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Missing money found causing Australia's inflation

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ABSTRACT

This paper examines the nexus between excess currency growth and inflation in Australia. It first canvasses the operation of monetary policy. Using different econometric techniques, it next examines how well excess money supply growth, measured in terms of currency and M3, explains Australia's inflation over the long term from 1970–2015, and then more specifically before and after the adoption of inflation targeting. Its key result is that excess money growth has been the main determinant of Australia's inflation, although became less important during the inflation targeting era. This implies the velocity of currency, the *sine qua non* of the Quantity Theory of Money, has been remarkably stable. Given the role excess currency plays in generating Australian inflation, it should be afforded greater prominence in monetary policy deliberations.

1. Introduction

Australia has experienced numerous episodes of high inflation since Federation, most notably during the First World War and its aftermath, the Second World War, the Korean War, and throughout the 1970s and 1980s due to high world oil and other commodity prices. There were also instances of deflation in the early 1920s and 1930s, while the most prolonged disinflation occurred from the mid-1970s until the early 1990s when inflation targeting was adopted. Since then inflation has remained low by historical standards within the average 2–3 per cent inflation target range, a phenomenon that has attracted little theoretical or empirical analysis in the economics literature (Fig. 1).

To analyse Australia's inflation experience pre- and post-inflation targeting this paper focuses on the role of money, recalling that Friedman (1968), in the context of the Keynesian-Monetarist debate of the 1970s, famously asserted that "inflation is always and everywhere a monetary phenomenon". Early empirical studies of the determinants of inflation found that the classic Quantity Theory of Money that Friedman revived, and which can be traced back to Roman times, Hume (1748) and Fisher (1911) amongst others, best explained inflation over the long run.

Notable early studies of the causes and effects of inflation include Bailey (1956), Fischer and Modigliani (1978), Vogel (1974), Lucas (1980), Hall (1982), Dwyer and Hafer (1988), Laidler (1991), Cooley and Hansen (1991), Pakko (1994), Poole (1994) and Dotsey and Ireland (1996). A comprehensive empirical study by McCandless and Weber (1995) examined data from 110 countries over a 30 year period using three definitions of a country's money supply (M0, M1 and M2) and concluded price level change and money supply growth were highly correlated for all measures and country sub-samples.

Despite the evidence from these early studies and the practice of money supply targeting it inspired in many countries, surprisingly little recent research has been undertaken on the role the money supply has played as an explicit determinant of inflation.[1] This paper addresses this gap and contributes to the monetary economics literature in several ways. First, it examines the monetary transmission mechanism in advanced economies and money's role in determining inflation. Second, using an alternative specification of the recently neglected quantity theory, it then analyses the inflation experience of Australia as a case study before and after the adoption of inflation targeting. Third, new results show alternative monetary measures, particularly currency, explain Australia's past and more recent inflation behaviour.

Lastly, the paper contributes to Australian economic policy evaluation by highlighting how the adoption of inflation targeting by the monetary authorities signalled a major institutional change of lasting benefit to the Australian economy. Prior to inflation targeting, monetary policy in Australia had not had a clear objective, and had previously adopted a so-called "checklist" approach, whereby monetary policy was simultaneously directed toward multiple objectives, including economic growth, employment, the current account deficit, with inflation control of secondary importance.

This paper examines Australia's inflation behaviour, uniquely focusing on two measures of the money supply, currency and the broader money measure M3. It is structured as follows. Section 2 canvasses the relationship between interest rates, money and inflation targeting, reconciling it with the money oriented analysis to follow.

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[1] Exceptions are Sargent and Surico (2011), Pruitt (2012) and Lubik and Matthes (2016) which focus on historical inflation episodes in the United States.

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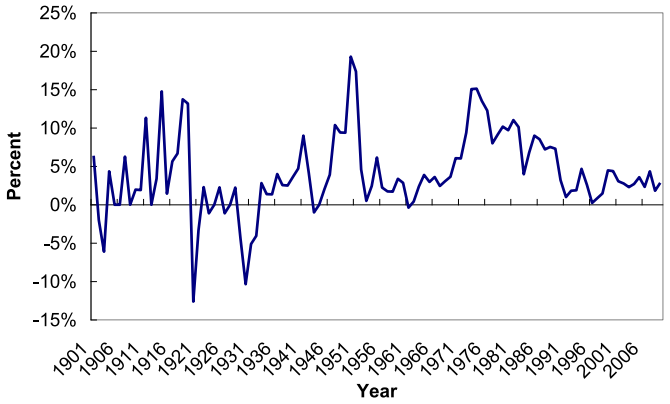

Fig. 1. Consumer Price Inflation in Australia, 1901–2010.
Source: Australian Bureau of Statistics, Cat. No. 6461.0, *Consumer Price Index: Concepts, Sources and Methods*, Australia, 2011.

Section 3 empirically examines Australia's inflation experience from a QTM perspective, revealing that excess money growth - changes in the money supply in excess of real GDP growth – has historically been a predictor of CPI inflation in Australia, especially during the relatively high inflation era before inflation targeting. Section 4 provides the key empirical results while Section 5 concludes the paper.

2. Inflation targeting, interest rates and money

2.1. The monetary transmission mechanism

Australia is one of 28 countries practising inflation targeting, a group fairly evenly divided between advanced economies, including Japan, the United Kingdom, Canada, and New Zealand and emerging economies, including Brazil, Indonesia, Turkey and South Africa (Bank for International Settlements 2016).

The worldwide adoption of inflation targeting was an acknowledgement that high inflation harms economic growth by imposing real costs and that monetary policy only influences nominal rather than real variables in the long run. These real costs include resource misallocation costs that arise in a high inflation environment when relative price signals become difficult to discern, the 'menu cost' to firms of high frequency price mark up, and the 'shoe-leather cost' associated with minimising cash balances to avoid the inflation tax.

To achieve a given inflation target, central banks operating independently of government with a high degree of transparency and accountability focus on an intermediate monetary target, which is a prescribed short term interest rate, such as the overnight cash rate in Australia, the bank rate in the United Kingdom or the federal funds rate in the United States, rather than the money supply, exchange rate, asset prices or nominal GDP. Hence, one instrument, a short term interest rate, aims at one target, the medium term inflation rate.

Under inflation targeting the main channels through which changes in the official interest rate influence aggregate demand and hence the overall price level are via other interest rates, asset prices, and the exchange rate. In Australia's case, the official interest rate is the short term cash rate, whose movements are strongly correlated with other key interest rate series, as Fig. 2 shows.

Varying real interest rates across the spectrum alters real investment, most notably including housing, by changing the cost of capital, and influences household consumption to the extent this is interest sensitive. Interest rate changes also influence asset prices, particularly equities and real estate more generally, thus re-enforcing the impact on investment via Tobin's q and on consumption via household wealth.

The interest rate-exchange rate link provides another key transmission channel. Standard Mundell-Fleming analysis suggests that higher domestic interest rates induce foreign capital inflow which strengthens

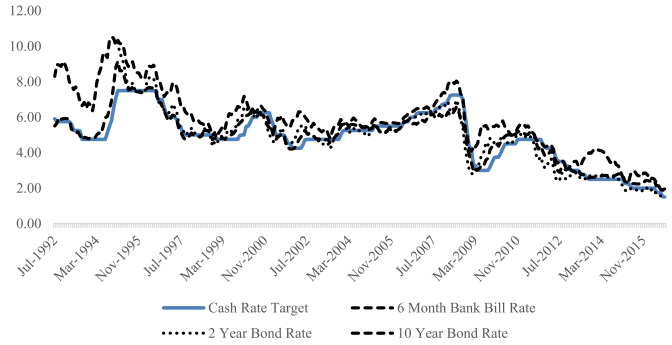

Fig. 2. The cash rate and market interest rates.

the real exchange rate. This worsens the economy's competitiveness in relation to its trading partners, resulting in lower export volumes and higher import volumes. Hence, the net exports component of aggregate demand also plays a key role. In addition, pass-through of exchange rate changes to the domestic currency prices of internationally tradable goods and services directly influences the tradables component of the CPI, raising (lowering) it following a cut (rise) in official interest rates.

2.2. Interest rates and the money supply

If the central bank targets the interest rate, the money supply becomes endogenous, and vice versa, as illustrated in Fig. 2. For instance, assume the central bank initially aims for an official interest rate of i_0. With relatively stable real money demand depicted by schedule $L_{0,1}$, the central bank has to provide sufficient liquidity, and hence vary the real money supply,M_0, via its cash management operations, to achieve the i_0 target.

If the central bank relaxed monetary policy by lowering the target interest rate to i_1, the money supply would endogenously increase to M_1. Alternatively, if the central bank was to target the money supply at level M_1, the interest rate would endogenously fall to i_1. This suggests an inverse relationship between the official interest rate and the money supply. Fig. 3 provides evidence of this inverse relationship between the official cash rate and quarterly changes in the money base ($billions) in trend terms during Australia's inflation targeting period (with R^2 of 0.22).

Inflation targeting by the Reserve Bank of Australia kept consumer price inflation between 2 and 3 per cent, on average, over the economic cycle, although monetary aggregates are no longer an instrument of monetary policy. However, in light of the inverse relation between interest rates and the monetary supply, it is worth examining money's role explicitly in the Australian context and in what follows we focus on a narrow monetary aggregate – currency growth – and a broader money measure, M3. In preview, our empirical results suggest that although monetary aggregates are no longer used for policy purposes,

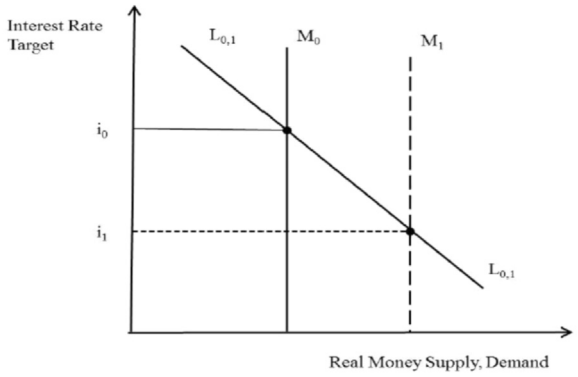

Fig. 3. Interest rate vs money supply targeting.