>
<th>k</th>
<th>q</th>
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<td>(a) Money stock increase (1%)</td>
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<td>(b) Govt. spending increase (1%)</td>
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<tr>
<td>deregulated</td>
<td>-3</td>
<td>-40</td>
<td>+3</td>
<td>0</td>
<td>0</td>
<td>+3</td>
<td>+2</td>
<td>-30</td>
<td>0</td>
<td>+10</td>
</tr>
<tr>
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<td>-40</td>
<td>+3</td>
<td>0</td>
<td>0</td>
<td>+3</td>
<td>+2</td>
<td>-30</td>
<td>-7</td>
<td>+10</td>
</tr>
<tr>
<td>(c) World price level increase (1%)</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>deregulated</td>
<td>+0.4</td>
<td>+4.4</td>
<td>-0.3</td>
<td>0</td>
<td>0</td>
<td>-0.3</td>
<td>-0.2</td>
<td>+2.2</td>
<td>+0.1</td>
<td>-2.1</td>
</tr>
<tr>
<td>regulated</td>
<td>+2.1</td>
<td>+4.4</td>
<td>-0.3</td>
<td>0</td>
<td>0</td>
<td>-0.3</td>
<td>-0.2</td>
<td>+2.2</td>
<td>+1.8</td>
<td>-2.1</td>
</tr>
</tbody>
</table>

The stability of the system depends only on the properties of the state matrix A. From matrix A the characteristic equation of the system can be obtained, and from this the characteristic roots (or eigenvalues) of the system derived. The signs of these will determine the stability of the system. In the deregulated version of the model, with three predetermined and two non predetermined
control variables, the system is required to produce three negative (stable) roots and two positive (unstable) roots for a stable saddlepath solution to long-run steady state. For the regulated version of the model, with four predetermined and one non predetermined variables the system needs to produce four negative and one positive root for model stability to be achieved. The computation of the signs of the system’s roots cannot be identified unambiguously by algebraic means, instead they are computed numerically. The parameter values outlined in Table 1 ensure appropriate signs of the roots, and the simulation results for the previously mentioned shocks are now briefly outlined.

Simulation results

The simulation results for the three exogenous shocks for either version of the model are summarised in Figures 1, 2 and 3 respectively, where focus is placed upon an analysis of the dynamic adjustment process of six key macroeconomic variables — aggregate supply (production), capital stock, price level, real exchange rate, trade balance and the foreign asset stock (current account).

Money supply shock (Figure 1)

A money supply shock produces important differences in the adjustment of the major macroeconomic variables to long-run steady state. As can be observed from Table 3, however, there is little difference in the long-run steady-state results, with the exceptions being that of wage and price level adjustment. In the financially regulated economy any increase in the money supply is offset by developments in the balance of payments, resulting in no overall change in the money stock in steady state. As a result there is no overall change in the macro variables in steady state. In
Figure 1. Exogenous increase in the Money Supply (1%)

Aggregate supply

Capital stock

Price level

Real exchange rate

--- Deregulated --- Regulated
the deregulated version there is also no overall effect upon real variables, hence there is money neutrality, although the money supply itself has increased permanently by 1%. The only variables
to be affected are nominal variables such as nominal wages (not shown) and the price level, which increase equi-proportionally to the increase in the money stock.

Despite the similarity in the steady-state results for both cases, the dynamics of adjustment are noticeably different. Taking domestic developments first of all, a monetary disturbance has a larger initial impact upon production where there is a regulated financial sector. Two factors contribute to such a development on the supply (production) side — the real wage and capital stock accumulation. Initially the real wage increases in the regulated economy, falling thereafter; however, it is the larger investment and hence accumulation of capital stock which is the major factor. In the financially deregulated economy the real wage initially falls, since the price level rises more than nominal wages due to the depreciation of the nominal exchange rate (not shown). Such a development stimulates aggregate supply (production), however the increase in investment is much smaller and likewise the increase in aggregate supply. Overall, a money supply shock is met with greater stability in the adjustment of output or aggregate supply in a financially deregulated economy, however there is inflation and the price level rises permanently.

In terms of external developments some noticeable differences are again apparent. Initially the real exchange rate depreciates in the deregulated case but appreciates in the regulated case, although in the latter this is quickly reversed. Thereafter, until steady state, the real exchange rate depreciates in both cases to be below its base level. Developments in domestic real income and the real exchange rate exert the major influence over the trade balance. In both cases this initially deteriorates and then improves throughout the remainder of the adjustment process. The improvement in the trade balance is most noticeable in the regulated economy case, primarily due to the larger depreciation
of the real exchange rate. Developments in the foreign asset stock, reflecting developments in the current account, arise from those taking place in the trade balance and real exchange rate. The current account deteriorates initially, as reflected by the decline in foreign asset stocks, but improves throughout the remainder of the adjustment process to steady state.

It is quite noticeable that in the context of a financially deregulated economy, an exogenous monetary disturbance exerts a much smaller influence on the macro variables identified, contributing to greater stability of these, with the exception of nominal wages and prices. In addition steady-state equilibrium is achieved more rapidly.

Fiscal expenditure shock (Figure 2)

In this case, an unanticipated and immediately implemented and sustained increase in government spending is assumed. The increase in government spending is assumed to be equivalent to that of a balanced budget increase. From Table 3 in long-run steady state the size of adjustment of the macro variables is the same with the exception of domestic wages and prices, although the change in the real wage is the same. However the dynamics of adjustment is again different, although mainly in terms of magnitude and not in the direction of adjustment. The dynamic adjustment of the domestic macro variables is as follows. Initially aggregate supply (production) decreases for either version of the model, due to an increase in the real wage level, the nominal wage rises by more than the price level, and declining investment as reflected in a lower capital stock. Thereafter production increases due to a fall in the real wage and larger capital stock, these being larger for the deregulated economy case. These developments ensure that production is larger with a deregulated economy during the adjustment process, and that long-run steady state, in
Figure 2. Exogenous increase in the Government Expenditure (1%)

Aggregate supply

Capital stock

Price level

Real exchange rate

--- Deregulated  --- Regulated
which output is 3% higher than its base level, is achieved more rapidly. As in the previous monetary shock case, a fiscal expenditure shock produces a less turbulent and more rapid
adjustment of output to steady state with a deregulated economy. In addition the price level adjustment is considerably dampened.

As for external developments, both versions of the model produce an initial appreciation of the real exchange rate and deterioration of the trade balance. Thereafter for both the real exchange rate depreciates and the trade balance improves. The size of this depreciation from base value is larger for a deregulated economy during the adjustment process and long-run steady state is achieved more rapidly. The current account deteriorates continuously throughout the adjustment process for either version of the model, although the extent of this tends to be larger in a deregulated economy. However steady state equilibrium is achieved more rapidly. In general it can be concluded that for this shock developments in the major macrovariables are less turbulent and steady state is achieved more rapidly in a financially deregulated economy.

World price of imported good shock (Figure 3)

Table 3 indicates that the long-run steady-state adjustment of the macrovariables from their base level will be the same, with the exception of the wage and price level, for either version of the model. The dynamic adjustment process indicates a difference in terms of the magnitude rather than direction of adjustment of the key macroeconomic variables of interest.

Domestic developments suggest an initial increase in aggregate supply for both versions of the model, although such developments tend to be more turbulent for the regulated economy case. Developments in production reflect an initial decline in real wages and increase in investment as reflected in an accumulation of capital stock. Both of which contribute to an expansion in production. Thereafter aggregate supply declines
Figure 3. Exogenous increase in the World Price of the Imported Good (1%)
below its base level throughout the remainder of the adjustment process to steady state, where it is some 0.3% lower than base level. An increase in the real wage level and declining investment contribute to this development. The decline in aggregate supply is
more substantial for a deregulated economy, although long-run steady state is achieved quicker. However domestic price developments tend to be more stable in the deregulated economy.

External developments suggest a similar evolution of the real exchange rate. While it appreciates initially and real income increases, these developments are offset by reduced imports from a higher world price contributing to an improved trade balance. This also contributes to an improvement in domestic holdings of foreign asset stocks arising from an improved current account balance. Thereafter the real exchange rate appreciates further, and despite a decline in production the trade balance deteriorates. Foreign asset stock accumulation continues primarily due to the strengthening of the real exchange rate.

As for the previous exogenous shock disturbances the direction of adjustment of the macro variables is the same for either version of the model. For the world price shock case the decline in production is larger for the deregulated economy, however steady state is achieved much more rapidly. It has the benefit of producing a more stable price level and better current account performance throughout the adjustment process. Hence if a primary objective of policy is to produce a better outcome in terms of these, the financially deregulated economy is the preferred one.

CONCLUSION

This paper has focused upon the macroeconomic adjustment processes arising in a financially deregulated and regulated economy from a number of exogenous shocks. Emphasis was placed upon the experiences arising in a small open economy such as that of Australia, which has engaged in swift and extensive financial deregulation during the 1980s and early 1990s. Whilst the jury is still out in that country regarding the benefits of such
deregulation, the theoretical model presented and simulation results derived therefrom suggest that turbulent developments affecting the money supply, fiscal expenditure and world prices result in potentially better macroeconomic outcomes, in terms of magnitude and speed of adjustment, where such deregulation exists.

This does not deny that there are a number of potentially adverse developments arising from such deregulation as alluded to earlier, however the rapid adjustment of financial variables can contribute to greater flexibility and adaptability of the economy to exogenous disturbances. Despite the criticisms of financial deregulation which have occurred in Australia it would be a brave government indeed which tried at this juncture to reverse this trend.
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