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Jeffrey Carmichael
Bond University

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INFLATION IN AUSTRALIA: PERFORMANCE AND POLICY IN THE 1980s*

Jeffrey Carmichael
Bond University

June 1990

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INFLATION IN AUSTRALIA: PERFORMANCE AND POLICY IN THE 1980s

1. INTRODUCTION

By most counts, Australia's overall economic performance in the 1980s was relatively successful. Following a brief recession in 1982/83, growth of output averaged around 4 percent, well above the OECD average. With the growth of output came growth in employment and a substantial fall in the rate of unemployment. At the microeconomic level there were much needed reforms in financial markets, the tax system and industrial protection and the start of reforms in industrial structure and regulations.

These successes on growth and reform, however, were marred by a substantial deterioration in Australia's trade account and the seeming inability of policy to make any headway against inflation, which remained stubbornly around 7 per cent.

This paper focuses on Australia's experience with inflation. Companion papers at this Conference deal with Australia's external accounts and other aspects of economic performance in the 1980s. Section 2 below outlines the stylized facts and some possible explanations for the experience of the past decade. This Section examines the deterioration, during the 1980s, of Australia's performance on inflation relative to experience in other major countries; it also addresses the role that monetary policy has played in fighting inflation since the floating of the exchange rate in 1983.

Section 3 provides an overview of the costs of inflation. The emphasis in this section is on the microeconomic costs; that is, on the distortions to resource allocation and capital accumulation that arise from inflation and, in particular, from its interaction with the tax system. Section 4 turns to the macroeconomic costs of inflation; namely, those involved in reducing inflation from one sustainable rate to another. Section 5 provides some concluding thoughts.
2. AUSTRALIA'S PERFORMANCE ON INFLATION

A. The Stylized Facts

(a) An overview of the decade

Australia's performance on inflation, as measured by the growth of consumer prices\(^1\) (CPI), shows some similarity over the past two decades with experience in the rest of the world; although the relationship is more noticeable in the seventies than in the eighties. This is shown in Chart 1.

The first major round of oil price rises in late 1973 and early 1974 gave a sharp boost to inflation in all OECD countries. In Australia, the impact was heightened by the wages outbreak of the mid 1970s. By 1978, Australia had joined the rest of the developed world in bringing inflation back under double digits, primarily through traditional demand management.

![Chart 1: Inflation: Australia and OECD](chart1.png)

\(^1\)For Australia, the CPI is adjusted to remove the artificial distortions to inflation created by the introduction of and changes to the national health scheme, Medicare and its predecessor, Medibank.
The second round of oil price rises in late 1979 and 1980 saw inflation again rise sharply. The oil price rise, however, was short lived and the steady decline towards zero inflation among the major OECD countries owed much to the sustained decline in energy prices that followed.

From the start of the 1980s, Australia's experience diverged more markedly from that of its major trading partners. While Japan, West Germany, the United Kingdom and the United States tightened their monetary policies sharply in an effort to permanently lower inflation, Australia faced the inflationary consequences of another outbreak of wage claims. These were led by unions seeking to capitalise on their (ill-founded) perception of a resources boom following from the energy price rises of 1979/80. Not only did inflation rise under the pressure of wage claims, so too did unemployment.

Within the decade, Australia's experience can be divided into three main episodes. The first, extending up to the end of 1984, was one of regaining control over inflation. Following the divergence from the rest of the world early in the decade, inflation declined steadily as the economy went into recession. Even when economic growth resumed strongly in 1983 and 1984, the rate of increase of prices continued to decline. Downward pressure on inflation in this period was exerted by tighter monetary policy and by both the wages pause in the final six months of the Liberal Government in 1982/83, and wage moderation under the new Labour Government's Accord (discussed in more detail in sub-section B below); this included an agreement by unions not to pursue a catch-up of income lost under the preceding pause. By 1985, most of the ground lost to the low-inflation countries of the OECD had been regained.

The second episode can be identified with the sharp decline in energy prices in the mid 1980s. To most developed countries, this presented itself as a windfall downward shock to inflation. To Australia, as a net energy exporter, the impact was, on balance, adverse. While energy prices were not the sole culprit, they contributed to a substantial deterioration of Australia's terms of trade in this period, the result of which was a series of sharp depreciations of the Australian dollar beginning in 1985; these more than offset the reduction in inflation attributable to the original fall in energy prices. With import prices set to rise sharply and wage increases more or
less pre-determined by the centralised wage-setting system, some degree of rebound in inflation was inevitable. This inevitability appears to have been accepted by the community and policy-makers alike. More importantly, both groups accepted the national benefits of quarantining the direct price impact of depreciation from wage rises. This was seen as a necessary condition for preventing the once-off price level rise from becoming entrenched into the on-going rate of inflation.

The clear expectation of the authorities in this period was that the rise in inflation would be temporary. This rise in the short term was seen as publicly acceptable, given the steps that had been taken under the Accord to limit the likelihood of its becoming a rise in the long term. This second phase could be characterised as one in which control over inflation was lost but for what, at the time, seemed to be logically unavoidable and broadly acceptable reasons.

For a while, the temporary rise scenario appeared to be unfolding according to the script. Unfortunately, quarantining the direct impact of depreciation through the Accord was a necessary condition, but not a sufficient condition for ensuring that the rise in inflation would be temporary. Following a brief economic slow-down in 1986, the economy again moved back into top gear, marking the start of the third phase. By mid 1988, hopes of a continuing steady decline in inflation, as projected under the temporary rise scenario of 1985/86, had been dashed. Not only did inflation not continue to fall, the final years of the decade saw a rise back into the seven to eight percent range. This final phase could be characterised as one in which control over inflation was again lost, but for less obviously-respectable reasons. The motivation behind the policy approach is taken up below.

(b) Characteristics and Components of inflation
While Australia's performance on inflation deteriorated relative to that in the major economies in the 1980s, there was a small improvement relative to its own performance in the 1970s. To the extent that the 1970s stands out as the post-war decade of high inflation, this improvement in the 1980s is less than flattering. The average inflation rates for the past three decades are shown in Table 1. Also shown in Table 1 are the standard errors of inflation in each of those decades. Together, these statistics give a picture of both the level and dispersion (or variability) of inflation in the three decades.
As Table 1 shows, while the advent of the 1980s saw a decline of little more than one percentage point from the near double-digit average inflation level of the 1970s, the variability of inflation declined by over half; indeed, the variability of inflation in the 1980s was only a little above that of the 1960s, despite the fact that the average level of inflation was over three times that of the 1960s. If the 1970s can be described as the decade of high inflation, the 1980s can be described as the decade of steady inflation.

**TABLE 1**

<table>
<thead>
<tr>
<th>DECADE</th>
<th>AVERAGE INFLATION (% p.a.)</th>
<th>STANDARD ERROR (% p.a.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960s</td>
<td>2.59</td>
<td>1.47</td>
</tr>
<tr>
<td>1970s</td>
<td>9.75</td>
<td>4.22</td>
</tr>
<tr>
<td>1980s</td>
<td>8.57</td>
<td>1.84</td>
</tr>
</tbody>
</table>

Table 2 shows the means and standard errors of the major components of the Consumer price index over the two decades of the seventies and eighties. While the means are, in general, quite similar, the standard errors vary considerably. Since the variations in the components are not perfectly positively correlated, the aggregate index tends to display greater stability than its components.

**TABLE 2**

<table>
<thead>
<tr>
<th>COMMODITY GROUP</th>
<th>AVERAGE INFLATION (% p.a.)</th>
<th>STANDARD ERROR (% p.a.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI (ALL GOODS)</td>
<td>9.49</td>
<td>3.09</td>
</tr>
<tr>
<td>FOOD</td>
<td>9.24</td>
<td>3.89</td>
</tr>
<tr>
<td>FUEL &amp; ELECTRICITY</td>
<td>9.46</td>
<td>5.94</td>
</tr>
<tr>
<td>KENT</td>
<td>9.71</td>
<td>2.75</td>
</tr>
<tr>
<td>IMPORTS</td>
<td>9.09</td>
<td>8.83</td>
</tr>
</tbody>
</table>
Chart 2 shows the paths of the major components of the Consumer price index against the path of the index itself. As might be expected, the components diverge markedly on occasions. In several periods during the 1970s, food prices moved counter-cyclically, relative to the index, as weather cycles dominated economic cycles. Fuel and electricity tend to follow the general trend but with amplified cycles reflecting the impact of the two oil price rises. Rent also displays slightly exaggerated cycles, reflecting the strong pro-cyclical nature of the real estate market. Import prices are largely determined by movements in the exchange rate and display considerable volatility, particularly after the floating of the exchange rate in 1983.

CHART 2
COMPONENTS OF INFLATION

FOOD

FUEL & ELECTRICITY

RENT

IMPORTS
The fact that certain components of the CPI are more volatile than others has lead some commentators to focus on the index adjusted to exclude some of these components, on the grounds that series adjusted in this way provide better measures of the underlying rate of inflation.

The question of how to measure inflation (and other similar indices of welfare, prices and costs) is a philosophical issue that has occupied some of the greatest minds in economics, without resolution. The problem, of course, is that all individuals do not consume the same bundle of goods and services. Thus, unless all relative prices move in tandem, the measure of inflation relevant to one consumer may be quite different from the measure relevant to another.

Two principles, however, should be observed, regardless of how one tries to resolve the more general index number problem. First, the question at hand should determine the relevant measure. For example, the CPI will be a reasonable approximation for questions involving the overall cost of goods actually consumed within a country; on the other hand, the GDP deflator would be more appropriate for questions involving the overall price of goods produced within a country.

The second principle is that prices at a given point in time should refer to goods and services consumed or produced at that point in time. This requires that asset prices should only be included in general price indices to the extent that they accurately represent the service flow of consumption from the asset in the current period. Interest rates, for example, reflect the price of consumption in the future relative to consumption in the present period. As such, they are more correctly viewed as intertemporal prices and have no place in an index of prices for current consumer goods and services. This sits in curious contrast with the practice in many countries (including Australia since the March quarter of 1987) of including them, typically as a (poor) proxy for the price of housing services.

The impact of including mortgage interest charges on the Australian CPI is shown in Chart 3. In the brief period since their introduction in 1987, mortgage interest charges have increased the measured inflation rate relative to the same series adjusted to remove their impact. This reflects the rise in interest rates over the latter part of the decade. As a general point, it
is ironic that, because tight monetary policy raises interest rates, the inclusion of mortgage charges tends to increase measured inflation in times of deflationary monetary policy and to decrease it when policy is expansionary.

**CHART 3**

**CPI INFLATION: THE IMPACT OF MORTGAGE INTEREST CHARGES**

Chart 4 shows, for the 1970s and 1980s, the path of inflation as measured by the CPI, along with the same index adjusted to exclude the volatile food component. Chart 5 shows the path of inflation, as measured by the CPI, along with the deflator for gross domestic product; the major differences between these two measures are that the deflator includes the price of capital goods produced and replaces import prices with export prices. The noticeable divergence between the CPI and the deflator since the middle of the 1980s reflects the dominance of exchange rates in determining the path of import prices, at a time when exchange-rate induced fluctuations in the

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2Food is often removed from the total CPI on the grounds that it is not only volatile, but also that it is affected by non-economic factors such as weather cycles. In fact, in Australia, food has not shown excessive volatility relative to other components of the CPI. For example, the standard error of food price inflation over the two decades of the seventies and eighties was 3.9, compared with 4.4 for clothing, 3.8 for housing, 4.2 for household equipment, 4.2 for transportation and 5.7 for tobacco and alcohol. Other comparisons are given in Table 2.
domestic prices of exports were being neutralised by fluctuations in world commodity prices.

**CHART 4**
CPI INFLATION: WITH AND WITHOUT FOOD

CHART 5
INFLATION: CPI AND GDP DEFLATOR
As can be seen from these graphs, while the exclusion of particular subcategories of goods alters the behaviour of inflation noticeably in some periods, the overall pattern of experience is little affected. Interestingly, whereas adjusting for the impact of mortgage interest charges tends to lower the underlying rate of inflation towards the end of the 1980s, the focus on domestically produced goods, rather than consumer goods, tends to raise it. On balance, the picture is still one of relatively steady inflation over most of the 1980s.

B. Proximate causes of inflation: the theoretical debate

There has been much disagreement over the "causes" of inflation. There are many good surveys of inflation theory and it is not my intention to replicate these in great detail here\(^5\). What follows is a thumb-nail sketch of the main ideas.

According to historical account, inflation has been a problem since ancient times\(^4\). Long episodes of rising prices are on record, as are periodic interruptions by extensive price declines. Long before economics emerged as a respectable discipline of study, debate and controversy surrounded this phenomenon of variations in the general level of prices. Two main theories emerged in the early days of economic thought. The first, based on the quantity theory of money, saw inflation as primarily a monetary phenomenon. The alternative group of theories saw inflation as a direct response to variations in the costs of production. In crude terms, these competing views can be identified as demand-side and supply-side explanations respectively.

In its strongest form, the quantity theory of money assumed a rigid relationship between the quantity of money demanded and nominal income. With relative prices and real activity assumed given by real demand and supply conditions, and the supply of money assumed to be largely independent of economic conditions, continuing inflation was seen as a direct consequence of monetary expansion. While this line of argument may have had some relevance in particular historical periods, several of its key assumptions are clearly violated in the modern world.

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\(^5\)See, for example, Cagan (1979), Dean (1981), and Green (1987).

\(^4\)A brief account of the history of inflation from early times can be found in Cagan (1979).
This has not deterred the faithful. Modern Monetarists argue that the demand for money, while not necessarily of the simplistic form suggested by the rigid quantity theory, is still sufficiently stable for monetary expansion to remain the major determinant of nominal demand growth in the short term and of inflation in the longer term\(^5\). To them, the issue is essentially an empirical one.

The alternative, supply-oriented approach looked to the costs of production as the major determinant of inflation. In its various versions this approach has emphasised capital costs (most notably interest rates), wages and regulations. Like the simple quantity theory, the cost approach, in its simplest forms, relied on several important assumptions. The most fundamental was a joint hypothesis that prices were set largely on the basis of a mark-up over costs and that these margins were more stable than the costs themselves. There remained the troublesome problem of how cost increases could induce the necessary rise in aggregate demand needed to sustain inflation. This was typically handled by assuming either that the velocity of circulation of money rose to accommodate the cost pressures or that the monetary authorities themselves accommodated the cost rise with monetary expansion, in order to prevent widespread unemployment.

The difficulties faced in discriminating between these two general approaches should be immediately apparent. If monetary growth is the primary determinant of inflation, it will result in rises in wages (the major cost of production) as well as prices. Similarly, if costs are the primary determinant of inflation, but induce monetary expansion in the process, money, prices and costs will again move in harmony. The distinction between these "cost-push" and "demand-pull" explanations is only useful if the behaviour of costs can be treated as independent of demand conditions, or if the growth of money can be treated as independent of supply conditions. To the extent that there is two-way causation, the two explanations will be difficult to separate empirically.

\(^5\)See, for example, Friedman (1956), Friedman and Schwartz (1963) and the various essays and references in Gordon (1976).
While some members of the profession remain faithful to these original positions, most have moved to the middle ground in which both demand and supply factors are recognised as important.

Conceptually, it may be simpler to think of the transmission of inflationary pressures as a two-stage process. In the first stage, the economic system is buffeted by exogenous factors, such as changes in macroeconomic policy, tastes, prices of competitive goods abroad, productivity and some (completely exogenous) cost factors. These feed directly into generalised excess demand through their impact on demand conditions, costs and projected profit margins. In the second stage, the excess demand is cleared by changes in either the prices of goods and services or the quantity of goods and services produced, or some combination of the two.

This two-stage break-down is useful in several respects. First, it focuses on the exogenous shocks as the true "causes" of inflation. Only shocks that can genuinely be regarded as coming from outside the market, and not determined by the market, can be viewed as potential "causes" of inflation - others are, at best, indicators of inflationary pressure.

It also reminds us that there is more than one candidate in the category of exogenous disturbances. While one or two factors may dominate the inflationary process for a period, this need not be the case for all time or for all economies. In particular, a single-factor explanation of inflation requires that either the excess demand process works in such a way as to neutralise the impact of other exogenous shocks, or that the other shocks are statistically negligible; relative to the major-determinant; neither of these assumptions is likely to be inviolable over time.

The third advantage of the two-stage dichotomy is that it highlights the ambiguity of the resolution of excess demand between prices and quantities. A complete theory of inflation requires explanation of how this apportioning takes place. Importantly, this apportioning process is likely to depend on the nature of the shocks received, the reaction of policy makers and the structure of economic relationships (including impediments to market clearing behaviour).

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6 There are, of course, some explanations that lie outside this general mainstream framework. See, for example the "conflict theoretic" explanation in Rosenberg and Weisskopf (1981).
Analyses of inflation were very much the vogue in the 1970s. Debate continued into the 1980s though, possibly reflecting the general reduction of inflation rates around the world and, with it, a decline in the urgency of inflation as a problem, contributions became less prominent in the literature and less doctrinaire in style. Theoretical contributions over the past two decades focused on the two issues raised above; namely, identification of exogeneity and refinement of our understanding of the economic structure and how it affects the apportioning of excess demand between output and inflation. Empirical studies attempted to resolve key disputes, both in single equation studies and in full-model simulations. The Australian literature was as active in this respect as any in the world.\(^7\)

Much of the interest in the question of exogeneity centred on money. Under the historical gold standard arrangements, the money stock was determined by a combination of gold production and the arrangements under which domestic monetary institutions operated. With the exception of a longer-run feedback from gold prices to gold production, the money stock was reasonably independent of economic conditions. The same cannot be said of modern financial systems. As pointed out by Green (1987), "because the monetary authorities in most economies can prevent inflation"\(^8\), what is needed is not a theory of money, but a theory of how monetary authorities behave. While it is easy to accept his main point about the need to understand the motivation of the monetary authorities, the precise extent to which the authorities can prevent inflation is a question of economic structure and is still open to dispute. Both these points are taken up in sub-section C below.

Another important contribution to the question of exogeneity in the 1970s came from recognition of the international transmission of inflation\(^9\). In the most extreme case, a small open economy with a fixed exchange rate and no impediments to capital flows was recognised as surrendering both its monetary policy and inflation rate to its major trading partners\(^10\).

\(^7\)See for example the works cited in Challen and Hagger (1975).\(^b\)
\(^8\)Green (1987, p. 169).\(^d\)
\(^9\)While the analysis of imported inflation is a relatively recent contribution to the literature, its antecedents date back to discussion of the specie flow mechanism developed by David Hume (1752).\(^k\)
\(^10\)For a comprehensive discussion of both Keynesian and monetary explanations of this process, see Argy and Carmichael (1976).
Debate about the transmission of shocks to prices and output generated as much heat as the earlier debate between proponents of the cost-push and demand-pull schools of thought. Understanding of the structural process of transmitting inflation had progressed little by the middle of the 1960s. According to the simple post-war Keynesian view, the distribution of shocks between prices and output depended on the proximity of the economy to its full-employment capacity. The Phillips curve approach departed from simple Keynesianism by relating labour market utilisation rates to inflation, rather than to the price level\(^\text{11}\). While the Phillips curve appeared to fit the data of the period, it lacked a firm theoretical foundation\(^\text{12}\). Arguably the major contribution of the past two decades to both the logical and empirical consistency of the Phillips curve approach was the explicit recognition of the role played by expectations in the inflationary process.

The integration of expectations into the theoretical economic structure altered thinking about both the determination of inflation and the response of the economic system to policy actions. To the extent that firms and individuals expect inflation at a certain rate they behave accordingly, in both their price-setting and spending behaviour. In effect, expectations determine the level of excess demand or supply expressed in the market. Further, in a rational world, these expectations about inflation should reflect expectations about the various exogenous factors affecting the system such as the cost of imported goods, changes in productivity and monetary policy.

The various contributions to this literature on the relationship between economic structure and the transmission of shocks to inflation and output are reviewed in more detail in Section 4 below.

C. The Australian Experience: Some Possible Explanations

Australia's experience with inflation in the 1980s is particularly notable for its divergence from the world trend. The possibility of divergence was, of course, predictable, given the changes in Australia's exchange rate system in 1983 from an adjustable peg to a floating rate.

\(^{11}\) For a review of this early literature, see Okun (1975).
\(^{12}\) As Tobin (1972, p. 9) put it "The Phillips curve has been an empirical finding in search of a theory..."
The extent to which domestic inflation is determined by world trends is a function of country size, the openness of the economy and the exchange rate regime. When exchange rates among a number of countries are linked through a system of fixed or crawling pegs, there is a tendency for their inflation rates (and interest rates) to move in harmony. This arises from the scope such arrangements offer for arbitraging goods and capital markets. The greater the degree of international mobility and substitutability of goods and capital, the greater the pressure for price equalisation. When the domestic economy is highly-integrated internationally and small relative to the other economies involved, the domestic inflation rate tends to be dominated by or "imported" from the others. As greater flexibility is introduced into the exchange rate system, the scope to arbitrage markets is reduced by the rise in the exchange rate risks involved.

Empirical studies of Australian inflation in the 1970s generally found external factors to dominate domestic factors13. This result is not surprising, given the relatively fixed exchange rate maintained throughout the period. It is also consistent with the visual impression given by Chart 1. Unambiguous resolution of the extent to which inflation is imported from abroad is not possible because of disagreement about both the correct model for counterfactual simulation and the appropriate construction of the counterfactual exercise. Nevertheless, both theory and evidence appear to agree that, at least for a small open economy such as Australia's, exchange rate inflexibility is likely to increase the importance of international factors in determining the rate of domestic inflation.

Preference for one exchange rate system over another is often related to the perceived costs or benefits in terms of inflation. France and Italy, for example, have been able to reduce their historically-chronic rates of inflation by tying their currencies to the Deutchemark under the EMS arrangement. In Australia, the opposite case was argued in the early 1980s. After a decade of high inflation, in which monetary control was largely lost to international influences, the floating of the exchange rate in December

13This result comes through strongly in both Jenson (1973), Argy and Carmichael (1976). Nevile (1976) found less support for the "imported inflation" hypothesis, though his analysis restricted the channels through which external influences were permitted to impact on the domestic economy. See also the discussion of the Argy and Carmichael and Nevile papers in Kasper (1976).
1983 was seen as a mechanism for restoring monetary policy, and thereby control of inflation, to the Australian authorities.\textsuperscript{14}

In many ways, Australia's experience both pre and post float is a textbook case. As integration of goods and capital markets increased through the 1950s and 1960s, the degree of coincidence between Australia's inflation and that in its major trading partners also increased (as it did for most countries in the developed world). The de-coupling of major exchange rates in the 1970s saw the reintroduction of substantial divergences in inflation rates for short periods though, as shown in Chart 1, the general trend in Australia remained closely tied to the average of the major countries.

From December 1983, the direct link from inflation abroad to inflation in Australia was broken - or, at least, diluted considerably. With the exchange rate free to respond to market pressures, the monetary authorities in Australia finally possessed the tools to pursue reduction of inflation as an independent objective. That Australia's performance relative to the rest of world actually deteriorated in the period since 1983 could be read as suggesting that either the Reserve Bank misjudged the settings of policy needed to reduce inflation, or that reducing inflation did not loom large among its objectives.

The evidence from this period suggests a little of both of these explanations, although the latter appears to have been much the more important. I will argue below that the reasons the Bank followed the course of action that it did were, in my view, justifiable in the circumstances.

As for problems of judgement, there is ample evidence that changes in Australia's financial system since deregulation posed problems for the Reserve Bank, both in monitoring the state of financial markets and in predicting the outcome of monetary policy actions. These difficulties were a constant theme of public addresses by Bank officials in the period following the float.\textsuperscript{15}

\textsuperscript{14}See, for example, the discussion of exchange rate and monetary policies in the Campbell Report (1981).

\textsuperscript{15}These themes were contained, for example, in the Giblin and Mills lectures delivered by the then Governor R.A. Johnston.
The formal relationship between monetary growth and aggregate demand has been examined by Stevens, Thorpe and Anderson (1987), Blundell-Wignall and Thorpe (1987) and, more recently, by Bullock, Morris and Stevens (1989) and Stevens and Thorpe (1989). They find that the process of deregulation appears to have strengthened the relationship between interest rates and aggregate demand, while the links between the various monetary aggregates and demand have weakened in the 1980s.

In terms of the theoretical debate about the structure of the economic system and the transmission of monetary shocks to prices and output, this evidence supports the view that the transmission process has changed as a result of deregulation. It does not mean that monetary policy has necessarily become ineffective as an anti-inflation tool. It simply means that the way in which the tool works and the precision with which it works may have changed.

This view, that the structural relationship between monetary policy and inflation has changed as a result of deregulation, is not universally accepted. McTaggart and Rogers (1990) and Seiper and Wells (1989) still argue that the link from monetary growth to aggregate demand and inflation is one of the more reliable relationships in the economy. The latter authors point to the apparent stability in the velocity of base money over the 1980s and argue that failure of the Australian authorities to reduce inflation was a consequence of their failure to control the growth of base money. The former authors go a step further to argue that, to the extent that monetary policy was used in the eighties as a tool for fine-tuning the economy, it appears to have been pro-cyclical rather than counter-cyclical. It is not my intention to comment further on these issues here, other than to note the disagreement on these points of interpretation. Interested readers are referred to the more extensive coverage of monetary policy issues in Milbourne (1990).

While some academics may remain unconvinced about the importance of deregulation for monetary policy, the Reserve Bank appears to have altered its thinking about the transmission process of monetary policy in a fundamental way. Whereas the links from monetary growth to inflation were emphasised in the late 1970s and early 1980s, the post-float period has
been characterised by a concerted effort to downplay these links\textsuperscript{16}. The change in philosophical leaning appears to rest, in large part, on an acceptance of the post deregulation endogeneity of the monetary aggregates. This view is stated quite clearly in Macfarlane (1980 and 1990), where he argues that the huge growth in money and credit in the middle years of the 1980s occurred despite the highest real interest rates in the post-war period, thus having more to do with a shift in preferences by the individual and corporate sectors than with unduly soft monetary policy. In his explanation, the shift in preferences was related to recognition of the benefits conferred on borrowers by the interaction of taxation and inflation over long periods of time and to supply-side factors related to the entry of a large number of new banks following deregulation.

In my view, the balance of both logic and evidence points to a change in the role of monetary aggregates and monetary policy in the transmission process since deregulation. At a minimum, the scope for banks to compete for funds has reduced the predictability of the relationship between monetary policy and monetary aggregates, while the removal of rationing on the lending side has reduced the predictability of the relationship between monetary policy actions and aggregate demand.

If floating the exchange rate has reduced the transmission of world inflation to domestic inflation and deregulation has reduced the relevance of monetary growth, the obvious question arises as to whether any exogenous factors remain to carry the blame for Australia's relatively poor performance on inflation over the past decade.

The quick answer is that monetary policy still has a major influence on inflation even if the transmission mechanism has changed. Tight monetary policy raises interest rates, which dampen excess demand and inflationary pressure. Tight monetary policy also puts upward pressure on the exchange rate, which puts downward pressure on inflation, both directly through lower import prices and indirectly through switching demand from domestic production. What it does not explain is why monetary policy in the 1980s did not pursue lower inflation more vigorously.

\textsuperscript{16}The evolution of Reserve Bank views on the transmission process can be found in the Reserve Bank's Annual Reports since 1975.
The answer to this more difficult question lies with the objectives of monetary policy. While inflation remained one of several goals during the 1980s, there is evidence that it was subordinated at times to other considerations, including the balance of payments and the exchange rate. This eclectic philosophy towards monetary policy was labelled the "checklist" approach, a term that became popular in the mid 1980s, though it has since slipped into disuse.

On some occasions the signals from the checklist were reasonably consistent. In the latter part of the decade, however, there were some important divergences. An apparent preoccupation with standing against appreciation of the exchange rate in 1987 almost certainly resulted in monetary policy looser than would have been consistent with ensuring that the exchange-rate induced rise in inflation in 1986 remained temporary. The situation was complicated further by the stock market crash in October 1987. While the Bank did not loosen monetary policy greatly after the crash, concern about the system's liquidity brought a halt to the tightening that had begun just before October.

More importantly, the objectives of monetary policy in the 1980s were complicated by the supporting role ascribed to it by the Government during the period after the float. The early years of the float were characterised by a fiscal-led drive for growth. Inflation was to have been controlled by the Accord, with monetary policy playing a largely passive or accommodating role. The mechanism through which the Accord was to have controlled inflation was the exogenous restraining of nominal wage increases, in return for a promise of job growth. The fundamental premise of the Government's macroeconomic strategy was thus a belief that wage increases, determined exogenously through the centralised wage-setting system, were the major determinant of inflation. That nominal wage growth was, in fact, subdued by the Accord in comparison with earlier periods, can be seen in Chart 6 below.

The supporting role for monetary policy was highlighted in 1985 when the large pass-through from depreciation to inflation was tolerated by the authorities, in the expectation that adjustments to wage indexation and

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17 For a more detailed discussion of the impact of the Accord on labour market outcomes, see Chapman (1990).
fiscal tightening at the time would ensure that the inflationary surge was temporary. As noted in sub-section A above, the surge was temporary - but inflation returned to a steady level of 7 to 8 per cent, rather than to the steadily-declining path that the Government had anticipated.

In broad terms, this explanation of inflation since the float appears to have some merit. Nominal wage rises were contained by the Accord and, while inflation was higher than might have been predicted by wage pressures alone, it never appeared likely to accelerate out of control. At a minimum, it seems likely that the Accord, supported by an accommodating monetary policy, was a major influence on expectations of inflation in the post-float period. As noted earlier, it is meaningless to try to identify whether the inflationary experience of this period was a result of the cost outcomes produced by the Accord or by the monetary policy that accommodated the Accord. The two are intertwined. What is clear is that the authorities did not place an especially high priority on reducing inflation in the 1980s.

CHART 6
INFLATION: CPI AND WAGES

The role of monetary policy in this structure is a far cry from the anti-inflationary weapon envisaged by many at the time of deregulation. At the risk of oversimplifying the point, wages under the Accord could be viewed as the primary determinant of base inflation, with monetary policy determining the path of real wages by the extent to which it accommodated
the underlying trend. On this interpretation, monetary policy was, by its lack of success on containing inflation, highly successful in encouraging growth and employment. Whether or not this was an acceptable outcome depends on one's perception of the costs of inflation.

3. THE COSTS OF INFLATION

Much of the concern about inflation stems from a belief that inflation imposes severe costs on society. These costs arise largely from three sources. First, the failure of institutions, including the tax system, to adapt to inflation imposes costs on certain sectors and activities. Second, it has been argued that inflation increases uncertainty. Third, inflation can impose arbitrary and unpredictable shifts in the distribution of income and wealth. These three aspects are considered in turn in the following sub-sections.

A. Institutional Rigidities

This section approaches the costs of inflation in terms of the impact of inflation on individual decision making. The emphasis is initially microeconomic in the sense that the focus is on inflationary distortions to prices (mostly interest rates) which are taken as given. The possibility that interest rates may respond to offset the impact of inflation (and taxation) is then considered. A major conclusion of this section is that financial and tax reforms in the 1980s have enabled the financial system to respond more flexibly in recent experience to offset much of the undesirable consequences of these distortions.

(a) The saving decision

Independent of any distortions among rates of return on different assets, the practice of taxing nominal interest payments distorts the choice between consumption and saving in periods of inflation.

Since saving involves a choice between real resources today and real resources in the future, the interest rate relevant to the saving decision

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18Understanding about the costs of inflation has been enhanced greatly by two important contributions to the literature, by Fischer and Modigliani (1978) and Fischer (1983). This section draws heavily on these papers.

19The behaviour of savings in Australia in the 1980s is covered in depth in Edey and Britten-Jones (1990).
should be the real after-tax rate. Ignoring cross-product terms, the following identities define the relationships between real and nominal interest rates pre and post tax:

\[ r = i - \pi \]
\[ r_n = i_n - \pi \]

where \( r \) is the real rate of interest, \( i \) is the nominal rate of interest, \( \pi \) is the inflation rate and a subscript \( n \) indicates net of tax.

When income tax is levied on nominal rather than real interest income we obtain the following (where \( \tau \) is the marginal tax rate facing the individual):

\[ r_n = i(1 - \tau) - \pi \]

It is clear from this relationship that, even if inflation were reflected one-for-one in nominal interest rates, real after-tax interest rates could quickly become negative in times of high inflation. This occurred in the mid 1970s, as shown in Charts 7 and 8.

**CHART 7**

INFLATION, TAXATION AND REAL INTEREST RATES
AUSTRALIAN 90-DAY BILL RATE
While it is generally believed that lower returns reduce savings, the theoretical result is ambiguous. This occurs because interest rate changes generate an income effect (higher rates increase the availability of future consumption, thereby increasing demand for current consumption) as well as a substitution effect (higher rates encourage substitution of future consumption for current consumption).

Savings behaviour in Australia has, at times, proved to be something of a puzzle\(^{20}\). Of particular intrigue was the rise in the household savings ratio in the mid 1970s. Most of the explanations of this period relate to inflation in one way or another, though not to its impact on real rates of return. One particularly interesting explanation is given by Austie, Gray and Pagan (1983) who suggest that inflation led to an overstatement of real incomes. After correcting for this bias they found the household savings ratio to be reasonably constant over the 1970s. Edey and Britten-Jones (1990) examine several corrections to the measured data and conclude that gross private savings have been remarkably stable over three decades.

\(^{20}\) See, for example, the comprehensive survey in Williams (1979).
Approximate stability in the savings ratio adjusted for these indirect effects of inflation does not rule out a direct effect from inflation via interest rates as well. Empirical studies for the seventies, using nominal rates of interest, detected a positive effect on savings, although this result was sensitive to small changes in model specification. Carmichael and Hawtrey (1981) found a positive effect on savings from real interest rates. In a full-model context, the RBII model (Jonson, Moses and Wymer (1977)) captures a similar effect. None of these studies makes adjustment for taxes. Extending the study into the eighties, Edey and Britten-Jones (1990), find that there is little or no evidence of a real interest rate effect on savings; both income and substitution effects are either small or hard to detect.

This issue remains of fundamental importance in Australia, since the ability of policy to reduce our dependence on foreign borrowings is closely tied to the responsiveness of national saving to policy actions. If lower inflation can, by increasing real after-tax rates of return, raise national saving significantly, the contribution to long-term welfare could be substantial.

(b) The inflation tax
Any country which prohibits or regulates the payment of interest on money imposes a tax on the holders of money in times of inflation. The owners of money lose from inflation because the value of money falls as the general price level rises. The inflation tax also generates revenue for the government as money holders increase their nominal balances over time to maintain constant their real money balances.

Since inflation can be viewed as a substitute for direct taxation as a means of financing government spending, an important question for microeconomic efficiency is whether the costs of the inflation tax are greater or smaller than those of alternative taxes.

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21 See, for example, Taylor (1975) and Bonyhady and Caton (1976).
22 This evidence appears to be consistent across countries. See the survey in Edey and Britten-Jones (1990).
23 The evolution and importance of Australia's external debt problem is discussed in Iese (1990).
24 In most countries, including Australia, the prohibition of interest payments is restricted to currency. The implicit rate of return on a broad definition of money, such as Australia's M3, is a weighted average of the interest bearing and non-interest-bearing components.
The effect of the inflation tax has been analysed mostly in the context of the traditional money demand model. This model specifies an arbitrary money demand function in which the ratio of money to capital desired by portfolio holders is inversely related to the nominal interest rate. *Ceteris paribus*, an increase in inflation increases the interest differential between capital and money by taxing money balances. This leads to a substitution of capital for money.

The cost of underutilising money balances due to inflation has been approached in two ways. The early literature on the welfare costs of inflation focused almost exclusively on the loss of consumer surplus from holding too little money during periods of inflation. Given the abstract and partial equilibrium nature of this approach it is quite surprising that it has received so much attention in the literature.\(^{25}\)

Following this approach, the increase in national income due to a one percent decrease in inflation (fully passed through into a fall in nominal interest rates) can be estimated as half the product of the rise in money balances and the fall in the interest rate. For example, the current level of nominal interest rates is around 15 percent and the level of notes and coins in circulation is round $12.5 billion. If we take (minus) one half as a reasonable approximation of the interest elasticity of money demand, reducing inflation by one percent (0.01) would raise money demand by around $815 million. The welfare gain from a one percentage point reduction in inflation from 8 percent to 7 percent would be in the order of $2 million per annum (in 1990 dollars).\(^{26}\)

The weakness of this approach is that it is strictly partial equilibrium. That is, it takes all other prices and quantities as given. In particular, it takes no account of the opportunity cost of the potential reduction in capital that occurs as money is substituted for productive capital. Not only is this a critical element in measuring the theoretical gain or loss in a static framework, it is even more fundamental in evaluating the dynamic optimum, since capital is a major determinant of the growth path of the

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\(^{25}\)See, for example, Bailey (1956), Frenkel (1976), Johnson (1969) and the literature they cite.

\(^{26}\)This figure is calculated by assuming that the one percentage point decline in inflation is fully reflected in the nominal interest rate, then averaging the changes in money holdings at 15\% and 14\% interest rates respectively.
This broader aspect of capital/labour substitution is considered along with other general equilibrium issues in sub-section (h) below.

(c) Other distortions to asset allocation
In addition to the distortion between the relative returns on money and other assets, inflation may cause distortions among the returns on non-monetary assets. In some cases this will arise from regulations imposed by government. Analysis of these situations is similar to that of the inflation tax on money. In other cases, distortions arise from the special tax treatment of income from certain types of assets. The main example in Australian experience was the non-taxation of capital gains prior to 1986.

On assets such as real property and real capital, the nominal return to holders includes any cash flow from the asset's employment (rent, dividends, etc.) plus the change in the asset's capital value. Prior to changes in the tax legislation in 1986, the non-taxation of many forms of capital gains created a distortion between dollar-denominated assets (such as fixed-interest securities and deposits with financial intermediaries) and those assets implicitly denominated in real units (such as real estate and equities).

In a perfectly-competitive market, interest rates should adjust until the rate of return differential between these two types of assets is roughly constant (reflecting a risk premium on one or the other of the assets). The presence of progressivity in the personal income tax scale, however, means that even in a competitive equilibrium, the holding of non-taxable assets will be relatively more attractive to those in high income brackets. More importantly, the attractiveness of these assets rises with inflation. This attractiveness is often reinforced by a tendency for many non-taxable assets to yield a capital gain at a rate greater than the inflation rate. It is further reinforced if nominal interest rates are sticky and do not fully reflect inflation; this situation increases the return to non-taxable assets financed with leverage. Since the incentive to invest in inflation-protected assets rises with inflation, these assets will tend to exhibit amplified pricing cycles with regular booms and collapses as a by-product of this distortion.

The distortion in Australia due to capital gains tax has been reduced considerably, though by no means eliminated. Owner/occupiers still face a

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27 A detailed listing of tax changes in the 1980s is presented in the Appendix to this paper.
tax-free incentive to invest in real estate. There is also an exemption for property owners who purchased prior to the legislation change in 1986.

(d) Investment

In the same way that inflation and taxation interact to distort the savings decision, the allowance of full deductibility of nominal interest payments on debt introduces a potential distortion to investment decisions. This sub-section deals primarily with the theoretical issues involved. The Australian experience in the eighties is covered in more detail by Edey and Britten-Jones (1990).

Corporate taxes are levied on current operating profits. To the extent that prices, and therefore profits from real production, are expected to rise over time in step with rises in the general price level, current dollar profits are a rough proxy for expected future real profits.

The same cannot be said of repayments and servicing of debt. Since debt and debt service both remain constant in nominal terms, their real values fall with inflation. Thus, part of debt service can be viewed as a payment of real interest, and part as compensation to the lender for the loss of real principal value due to inflation. To the extent that inflation is anticipated, this compensation for erosion of principal value will be included in the nominal interest rate.

Under an inflation-neutral tax system, only real debt service would be allowable as a tax deduction against current profits. In Australia, as in most countries, nominal debt service is allowed as a full deduction.

Whenever inflation runs ahead of expectations, or when the full extent of the inflation distortion is not reflected in ex ante interest rates, the inflation will tend to lower the cost of debt finance relative to equity. Thus, high inflation tends to act both to encourage substitution of debt for equity and to encourage investment. If the distortion were sufficiently large, investment could be misdirected into industries with very low or even negative marginal productivity. There is some anecdotal evidence that this

28 The literature on this topic owes much to the work of Feldstein (1976), (1978) and (1980).
29 Though, as noted below, in sub-section B, to the extent that inflation increases uncertainty, it may decrease investment in real capital.
may have occurred in the second half of the 1970s and early 1980s in Australia.

There are two factors offsetting this inflation-induced bias towards investment. The first is the tendency for inflation to erode the real value of depreciation allowances. Under existing tax laws, depreciation on capital is allowable as a tax deduction at a proportion of historical cost. The extent to which the real income of firms is reduced by the understatement of true depreciation is a function of the tax rate, the cost of funds and the allowable depreciation rate.

The second factor is the need for firms to generate profits in order to gain the benefit of the inflation-induced tax deductions. While higher inflation may induce increased leverage, that leverage itself may induce greater risk taking and, in times of fluctuating fortunes, bring otherwise solvent firms to the edge of bankruptcy. This point is amplified in a world of floating-rate debt, where leverage may look attractive while rates are low relative to inflation but may quickly become onerous as rates rise relative to inflation.

This factor is becoming increasingly relevant in the current Australian situation with many highly-leveraged firms finding the benefits of tax deductibility insufficient to offset the burden of high nominal debt service on cash flow.

Empirical models of Australian investment generally have a poor record in tracking the path of business investment\(^{30}\). There have been essentially two approaches to modelling investment behaviour in Australia: the flexible accelerator model which focuses on the lags between output and investment; and variants of the standard neo-classical model of Jorgenson (1967).

Casual observation of the facts suggests that the neo-classical model should perform quite well on Australian data. However, while a good deal of effort has gone into applying the neo-classical approach to Australian business investment, the simpler flexible-accelerator model appears better able to explain the Australian experience.

\(^{30}\) For surveys of the empirical work, both Australian and overseas, see Hawkins (1979) and Carmichael and Deuts (1989).
Despite the number of Australian studies of investment, little attention has been paid to the specific issue of interaction between inflation and taxation. Recent exceptions are Macfarlane (1989) and EPAC (1989). The EPAC study argues that the changes in the Australian tax system since the mid 1980s have largely removed the bias towards debt finance relative to equity. Macfarlane argues that the inflation-induced tax distortion has encouraged investment (though not always in the most productive assets). This contrasts with the evidence from the United States. In summarising the findings for the US in the 1970s, Feldstein (1980) argues persuasively that the United States tax system combined with inflation to seriously discourage investment.

(e) The labour market

Another potential distortion from the interaction of inflation and taxation arises from the non-indexation of the progressive income tax scales. A progressive income tax system is affected by inflation through changes in the real value of tax allowances and changes in the structure of tax brackets. Since inflation reduces the real value of most tax deductions for PAYE tax payers, it increases the effective progressivity of income taxes even in a proportional tax structure. Tax rebates fixed in nominal terms have the opposite effect. In a progressive structure, nominal increases in income may move taxpayers into higher brackets, thereby raising both the real and marginal tax burdens. Even without moving the taxpayer from one marginal bracket to another, nominal wage increases with a non-indexed tax scale tend to raise the average tax burden by increasing the proportion of income falling into the upper tax brackets.

In addition to the possible effect on the labour-leisure choice, bracket drift due to inflation can cause supply substitution between different types of labour. Further distortions can arise from two sources. First, as bracket drift becomes more pronounced, more resources will be devoted to finding non-taxable sources of income. Second, consumption patterns may be altered if some goods are tax deductible; for example, business trips, company cars, subsidised home loans and so on.

31 The issues are also covered in Edey and Britten-Jones (1990).
32 The likelihood that either of these effects will be significant empirically is small. Dowrick (1988), for example, finds little evidence of real wage substitution.
The extent of the distortion due to bracket drift, or nominal fiscal drag, depends on the form and extent of adjustment of the tax system to inflation. Many countries, including Australia, have adopted at least some form of partial indexation of their taxation scales (either explicit or de facto through regular adjustments to the scales). Chart 9 gives an indication of the extent to which Australia's tax system has kept pace with inflation.

**CHART 9**
INFLATION AND THE TOP MARGINAL TAX RATE IN AUSTRALIA

The lower line in Chart 9 shows the nominal income level at which the top marginal tax rate became operative in each fiscal year since 1966/67. The upper line takes that threshold income level in 1966/67 and adjusts it each year for the rate of inflation. Thus, the upper line shows where the top marginal tax rate would have become operative if the tax scale had been fully indexed for inflation since the mid 1960s. The gap between the two lines is an indication of the limited extent to which the tax scales have been adjusted for inflation. One mitigating factor, not shown in Chart 9, is the decline that has occurred in the top marginal tax rate over this period; from almost 67% in 1966/67, the rate was cut in two main exercises, to 60% between the middle and end of the 1970s, and again to 48% between the middle and end of the 1980s.
Tax reforms in Australia since the mid 1980s have not only helped offset the impact of non-indexation of the tax scale, they have done much to reduce the scope and incentive to divert income to lower-taxed activities. Evidence of labour market restructuring in response to price distortions is hard to find. The rapid growth of PAYE tax relative to other sources of individual income tax and from studies of the underground economy provide very weak, indirect evidence that bracket drift may have induced occupational restructuring of the Australian labour in the 1970s into lower-taxed activities. As shown in Chart 10, the tax reforms of the late 1970s and 1980s have arrested the upward trend in the relative burden on personal income taxes tax collections and, in the process, may have reduced the distortion between labour market activities.

**CHART 10**

**PERSONAL INCOME TAX COLLECTIONS AS A PERCENTAGE OF TOTAL TAXES**

(f) Government revenue

In addition to distorting current incomes and prices facing individuals, nominal fiscal drag affects the government's budget by raising real revenue. The extent of the increase in revenue depends on the different inflation elasticities of various taxes.

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33 See, for example, Evans and Renchan (1980) and Trengove (1981).
The real value of revenue from ad valorem taxes, such as sales tax and payroll tax, is unchanged by inflation. At the same time, inflation reduces the real value of specific excise taxes. As argued above, incomplete indexation of the progressive income tax scales should imply an inflation elasticity of real income tax collections considerably greater than unity. As shown in Chart 10, this certainly appears to have been the case prior to the tax reforms of the 1970s and 1980s.

Real tax revenues also tend to rise in periods of inflation due to the basing of a number of taxes on nominal rather than real magnitudes. The taxation of nominal interest income is a case in point, as is the allowance of tax-deductible depreciation based on historical cost.44

Two factors work to offset the upward drift in real tax revenues associated with inflation. The first is the allowance of nominal debt service payments by firms as a tax deduction. The second is administrative lags in the system of collecting taxes. PAYE income taxes are collected as the income is earned. Other forms of taxes are often collected with a considerable lag. The importance of these lags in reducing real tax revenues may be substantial in periods of high inflation. Recent changes to Australia's tax legislation to facilitate quicker collection of company taxes should reduce this latter effect.

Overall, inflation could be expected to increase the proportion of taxes to gross domestic product and to increase the proportion of income tax revenue to total tax revenue. Both of these characteristics are reflected in the Australian data though, as a result of tax reform, the extent of the bias has declined in the 1980s relative to the experience of the 1970s.

(g) Miscellaneous costs of inflation
Other costs in terms of microeconomic inefficiency arise from inflation in the form of so-called 'menu' costs and accounting conventions.

When inflation is rising rapidly, even when it is fully anticipated, there is a need for firms and vendors to requote prices. Provided money is retained as the unit of account, the cost of relabelling shelf stock, reprinting menus, price tags and so on, rises directly with the rate of inflation. To the extent

\[^{34}\text{For references to the experience of various countries, see Nowotny (1980).}\]
\[^{35}\text{For example, see Tanzi (1977).}\]
that prices are fixed in nominal terms, even for short periods, relative prices may also be distorted as vendors trade off the cost of price changes against the opportunity cost of selling at unprofitable prices.

These costs are highlighted in periods of hyperinflation when prices can change frequently while buyers are at the market. In these situations, the timing of purchases becomes critical.

The other main source of miscellaneous costs from inflation also relate to the convention of using money as the community's unit of account. As a result, accounting conventions tend to concentrate on measuring revenues and expenses in the unit of account and often fail to account fully for changes in the real value of the unit.

This point was made earlier with respect to the Government's accounts. It applies equally to private sector accounting. Most private contracts are specified in nominal units and most measures of profits rely on nominal units. Accounting procedures have, over time, been modified to incorporate the effects of inflation, but full accounting for inflation is neither universally practiced nor even accepted. Progress on this front requires adjustment first by the government in its own taxing arrangements. Only then, are private conventions likely to fall into line.

(h) Some aggregate implications
The analysis so far has focused on the impact of inflation on decision-making by individuals and firms under ceteris paribus conditions. That is, it was assumed that prices and interest rates did not themselves adjust to the inflation distortions. It is important to have some idea of how the microeconomic reactions feed through into equilibrium relationships if a consistent evaluation of the cost of inflation is to be possible.

At the most basic level, it is sometimes asserted that, if all prices were fully indexed for inflation, or adjusted fully by market forces, then the economy would be inflation neutral. If this were the case, there would be little reason for choosing one inflation rate over another. While there is an element of truth in this line of reasoning, most economies have institutional
structures that are far from indexed; indeed, in many cases, indexation would be physically costly and impractical.\textsuperscript{36}

In this sub-section, I will concentrate on three main aspects of inflationary distortions in general equilibrium: the saving/investment decision; the individual's asset allocation decision between money and capital; and the firm's financing decision between debt and equity.

At any given interest rate, a rise in inflation lowers the real after-tax return to savers and lowers the real after-tax cost of debt to firms. Provided individuals and firms both face the same marginal tax rate ($\tau$), a rise in the nominal interest rate that is greater than any rise in inflation by a factor of $1/(1 - \tau)$ should leave the real after-tax interest rates facing both groups unchanged.\textsuperscript{37} Tax reforms in the 1980s, which have brought the corporate and individual tax rates closer together, flattened the income tax scale and removed the double taxation of dividends, have done much to reduce the institutional distortion between saving and investment and to provide the scope for nominal interest rates to adjust to inflation in a manner that would be roughly neutral between borrowers and lenders.

In response to these changes, the relationship between interest rates and inflation appears to have shifted markedly between the 1970s and 1980s. This is illustrated in Charts 11 and 12.

\textsuperscript{36} For example, the payment of interest on currency in circulation.

\textsuperscript{37} For the individual,

$$r_n = (i(1 - \tau) - \pi$$

For $r_n$ to remain unchanged in the face of a rise in inflation, requires that, for any change in $\pi$,

$$0 = di(1 - \tau) - d\pi$$

i.e.

$$di = d\pi/(1 - \tau)$$

For the firm, profit maximization requires equality between the marginal product of capital and the real after-tax cost of borrowing,

$$\zeta = i - \pi - \tau i$$

For $\zeta$ to be constant, it must be the case that

$$0 = di - d\pi - d\tau i$$

i.e.

$$di = d\pi/(1 - \tau)$$
In the 1970s, nominal interest rates remained relatively steady in the face of substantial swings in inflation. As a result, real after-tax interest rates
showed a strong inverse correlation with inflation. In the 1980s, however, there is evidence of greater responsiveness in nominal rates to inflation and, as a consequence, real after-tax interest rates have shown much greater stability - particularly in the period since the float.

The tendency for inflation to tax money balances and, thereby, to induce substitution of capital for money is one effect that cannot easily be indexed away. In the absence of a scheme to pay interest on currency holdings, these will remain a victim of the inflation tax. The impact of that tax on the overall level of capitalisation is a question requiring general equilibrium analysis.

In a pioneering study, Tobin (1965) examined the effect of the inflation tax on capital/money substitution in a general equilibrium monetary growth framework. Using an arbitrary money demand function, in which desired real money balances depend positively on income and negatively on interest rates, he found that inflation raised the equilibrium capital intensity of the economy, leading to a higher steady-state growth path. In extending Tobin's analysis to an explicit optimising framework, Sidrauski (1967) produced the curious result that, in the long-run, the capital stock was essentially independent of inflation; a result that was promptly labelled the "superneutrality of money". As shown subsequently by Carmichael (1982), however, this result rests on the questionable assumptions that individuals make decisions on a dynastic basis (i.e., they consider the impact of all their actions on future generations) and that their preferences are intertemporally additively separable (i.e., that rate at which future utility is discounted remains constant over time and is independent of wealth, consumption, etc., in future periods).

Whether or not a rise in capital intensity leads to an increase or decrease in welfare depends on the position of the initial growth path relative to the golden rule path. Put more simply, there are levels of capitalisation so high that they put an excessive demand on current output just to maintain the capital stock. In this "overcapitalised" situation, further increases in capital intensity are self-defeating in that they actually lower per capita consumption.
As noted above, since inflation is an alternative to direct taxes, it is important to ask whether it is more or less efficient than these alternative taxes as a means of raising revenue. Carmichael and Stebbing (1981) show that, for the same revenue generation, the inflation tax is likely to have a greater impact on capital than an equivalent lump-sum tax. The analysis becomes more complicated, however, when inflation/taxation distortions are introduced for the firm.

In a non-optimising framework, Feldstein (1976) finds that the general-equilibrium relationship between inflation and the capital intensity is ambiguous unless tax rates are equal across firms and individuals. The ambiguity is increased when equity as well as debt finance is considered. Carmichael and Stebbing (1981), however, show that explicit consideration of optimising behaviour is likely to restore the expected relationship that a rise in inflation leads to substitution of capital for money and thereby to a rise in the economy's capital intensity.

In the absence of evidence to suggest that Australia is overcapitalised, the tendency for inflation to generate growth through the substitution of capital for money in individual portfolios must be regarded as a benefit rather than a cost. The empirical magnitude of the substitution, however, is likely to be small, since holdings of currency are in the order of $12.5 billion compared with estimates of the capital stock in the order of $1,400 billion.

Finally, whereas the inflation-induced distortion between money and capital cannot be removed by adjustments in market rates, the distortion between debt and equity finance can be. Provided nominal interest rates on debt move sufficiently to offset the impact of both inflation and taxes on real rates (and provided expectations about inflation are broadly consistent with outcomes), the after-tax financing costs of debt and equity should move more or less in tandem. As mentioned above, following financial deregulation in the early 1980s and the tax reforms of the mid 1980s, there is

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38 This latter conclusion is a simple extension of the property noted above that, for each rise in inflation, there exists a rise in nominal interest rates that leaves interest-earning individuals and profit-earning firms no worse off than before the rise.
40 I should note that there is no universally agreed measure of the capital stock. The figure quoted here is based on ABS estimates.
some evidence that real after-tax rates on debt are now showing some independence from the rate of inflation.

B. Uncertainty

The proposition that inflation increases uncertainty, essentially through its effect on relative prices, gained popularity in the 1970s as an explanation for the deterioration of economic performance. Uncertainty can arise with inflation in two ways. First, a higher level of inflation may be more variable, thereby making its prediction more difficult. Second, a higher level of inflation may be associated with a greater degree of relative price variability.

(a) Inflation and the variability of the general price level

There is some international evidence that the variability of inflation rises with the level of inflation. Logue and Willett (1976) find a positive correlation between average inflation levels and the standard deviation of those levels across a data set for 45 countries. Fischer (1983) provides evidence which supports this finding for the US, using data since the beginning of the nineteenth century. The figures provided in Table 1 of this paper suggest that if the relationship holds for Australia over the past few decades, it is far from precise.

Of course, increased variability does not necessarily mean increased uncertainty, although a reasonable presumption must exist that this would be the case. For the US, Fischer links the cross-sectional variance of actual inflation with that of survey data about inflation expectations. He finds a positive relationship, which he takes as support for the hypothesis that higher inflation raises the level of uncertainty. Against this, he cites tests by Engle which use a forecasting equation for inflation to construct a time series for the variance of the error term. With the exception of the Korean War period, Engle finds no significant relationship between the variance of the residuals and the level of inflation. The difficulty in deciding between these types of evidence is that neither provides an unambiguous measure of uncertainty.

Klein (1976) distinguishes between short-run and long-run inflation uncertainty. He argues that the level of long-run uncertainty rose during
the 1970s. Indirect evidence for this effect in Australia during the 1970s is provided by the general shortening of contract periods, where the contractual arrangements were denominated in nominal terms. There does not appear to have been a major reversal of this process in the eighties despite the decline in the measured variance of inflation. Long-term uncertainty in practice is likely to be more closely related to macroeconomic policies than to the inflation level per se. In this respect, the 1980s would appear to have a greater claim to certainty than did the 1970s.

Measuring the costs associated with uncertainty is hazardous; this is particularly so given the lack of direct evidence supporting the proposition that inflation raises uncertainty. Fischer uses the static welfare triangle approach, based on his estimation of the implicit risk premium associated with inflation uncertainty. For the US, he speculates that a doubling of the variance of the inflation rate would create an annual welfare loss equal to roughly one percent of the stock of outside assets. For Australia this would give a figure of around $1.2 billion per annum.

(b) Inflation and the variability of relative prices
The theoretical case that relative price variability should rise with the level of unanticipated inflation has been made by Cukierman (1979) and Hercowitz (1981). Taking a different approach, Sheshinski and Weiss (1977) and Rolemberg (1980) argue that relative price variability should also be associated with anticipated inflation. Their argument rests largely on adjustment costs.

The existence of an empirical regularity between relative price dispersion and the rate of increase of the general price level was noted as far back as the 1920s. More recent studies, by Hercowitz (1981) and Vining and Elvehjem (1976), confirm the relationship using US data. Clements and Nguyen (1981) found evidence to support the relationship using Australian data in the 1970s.

An important aspect of economic behaviour at the level of firms and individuals is the need to extract information from prices. As captured in a number of the early papers on rational expectations (in particular, Barro (1976)), individual agents tend to observe a limited set of prices. These are

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41See Mills (1927).
typically in markets that are "localised" - either to their own product or to their products plus those of their competitors. From these observations, firms must draw conclusions not only about their own product but also about the general price level.

If higher levels of inflation correspond with a greater variance of relative prices, the signal extraction problem will be positively correlated with inflation. The response of individual decision-makers to the increased noise will, in turn, depend on their attitudes towards risk. In general, we would expect risk-averse decision-makers to become more conservative as signal extraction becomes more difficult, although the outcome could be quite complex.

It is not obvious that relative price variability reduces welfare directly. The main cost it is likely to generate is the misallocation of resources. In his widely-quoted non-conventional approach to inflation theory and the costs of inflation, Leijonhufvud (1981a and 1981b) puts great emphasis on uncertainty, and on relative price uncertainty in particular. He sees costs arising from the misallocation of effort, as the relative value to the firm of the forecaster rises relative to those engaged in production. He also argues that variable inflation makes private contracts less reliable and less acceptable. As an alternative, he argues that individuals are likely to rely more on inefficient social compacts as a means of re-introducing a measure of certainty to their actions. In the process, these compacts may reduce further the efficiency of political institutions. He also argues that relative price uncertainty could be a major deterrent to capital formation, thereby offsetting the positive substitution effect arising from the inflation-induced reduction in the cost of capital.

These concerns should not be dismissed lightly, although there is little evidence that a breakdown in social order of the type or scale predicted by Leijonhufvud is likely to happen at the levels of inflation experienced by the major countries over the past decade or two.

C. Redistributions

Regardless of the extent to which inflation premia are built into the pricing of fixed-interest securities ex ante, actual outcomes impose redistribution
between borrowers and lenders. The redistribution will be amplified if higher inflation also increases the variability of relative prices. In the case of the ownership of large, highly-leveraged assets, this redistribution can be substantial.

While this sudden and arbitrary redistribution of wealth will tend to net out in aggregate terms, it may have both social and economic implications. First, by introducing an inflation-induced element of lottery to certain classes of assets, inflation raises class mobility as well as generating boom and bust cycles in these assets. Further, the paper wealth generated by inflation in these assets is itself a source of demand, thereby potentially adding a stock/flow interaction to the inflation process.

D. Summary of the Costs of Inflation

If all contracts and institutional arrangements were indexed for inflation, the net cost of inflation and of increases in inflation would be restricted to three main sources: inefficiencies arising from the substitution of capital for money; the impact of inflation on uncertainty; and menu costs.

As argued above, the two sources of inefficiency from capital/money substitution are offsetting. Further, while these costs exist in theory, the secular decline of currency in circulation relative to other assets suggests that, empirically, the costs are likely to be relatively minor. The same can be said of menu costs which, in effect, represent the administrative cost of keeping the indexation system up with the rate of inflation.

The impact of inflation on relative prices is an empirical fact. If it continued in a fully-indexed system, inflation would continue to impose a signal-extraction problem for individuals and firms and to generate possible distortions in the process. However, the main theoretical justification for the empirical regularity is the signal extraction itself. It is by no means clear that a signal-extraction problem would remain in a fully-indexed economy and so it is by no means clear that relative prices would be affected by inflation in such a system.

In practice, indexation is far from universal. Without indexation, problems arise in addition to the three mentioned above. The main source of
distortion comes from government and the impact that a non-indexed tax system can have on decisions by individuals. The market, of course, has some scope to incorporate its own views on inflation into interest rates, wage negotiations, etc. In a sense this is a form of de facto indexation. As argued above, the scope to do this, and the extent to which it is actually being done in Australia, have both increased in the 1980s as a result of institutional reforms.

The problem with de facto indexation as opposed to explicit indexation is that it still leaves the system prone to unintended wealth redistribution when actual outcomes are at variance with expectations. Recognition of this potential may increase the general level of uncertainty in the economy with implications for the availability of risk capital, the length of contracts and so on.

4. POLICY OPTIONS

While the analysis of Section 3 is unlikely to fill the reader with the urgency of reducing inflation, he/she is nevertheless likely to agree that inflation is far from costless. The question of how vigorously the Government should pursue the reduction of inflation is a matter of weighing the costs and benefits involved. This Section looks at the issues involved in evaluating these costs and benefits and attempts some modest quantification of the trade-offs facing policy makers in Australia.

A. Theoretical Considerations

There are few who would argue that inflation can be reduced without some short-term costs in terms of disruption to labour and product markets and a likely increase in involuntary unemployment. Debate about the short-term trade-off between inflation and unemployment has a long history in the economic literature both in Australia and abroad\(^\text{42}\). In terms of the discussion in Section 2, the existence and nature of such a trade-off is a question of economic structure and how the system apportions changes in aggregate demand between prices and quantities.

\(^{42}\)See, for example, Friedman (1968), Phelps (1967) and Gordon (1976), and, for Australia, Parkin (1973 and 1976), MacDonald (1975) and Challen and Hagger (1975a).
The idea of a Phillips curve, offering a trade-off between unemployment and inflation, was an important element in economic policy debates of the 1950s and 1960s. By the early 1970s, however, following the important contributions of Friedman (1966 and 1968) and Phelps (1967), the Phillips curve was generally accepted as being a strictly short-run phenomenon. Noting that employment depended on real wages rather than money wages, Friedman and Phelps pointed out that employment could only continue increasing while the expected price level lagged below the actual price level, thereby generating low actual real wages alongside higher expected real wages. They argued that, as expectations were corrected over time, the economy would return to its equilibrium or natural rate of unemployment. Thus, exploitation of the short-run Phillips curve required fooling both firms and workers. The cost of attempting to exploit this trade-off continuously, they argued, was higher and possibly accelerating inflation, without any permanent beneficial impact on unemployment.

The argument that there is no long-run stable trade-off between inflation and unemployment altered attitudes towards discretionary stabilisation policy. In such a world, three issues emerge as critical to evaluating the short-term adjustment costs from one steady inflation rate to another: industrial structure; expectations about inflation; and policy credibility.

(a) Industrial structure and the natural rate of unemployment
Contributions to the analysis of the natural rate have followed two main lines of analysis. The first, concentrated on the job search behaviour of rational individuals. This approach, labelled the 'new microeconomics' of labour markets43 began promisingly, but failed to gain acceptance as a general paradigm because of its inability to explain involuntary unemployment.

In these models, unemployment is all voluntary and reflects a decision by workers to reject job offers when actual wage offers fall below their reservation wage. While these models added little to our understanding of unemployment per se, their emphasis on misinformation in generating unemployment contributed to the subsequent development of the rational expectations literature.

43See, for example, the works in the volume edited by Phelps (1970) and also the contributions by Mortensen (1970b and 1970c) and Azariadis (1975).
The second approach concentrated on the strategic interactions of employer and employer groups; that is, on non market-clearing behaviour. The central idea of this approach is that movements in the natural rate of unemployment can be greatly affected by changes in the relationship between "insiders" (those with jobs) and "outsiders" (those out of jobs). The literature is discussed in detail in Chapman (1990) and so will be touched on only briefly here.

An important conclusion of this literature is that relatively decentralised bargaining systems, in which unions and employer organisations are weak, are likely to produce labour market outcomes that are relatively flexible in responding to market signals. Similarly, highly-centralised systems in which the needs of outsiders are taken into account can also produce flexible, market-type outcomes. In between these two extremes, flexibility is lost as insider bargaining units create negative externalities for outsiders.

Flexibility here is interpreted fairly loosely. In the "insider/outsider" literature, the idea is applied to the determination of the natural rate (or NAIRU - non-accelerating inflation rate of unemployment - as authors in this strand of the literature prefer). The idea, however, can also be applied to the slope of the trade-off between unemployment and inflation. If insider power is high and altruism low, wages will tend to be relatively inflexible downwards but relatively flexible upwards, regardless of the state of unemployment. Attempts by policy to generate real wage outcomes below the band targeted by insiders will result in unemployment, while attempts to raise real wages will add to inflation. Thus, the slope (and convexity) of the short-term Phillips curve could depend importantly on both the degree of decentralisation of the labour and product markets and the extent of altruism on the part of key bargaining groups.

44 Indeed, this literature argues that an altruistic, highly-centralised system can dominate a fully-decentralised system for flexibility.
45 Carter and Maddock (1987), for example, analyse the bargaining process as a strategic game. They conclude that non-cooperative outcomes are more inflationary than cooperative outcomes.
(b) Expectations and the slope of the short-run Phillips curve
Possibly the greatest (temporary) setback to the case for discretionary stabilisation policy came from the rational expectations literature\footnote{See, for example, Barro (1976), Lucas (1972 and 1975), and Sargent and Wallace (1975a and 1975b).}.

The essence of the supposed short-run trade-off between inflation and unemployment was the supposition that there existed some finite time period over which expectations could be taken as fixed. This gave the authorities the opportunity to induce inflation greater than expected, thereby reducing real wages and generating output and employment.

The rational expectations literature pointed out that it would be irrational of agents not to observe government actions and to incorporate the effect of those actions into their expectations.

In its most extreme form, the joint assumptions of rational expectations and market-clearing, yielded the result that predictable changes in policy would have no impact on real activity, even in the short run. While this conclusion was anathema to those who preferred interventionist monetary and fiscal policies, it was reassuring to those who argued that the optimal rate of inflation should be pursued vigorously; if the rational expectations models were correct, it would be sufficient simply to define the optimal rate and announce it to the world as a target, and the economy would move quickly and costlessly into line.

Like search theory, the extreme form of rational expectations suffered from an uncomfortable inability to explain the facts. The central idea, of recognising information available to rational decision makers, was rescued by Fischer (1975), Taylor (1979) and others, who showed that the policy ineffectiveness results came not from rational expectations \textit{per se}, but from their combination with the assumption of market clearing\footnote{For an entertaining account of historical developments in the rational expectations debate, see Gordon (1980).}. In this way, it became possible to reintroduce a short-run Phillips curve into rational expectations models. This was done, not by reintroducing irrationality but, rather, by introducing considerations such as: asymmetric information; fixed-term contracts\footnote{See also, Okun (1975).}; and, perhaps most importantly, through questioning...
the credibility of policy announcements in a world where people have memories and where incentives may exist to renge on policy commitments.

(c) Policy credibility

The role of policy credibility in steepening the short-run Phillips Curve is a fairly recent addition to the literature. As Backus and Drifill (1985b) observe, worldwide private sector wage demands in the early 1980s remained high despite the stated intentions of many governments to reduce inflation. Yet, on their records of the 1970s, few governments had strong grounds on which to convince the sceptics of their resolve. Not only did this lack of credibility create a gap between actual and expected policy, it may have led governments to pursue more drastic measures in an effort to convince the public of their resolve.

Contributors to the credibility literature\(^4\) model the behaviour of governments and private agents as actions in a strategic game. The game is played as a test of resolve until credibility is either established or the policy is abandoned as too costly. These analyses emphasise rationality as well as information in the policy process. The bottom line of this literature is both intuitive and analytically robust; the less credible the government is in its anti-inflationary stance, the greater the costs (the flatter the short-run Phillips curve) of reducing inflation.

Credibility is a difficult issue to establish empirically. At an intuitive level, a tightening of monetary policy that is credible in terms of its intention to lower inflation should cause short-term interest rates to rise more than long-term interest rates. Unfortunately, this outcome is also consistent with other hypotheses.

Using US data about money supply announcements, Engel and Frankel (1982), Urich and Wachtel (1981) and Cornell (1983), consider a range of outcomes for long-term and short-term interest rates, exchange rates and stock prices under four different hypotheses\(^5\). All hypotheses considered


\(^5\) These include: the expected inflation hypothesis (a rise in money means a rise in inflation); the policy anticipation or Keynesian hypothesis (credibility); the real activity hypothesis (that the money data carry information about changes in real activity); and the Risk-
involve a rise in short-term interest rates following an unexpected rise in
the money supply. Of the four, the policy anticipations hypothesis involves
the lowest rise in long rates (the outcome is actually ambiguous), though
how low is not clear. Empirically, the results are mixed, although Engel and
Frankel find evidence of a credible shift in US monetary policy following
the move to new operating procedures in the late 1970s.

B. Measuring the costs of disinflation

There are two main approaches that could be adopted in attempting to
measure the short-run costs of reducing inflation in Australia. The first is
to estimate a Phillips curve for Australia. The second is to draw on the
experiences of other countries that have attempted disinflation, treating
their experiences as 'semi-controlled' experiments.

(a) Empirical trade-offs for Australia

Direct estimation of Phillips curves was popular for a time in the early
1970s. Most of these studies (for example, Nevile (1974 and 1976), Parkin
(1973), Jonson, Maher and Thompson (1974), Carmichael (1974) and the
survey in Flagger (1978), use a structural approach to link inflation,
unemployment, expectations, productivity and taxes. Most also concentrate
on wages growth as the explanatory variable.\(^5^1\)

Methodology, data construction and definitions, and time periods vary
greatly across these various works. Most, however, find evidence of a short-
run trade-off, at least between wage inflation and some measure of labour
market imbalance. At the steeper end of the spectrum, Kirby finds a trade-
off of between three and four; that is, a one percentage point reduction in
wage inflation would require a rise in unemployment of one quarter of a
percentage point.\(^5^2\) Most other studies find trade-offs of between two and
three.

aversion hypothesis (that shifts in money reflect shifts in demand prompted by changes in
risk aversion).

\(^5^1\) Exceptions are Carmichael (1974) and Nevile (1974 and 1976).

\(^5^2\) Kirby uses quarterly rates of change for wages. To make the units comparable with other
studies, I have multiplied his range of co-efficients by four.
Taking the mid-point of these results would point to a trade-off of around one third of a percentage point rise in unemployment for each percentage point reduction in inflation. These analyses suffer from a range of empirical problems. Those concerned with data construction and the statistical properties of co-efficient estimates were argued out in the mid 1970s53.

The more difficult problem of exogeneity was raised in the 1980s. For co-efficient estimates to be valid, it is necessary that the independent variables in an estimated equation be genuinely independent. Interestingly, two studies at around the same time, reached essentially opposite conclusions about independence. Alston and Chalfant (1987), test the links between money supply, wages and prices. They conclude that money is exogenous, that wage growth depends on lagged monetary growth and current inflation and that there was bi-directional causation between wages and prices. They interpret this evidence as supporting the monetarist explanation of inflation. Boem and Martin (1989), carry out a similar set of tests, only to find a uni-directional causal link from wages to prices and an indirect link only from money to wages via prices. They interpret their results as rejecting the monetarist explanation. As argued earlier, it is probably misleading to look for consistent exogeneity in these variables. What is of paramount importance is to identify the (not necessarily constant) objectives of policy.

(b) Cross country comparison

The alternative approach to evaluating Australia's trade-off between inflation and unemployment is to draw on the experience of other countries. In many ways this is the more promising of the two approaches, although the limitations of such comparisons must be fully recognised. In particular, Australia's centralised wage-setting system is likely to give it some unique response characteristics. With these limitations firmly in mind, two lines of comparison appear likely to be fruitful. The first is with the recent experience of New Zealand. The second is with the anti-inflation experiments in the UK and the USA in the early 1980s.

53 See, for example, McDonald (1975) and Kirby (1981).
(i) The New Zealand experience

New Zealand since 1983 possesses many of the characteristics of a controlled experiment for Australia:\(^{54}\):

- both elected Labor governments which followed economically conservative policies;
- both economies underwent extensive financial deregulation;
- both went through fiscal contraction and tax reform;
- both floated their exchange rates;
- both are dependent on commodities in their export trade; and
- both suffered terms-of-trade reversals in the mid 1980s (first deteriorating, then improving, though New Zealand’s deterioration was much less marked than Australia’s).

The major structural difference is in the labour markets, where Australia has a strongly centralised wage-setting system. In contrast, New Zealand has given over a greater role to market forces. Following long periods of heavy intervention in the wage-setting process, the New Zealand Government moved to a non-interventionist approach from early in 1985. The result was a partially-deregulated market in which wage bargains were negotiated between employer organisations and unions organised along craft and occupational lines.\(^{55}\) Beyond the labour markets, the differences between the two countries are largely matters of degree; although New Zealand’s initial conditions (prior to deregulation) were arguably much worse than Australia’s in terms of distortions and inefficiencies.

From broadly similar starting points in 1983, Australia pursued an accommodating (de facto steady-inflation) monetary policy, while New Zealand, after a period of policy reform, pursued a fully-announced and

\(^{54}\)This point was noted by Bob Gregory at a recent conference.

\(^{55}\)For a more complete description of the New Zealand labour market, see Seiper and Wells (1989). They argue that the New-Zealand Government’s attempt to deregulate the labour market (admittedly in a timid form) before having completed deregulation of financial and product markets was a mistake that added to the cost of disinflation.
vigorously-implemented policy of reducing inflation. The initial experiences of both countries under their new Labour Governments were broadly similar. Both recovered strongly from the recession of the early 1980s and, while the inflation picture for New Zealand is distorted by the prices and incomes freeze between 1982 and 1984, there is evidence that both countries experienced a decline in their underlying inflation rates.\(^{56}\)

From around mid 1985, however, the two pictures diverge markedly. As shown in Chart 13 (see also, Table 3 below), over the second half of the 1980s, Australia's inflation was relatively steady at around seven and a half percent. In contrast, New Zealand reduced its inflation rate by a little over 10 percentage points (from a peak of over 15 percent\(^{57}\) to its current level of a little under five percent). Over the same period, Australia's unemployment rate fell by around two percentage points (to around six percent) while New Zealand's rose by around four percentage points (from around three percent to seven percent). Under the (admittedly simplistic) assumption that New Zealand can be viewed as a controlled experiment for Australia, the implicit short-run Phillips curve suggests that every one percentage point reduction in inflation would increase unemployment by around .6 of a percentage point. Under these conditions, halving Australia's inflation rate to four percent would increase the unemployment rate to well over eight percent. Under the same assumptions, eliminating inflation completely would increase unemployment to the levels experienced in the recession of 1982/83.

There are many reasons why these rough approximations could overstate the true trade-off involved for Australia. In particular, the substantial disruption to both labour and product markets at that time, associated with structural reforms undoubtedly added to New Zealand's problems, relative to those experienced by Australia.

There are also reasons why the trade-off may be understated. In particular, as pointed out by Chapman (1990), the rise in Australian labour force participation over this period suggests that the true decline in unemployment is greater than is indicated by the recorded data. By the

\(^{56}\)The unsustainability of the freeze is indicated by the speed with which inflation returned to its previous high level after the freeze was lifted.

\(^{57}\)The CPI for New Zealand is adjusted for the once-off increases in the price level in 1986 and 1989, associated with the introduction of their consumption tax.
same reasoning, the large fall in New Zealand's labour force participation over this period suggests that its measured unemployment may be a downward biased estimate of true unemployment.

CHART 13
AUSTRALIA AND NEW ZEALAND

This bias is not present in employment data. If the comparison is made in terms of employment growth, the trade-off looks considerably worse. Between 1985 and 1989, total employment in Australia grew by around 15 percent. Over the same period, total employment in New Zealand fell by around ten percent. The implicit (five-year) trade-off between employment and inflation suggested by these figures is a loss of employment of around two and a half percentage points for every one percentage point reduction in inflation. Since this occurs over a five-year period, it is equivalent to a
reduction in annual employment growth of around half a percentage point for every one percentage point reduction in inflation. Note that, even if job growth resumed at the original pace once inflation levelled off, the job loss during the transition period would be permanent and would be roughly equal to half the total growth differential multiplied by the initial level of employment\textsuperscript{58}.

One possible explanation of New Zealand's experience of a very flat short-run Phillips curve is low policy credibility. Despite the change of government and the clear resolve of the new Government to reduce inflation, the country's track record could not have generated any confidence in the authorities' ability to achieve their goals. This lack of credibility was probably heightened, rather than diminished by the far-reaching structural changes which were occurring at the time under deregulation and corporatisation. Certainly, nominal wage claims continued to run ahead of the Government's stated aims on inflation.

A second possible (not necessarily mutually exclusive) explanation of the divergence in experience between Australia and New Zealand in the latter half of the 1980s lies in the different labour market structures. As mentioned earlier, Chapman (1990) argues that the Accord appears to have altered the balance of power between labour market insiders and outsiders in a way that has permitted unemployment to decline without, at the same time, putting undue pressure on inflation. The converse appears to have occurred in New Zealand where insiders have continued to bargain to maintain real wages despite sharp rises in unemployment.

(ii) The UK and US experience
Both the UK and US economies undertook substantial anti-inflationary measures in the early 1980s. As shown in Charts 14 and 15, the economic outcomes in these two countries in the second half of the 1980s are quite similar and, in many ways, not dissimilar to those in Australia.

\textsuperscript{58}This measure assumes the loss of job growth is uniform over the period and is a rough approximation to the cumulative difference between the total time worked under the two scenarios.
### TABLE 3
INFLATION, UNEMPLOYMENT AND GROWTH: AUSTRALIA, NEW ZEALAND, THE UNITED KINGDOM AND THE UNITED STATES

#### INFLATION (% pa)

<table>
<thead>
<tr>
<th>Period</th>
<th>Australia</th>
<th>New Zealand</th>
<th>United Kingdom</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 (Ave.)</td>
<td>10.2</td>
<td>17.3</td>
<td>18.0</td>
<td>13.6</td>
</tr>
<tr>
<td>1985 (Ave.)</td>
<td>7.0</td>
<td>15.5</td>
<td>6.1</td>
<td>3.6</td>
</tr>
<tr>
<td>1989 (Ave.)</td>
<td>7.6</td>
<td>4.7</td>
<td>7.8</td>
<td>4.8</td>
</tr>
</tbody>
</table>

#### UNEMPLOYMENT (% of workforce)

<table>
<thead>
<tr>
<th>Period</th>
<th>Australia</th>
<th>New Zealand</th>
<th>United Kingdom</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 (Ave.)</td>
<td>6.1</td>
<td>2.5</td>
<td>6.5</td>
<td>7.1</td>
</tr>
<tr>
<td>1985 (Ave.)</td>
<td>8.2</td>
<td>3.2</td>
<td>11.2</td>
<td>7.1</td>
</tr>
<tr>
<td>1989 (Ave.)</td>
<td>6.2</td>
<td>7.1</td>
<td>6.4</td>
<td>5.2</td>
</tr>
</tbody>
</table>

#### EMPLOYMENT (cumulative % growth over 5 yrs.)

<table>
<thead>
<tr>
<th>Period</th>
<th>Australia</th>
<th>New Zealand</th>
<th>United Kingdom</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 to 1985</td>
<td>6.6</td>
<td>2.8</td>
<td>-3.7</td>
<td>7.6</td>
</tr>
<tr>
<td>1985 to 1989*</td>
<td>15.4</td>
<td>-10.0</td>
<td>9.3</td>
<td>10.3</td>
</tr>
</tbody>
</table>

#### NATIONAL OUTPUT (cumulative % growth over 5 yrs.)

<table>
<thead>
<tr>
<th>Period</th>
<th>Australia</th>
<th>New Zealand</th>
<th>United Kingdom</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980 to 1985</td>
<td>16.4</td>
<td>14.8</td>
<td>7.9</td>
<td>12.5</td>
</tr>
<tr>
<td>1985 to 1989*</td>
<td>15.7</td>
<td>2.9</td>
<td>16.4</td>
<td>15.5</td>
</tr>
</tbody>
</table>

* Where complete data for 1989 were not yet available, the averages were based on the latest available observations.

In all three countries, inflation in the second half of the eighties was relatively constant compared with the preceding decade and a half; the levels, however, varied somewhat, with Australia averaging around seven and a half percent, compared with around five and a half percent in the UK.
and under five percent in the US. All three experienced a steady decline in unemployment and reasonably solid growth in output and employment. The UK, of course, diverges from this neat categorisation in the final two years of the decade, in which the stance against inflation was largely reversed. While more will be said about this below, the focus of this exercise is on the first half of the decade where the UK and US experiences diverge most sharply from Australia’s.

From the time it was first elected in May 1979, the Thatcher Government tightened UK monetary policy in an effort to redress the inflationary excesses of the 1970s. As shown in Chart 14 and Table 3, the result of this policy, and the decline in world energy prices, was a reduction of around 12 percentage points in the inflation rate over the first half of the 1980s.

**CHART 14**

**AUSTRALIA AND THE UNITED KINGDOM**

**INFLATION**

**UNEMPLOYMENT**

**EMPLOYMENT GROWTH**

**OUTPUT GROWTH**
A similar picture emerged in the US (see Chart 15), where the sharp monetary contraction of the early 1980s saw inflation decline by around 10 percentage points from around 13 and a half percent to around three and a half percent. Over the same period, Australia's inflation rate declined by around three percentage points.

**Chart 15**
**Australia and the United States**

*Inflation*

*Unemployment*

*Employment Growth*

*Output Growth*

Unemployment increased in all three countries though, by mid decade, the rise in the United States had largely been reversed. The rise in unemployment in the UK was considerably larger and was sustained well into the second half of the decade.

While the grounds for regarding these two countries as controlled experiments for Australia are less compelling than was the case for New
Zealand, the same methodology provides an interesting contrast. Taking
the first half of the 1980s as a whole, the decline in inflation in the UK
relative to Australia was a little over nine percentage points, while the
relative unemployment rate increased by around three percentage points.
This suggests a trade-off of around one third of a percentage point rise in the
rate of unemployment for each one percentage point reduction in inflation;
this is around half the rise in unemployment implied by the New Zealand
comparison. This would be a more acceptable trade-off than that implied by
New Zealand's experience, though by no means would it imply a costless
path to low inflation.

The United States suggests an even more favourable trade-off. While
inflation in the US declined relative to inflation in Australia by almost
seven percentage points over the first half of the 1980s, its relative
unemployment situation improved by around two percentage points.
Measured in terms of lost employment, rather than rises in unemployment,
the US still shows a modest gain of around one percent over the five-year
period. Using lost output as the yardstick shows a cumulative loss for the
US relative to Australia of around four percent points over the five years.59

(iii) Labour market structure and policy credibility

These cross-country comparisons suggest a possible short-run relationship
between inflation and unemployment ranging from an approximately
vertical short-run Phillips curve (if the US is taken as the relevant
benchmark) to a trade-off of around .7 of a percentage point rise in
unemployment for each percentage point decrease in inflation (if New
Zealand is taken as the relevant benchmark).

In each of these thought experiments the trade-off is implicitly
superimposed on top of any other shocks that might have influenced either
or both of inflation and unemployment; for example, world business cycles,
commodity price swings and taste or regulatory changes. As such, they are
not so much statements about where unemployment and inflation are
likely to move in absolute terms, as they are statements about how these
two variables are likely to move relative to each other.

59See footnote 58.
The question is whether Australia is more like New Zealand or whether it is more like the UK and US. In turn, this requires some judgement about the relative importance of policy credibility and labour market structure in determining the shape of the short-run trade-off between inflation and unemployment.

Chart 16 shows the path of short-term interest rates, along with the percentage point gap between short-term and long-term rates in the four countries over the periods under consideration. Under the assumption that a credible monetary policy should see short rates rise well above long rates in times when monetary policy is attempting to reduce inflation, the behaviour of these differentials can be taken as a (very rough) guide to the degree of monetary policy credibility in each country.

Comparisons are difficult to the extent that each country tends to have a slightly differently-shaped "normal" yield curve. The evidence from Chart 16 points to a reasonable level of credibility in each of the four countries with no one country standing out.

The labour market structure explanation is also difficult to establish empirically. The general story, however, appears to be consistent with the data. The US labour market is relatively decentralised, with a low level of union power and extensive enterprise-based wage bargaining. Following the tightening of US monetary policy in the early 1980s, the labour market responded quickly and flexibly. By the end of 1983, total employment was again growing positively and, despite the subsequent sustained period of real economic growth, nominal wage claims remained relatively subdued.

The UK began the decade with a very different labour market structure to that of the US; union power was strong and was organised on a trades and crafts basis rather than by enterprise. Against this background, the response to the fight against inflation was a greater and more prolonged rise in unemployment. This period, however, also marked a change in UK industrial relations, with the Thatcher Government showing a willingness to meet the more militant unions head on. By the mid 1980s the UK had, arguably, moved towards a considerably more decentralised wage-setting system. This occurred at a time when Australia was increasing its degree of
centralisation and New Zealand was more or less marking time with labour market reforms.

Of most interest in the UK, however, is the apparent reversal of emphasis on monetary policy in the later stages of the 1980s, away from inflation and towards exchange rate maintenance. In the view of many commentators, the UK has abandoned its anti-inflationary policy at the worst possible time, having suffered the costs while seeing few of the gains.

CHART 16
INVERSION OF YIELD CURVES

(c) Lessons for Australia

In evaluating Australia's prospects for reducing inflation at minimal cost, the key questions remain credibility and industrial structure. In this respect, the short-term outlook is not encouraging. Any attempt to reduce inflation by monetary policy alone - without a corresponding adjustment in wage
agreements under the Accord - would tend to lack credibility by its very attempt to run against the general thrust of Government macroeconomic policy.

More importantly, if the lessons from overseas are relevant and if the assessment of Section 2 is correct, the Accord has worked to produce a relatively flat short-run trade-off for Australia. Such a trade-off is ideally suited to reducing unemployment, but much less so to reducing inflation. In the worst of all outcomes, an attempt by monetary policy to pursue a major reduction in inflation could cause the Accord to collapse. Without the structure to handle fully-decentralised wage bargaining, the result could be a return to the strong "insider-oriented" system of the 1970s, with a possible rise in both inflation and unemployment.

This structure does not rule out the theoretical possibility of using the Accord and monetary policy in tandem to reduce inflation. If parties to the agreement were willing to accept the possible loss of income share, the evidence suggests that a steady reduction in nominal wage growth, backed by tighter monetary policy could reduce inflation without creating widespread unemployment. Acceptance, however, would require faith in monetary policy as well as a willingness to accept some rise in unemployment. This would require a very different form of Accord to that which is in place at present; a form which would be very unlikely to elicit support, if historical evidence is any guide.

To a large extent, the Accord with generally supportive monetary policy, represents a means of living with institutional rigidities at relatively low cost. Unless there is a change in the direction of altruism under the Accord a major attack on inflation should probably wait until the mandate is given to dismantle the rigidities. Then, and only then, is the cost of disinflation likely to be tolerable.

5. CONCLUDING THOUGHTS

The 1980s appear to have seen a substantial rethinking in many parts of the community about the processes generating inflation and the costs of living with inflation.
From a reasonable consensus in the 1960s and 1970s about the central importance of monetary policy and monetary aggregates in the inflationary process, views about inflation now seem both more diverse and less precise. The Labor Government, in office for most of the 1980s, has clearly identified its view of inflation as a wages process. This is a view is by no means universally accepted. The monetary authorities appear to remain committed to the view that monetary policy can control inflation, though the mechanism for achieving this is less direct than previously thought and probably less reliable. In academic circles views remain, as always, mixed.

Whatever the beliefs about the reliability of monetary policy in containing inflation, the general consensus in the early 1980s was that deregulation and a floating exchange rate gave the Reserve Bank a capacity to pursue lower inflation that it had lacked in the preceding decade of high inflation. That Australia's performance on inflation deteriorated relative to the world trend over the remainder of the eighties appears to reflect a conscious choice within the overall macroeconomic policy strategy of the Government.

To the extent that the strategy aimed to generate high economic growth with a steady (non-accelerating) rate of inflation, it must be judged relatively successful. The longer-term success of the strategy depends on how one evaluates the costs of steady inflation. In current circumstances, it is difficult to mount a case that the costs are overwhelming. While the Australian economy is far from inflation proof, financial deregulation and reforms enacted to the tax system during the decade have reduced considerably some of the more costly distortions exposed during the 1970s.

More importantly, evidence from other countries offers little comfort that the short-term costs of substantially reducing or eliminating inflation will be acceptable to society. Given Australia's history with inflation and the continued existence of the Accord, the preconditions, in terms of expectations and credibility, for a relatively costless reduction of inflation do not appear to be present.
### APPENDIX

**MAJOR CHANGES IN THE AUSTRALIAN TAX SYSTEM:**

**1980 - 1989**

<table>
<thead>
<tr>
<th>Estimated Change in Receipts ($m)</th>
<th>Initial</th>
<th>Full Year</th>
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<tbody>
<tr>
<td><strong>1980/81</strong></td>
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<tr>
<td>Half Indexation of Personal Income Tax Rate Scale</td>
<td>-636</td>
<td>-690</td>
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<tr>
<td>Increased Dependent Rebates</td>
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<tr>
<td>Other Changes to Personal Income Tax</td>
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<td>-943</td>
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<td>Rebate on Home Loan Interest Payments</td>
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<td>Rebate on up to $1,000 of Dividend Income</td>
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<tr>
<td><strong>1983/84</strong></td>
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<tr>
<td>Introduction to Medicare Levy</td>
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<td>Abolition of Income Tax Rebate for Basic Health Insurance</td>
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<td>+2,584</td>
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| **1984/85**                                                              |         |           |
| Changes to Personal Income Tax Rate Scale                                 | -1,297  | -2,125    |
| Other Changes to Personal Income Tax                                     | -42     | -50       |
| Changes to Business Income Tax                                           | +22     | +117      |
| **TOTAL**                                                                | -1,317  | -2,058    |

| **1985/86**                                                              |         |           |
| Abolition of Concessional Expenditure Rebate                             | +15     | +80       |
| Removal of Ceiling on Medicare Levy                                     | +7      | +12       |
| Other Changes to Personal Income Tax                                     | +61     | -64       |
| Changes to Business Income Tax                                           | -       | -70       |
| **TOTAL**                                                                | +83     | -42       |

| **1986/87**                                                              |         |           |
| Personal Income Tax Scale Rate Restructuring (including reduction of top | -1,435  | -5,000    |
| marginal tax rate from 60% to 49% in two steps)                          |         |           |
| Abolition of Entertainment Expenses                                     | +310    | +330      |
| Fringe Benefits Tax                                                     | +325    | +575      |
| Increase in Medicare Levy                                               | +175    | +325      |
| Imputation System of Company Tax                                        | -       | -350      |
| Other Income Tax Changes                                                | +420    | +230      |
| **TOTAL**                                                                | -225    | -3,890    |
|--------------------------|-------------------------------|---------|---------|
| Personal Income Tax Scale Rate Restructuring | -4,480                        | -4,560  |         |
| Imputation System of Co. Tax | -50                          | -300    |         |
| Fringe Benefits Tax       | +750                          | +750    |         |
| Capital Gains Tax         | 50                            | na      |         |
| Other Income Tax Changes  | 240                           | 142     |         |
| TOTAL                     | -3,490                        | -3,968  |         |

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REFERENCES


