



Exchange rate movements and the Australian economy[☆]



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ABSTRACT

We use a structural vector autoregression model to characterise the aggregate and industry effects of exchange rate movements on the Australian economy. We find that a temporary 10% appreciation of the real exchange rate that is unrelated to commodity prices or interest rate differentials lowers the level of real GDP over the subsequent one-to-two years by 0.3% and year-ended inflation by 0.3 percentage points. The mining, manufacturing, personal services, construction and business services industries are the most exchange rate sensitive sectors of the economy. In the context of the boom in Australia's terms of trade over the past decade, we use our model to explore how the Australian economy might have evolved under alternative scenarios. These suggest that exchange rate movements over the past decade have had a stabilising effect on the domestic economy and can largely be explained by economic fundamentals.

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1. Introduction

Over recent decades, the Australian economy has experienced significant swings in the value of its real and nominal exchange rates. Economic theory would suggest that these exchange rate movements, by altering the relative prices of domestically and foreign produced goods and services, should lead to changes in production, inflation and interest rates. To the extent that industries differ in their trade exposure and in their price sensitivity of demand and supply, exchange rate movements will also have compositional effects, causing some industries to expand and others to contract.

But to what extent do these effects depend on the economic factors that have driven movements in the exchange rate? Which sectors are most sensitive to exchange rate movements? And how would the real exchange rate and the Australian economy more broadly have behaved if Australia's economic environment had evolved differently? In this paper we present some answers to these questions.

To do so, we estimate a structural vector autoregression (SVAR) model of the Australian economy. We identify exchange rate shocks as any movement in the exchange rate not explained by other economic

factors, such as interest rates or the terms of trade. At an aggregate level, our model allows us to quantify the macroeconomic effects of exchange rate shocks. Our results suggest that a temporary 10% appreciation of the exchange rate that is unrelated to commodity prices or interest rate differentials reduces the level of real GDP by 0.3% and year-ended inflation by around 0.3 percentage points over the subsequent eighteen months and is typically followed by a decrease in the cash rate of around 40 basis points.

At an industry level, we find that the most trade-exposed industries, including the mining and manufacturing industries, are the most responsive to exchange rate movements. But large responses are not confined to industries that export or compete with imports. Some industries that respond to exchange rate movements, such as business services, have little direct trade exposure but produce inputs into the production processes of trade exposed firms. In general, an exchange rate appreciation lowers output in directly or indirectly trade exposed industries. In contrast, some industries in the nontraded sector of the economy, such as retail trade and wholesale trade, expand production following an appreciation.

Our model indicates that foreign sector variables, including the terms of trade, are the major cause of movements in Australia's real exchange rate. In contrast, exchange rate shocks themselves are a minor contributor to the volatility of domestic economic variables. This is consistent with the idea that exchange rate movements typically serve as a shock absorber for the Australian economy, rather than acting as a source of shocks in their own right.

To investigate the role of the exchange rate further, we analyse two scenarios. In the first, we ask how the Australian economy might have evolved over the past decade if it had experienced the same macroeconomic shocks but the nominal exchange rate had not appreciated. We find that, even if the nominal exchange rate had remained constant in

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an environment in which the prices of Australia's export commodities were increasing rapidly, the real exchange rate would still have appreciated. However, this real exchange rate appreciation would have been accompanied by a large increase in domestic inflation and higher nominal interest rates. Moreover, output growth is largely unaffected because it ultimately depends upon the real, not the nominal, exchange rate. This scenario provides a practical illustration of how nominal exchange rate flexibility has helped to insulate the Australian economy from foreign shocks.

In the second scenario, we examine the contribution of international economic developments to the level of the real exchange rate and Australia's economic performance more broadly over the past decade. Our model suggests that, without a rising terms of trade and strong growth in overseas economies, the real exchange rate would not have appreciated. But a weaker real exchange rate would not have resulted in faster economic growth, as it would merely have reflected a weaker external environment. This scenario emphasises the point that what causes exchange rate movements determines their effect on the Australian economy.

Although our paper focusses on Australia, we believe that the results are of wider interest. The experiences of Australia are representative of a broad set of small open economies, including Canada, Chile, New Zealand and South Africa. Although these economies have their own idiosyncrasies, they each have largely market determined nominal exchange rates and export bases that are heavily weighted towards resource and agricultural commodities. Over the past decade, each of these economies has experienced large increases in the relative prices of their commodity exports, accompanied by an appreciation of their nominal and real exchange rates.¹ Our results may shed light on the causes and impacts of exchange rate movements, particularly over the past decade, on these economies.

Our results may also be relevant for policymakers in economies with less flexible exchange rate arrangements. Many of these economies exhibit a 'fear of floating' caused, among other factors, by concerns about the destabilising effects of nominal exchange rate volatility (Calvo and Reinhart, 2002). Our paper suggests that, at least for resource-commodity exporting economies like Australia, these concerns may be exaggerated.

This paper contributes to three strands of the existing literature. First, it is related to papers that examine the sectoral and industry implications of macroeconomic shocks on the Australian economy. Examples of this include Lawson and Rees (2008) and Vespignani (2013), who examine the effects of monetary policy shocks, and Cagliarini and McKibbin (2009), who describe the impacts of foreign shocks. In a similar spirit, Battersby et al. (2013) decompose variation in sectoral employment growth into sector-specific shocks and common economy-wide shocks. Our contribution to this literature is to document the industry-level effects of exchange rate shocks, which are an important source of macroeconomic volatility for small open economies. Second, our paper complements other papers that describe the effect of exchange rate movements on open economies. Examples of this include Karagedikli et al. (2013), who examine the sectoral impacts of exchange rate shocks in New Zealand, and Hahn (2007), who investigates how exchange rate shocks affect sectoral activity and prices in the euro zone. For Australia, Leu (2011) and Voss and Willard (2009) report dynamic responses of aggregate variables to exchange rate shocks. However, some of the responses in Leu (2011) are at odds with economic theory – for instance an exchange rate appreciation raises inflation – while Voss and Willard (2009) do not quantify the effects of their exchange rate shock on output or inflation. Moreover, neither Leu (2011) nor Voss and Willard (2009) examine the sectoral consequences of exchange rate movements. Third, our paper contributes to the literature estimating structural VAR models of small open economies. We cannot do

justice to this large body of work in the space available but instead point the interested reader to leading examples, including Cushman and Zha (1997), Bruneau and de Bandt (2003), Dungey and Pagan (2009), Jääskela and Smith (2013), Narayan (2013) and Knop and Vespignani (2014). In contrast to our paper, most of these papers focus on the effects of monetary, fiscal and commodity price shocks in open economies rather than exchange rate movements.

The rest of the paper is structured as follows: Section 2 describes our empirical model and data; Section 3 outlines our core results; Section 4 uses our model to present a number of counterfactual scenarios of how the Australian economy might have evolved if the exchange rate or global economy had behaved differently; Section 5 provides robustness checks; and Section 6 concludes.

2. Model and data

This section outlines the statistical model that we use to examine exchange rate shocks and describes the data.

2.1. The VAR model

We use the following vector autoregression (VAR) framework throughout our analysis. Let $Y_t \equiv [F_t D_t]'$ be a vector of foreign (F_t) and Australian (D_t) economic variables. We are interested in analysing the structural VAR:

$$AY_t = \tilde{A}(L)Y_t + \varepsilon_t. \quad (1)$$

Where the matrix A summarises the contemporaneous relationships between the variables, $\tilde{A}(L)$ is an autoregressive lag polynomial of order L and ε_t is a vector of independently and identically distributed structural shocks with a variance covariance matrix Σ . Consistent with the small open economy assumption typically used in studies of the Australian economy, we restrict the parameters of A and $\tilde{A}(L)$ so that Australian economic developments do not affect foreign variables either contemporaneously or with a lag.

We identify exchange rate shocks using a recursive ordering. Specifically, we define an exchange rate shock as any movement in the real exchange rate that is not explained by contemporaneous or lagged changes in other macroeconomic variables.²

This identification rests on two assumptions. First, that macroeconomic shocks affect the real exchange rate immediately. Second, that exchange rate shocks affect other macroeconomic variables with a lag. To justify the first assumption, we note that short-term movements in the real exchange rate largely reflect changes in nominal exchange rates. The Australian dollar floats freely and its nominal value is determined in highly liquid foreign exchange markets. Hence, its value can adjust rapidly to incorporate changes in macroeconomic fundamentals. The second assumption is consistent with the idea that it takes time for firms to alter pricing and production decisions in response to changed monetary conditions, including changes in exchange rate levels. At first glance, the case for a delayed monetary policy response to exchange rate movements might seem less plausible as movements in exchange rates are readily observable. However, numerous empirical studies have found that, in practice, exchange rate movements do not have a large direct influence on monetary policy decisions in Australia (Kam et al., 2009; Lubik and Schorfheide, 2007).³ In Section 5 we demonstrate that our results are insensitive to the ordering of the exchange rate and interest rate variables in the VAR.

² More formally, we identify exchange rate shocks by taking a Choleski decomposition of the variance-covariance matrix of the reduced form representation of Eq. (1). This is the same identification strategy used by Karagedikli et al. (2013).

³ Exchange rate movements may still have an indirect effect on monetary policy settings through their effect on inflation and output.

¹ For a discussion of the economic performance of these economies over the past decade, see Connolly et al. (2013).

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