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Growth in China and the US: Effects on a small commodity exporter economy

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ABSTRACT

This paper provides a comparative quantitative analysis of the relative effects of economic growth in the US and China on a small commodity exporting country, namely New Zealand. The framework is an SVAR model with an exogenous global block consisting of GDP growth in the two major international economies and world commodity price inflation; regional influences are controlled through the inclusion of Australian GDP growth, while the domestic block consists of GDP growth, inflation, interest rates and changes in the real exchange rate. Using a sample period from 1986 to 2011, we find that although growth spillovers to New Zealand GDP are substantially greater from the US than from China, nevertheless growth in China induces larger responses in the New Zealand real exchange rate than does the US. Commodity price responses to growth in each of the large economies are also explored, while time-varying estimates provide some evidence of increasing responses of commodity prices and the New Zealand real exchange rate to growth in China.

1. Introduction

China is now the world's second largest economy and, according to the forecasts of the International Monetary Fund, will overtake the United States later in the current decade. Indeed China's economic performance over the last two decades has been remarkable, accounting for less than 4% of world gross domestic product (GDP) in 1990 but 15% in 2012.[1] These figures would be striking at any time, but in the context of faltering global growth since the onset of the 2008 financial crisis, they underline the importance of continued growth in China for the world economic outlook.

Nevertheless, a large body of empirical literature continues to assume that US variables provide the key international drivers for small open economies; see, for example, Cushman and Zha (1997) for Canada, Dungey and Pagan (2000) for Australia, or Conway (1998) for New Zealand, while Kam et al. (2009) and Justiniano and Preston (2010) make this assumption in studies that examine all three of these small economies. While it is arguable that the US "essentially serves the role of the rest-of-the-world to Canada" (Cushman and Zha, 1997, p.435), this is not the case for countries that are geographically distant from North America, such as Australia or New Zealand, for whom China is more important in trading terms.[2]

New Zealand is a particularly interesting example of a small open economy for studying the domestic effects of international shocks. It was, in 1990, the first country in the world to adopt an explicit inflation target, hence facilitating modelling the domestic economy as a temporally stable system. Although exports comprise more than 30% of GDP (New Zealand Government, 2013), the rest of the world for New Zealand largely consists of China, the US and Australia,[3] the last of which is also a small (in world terms) commodity exporter subject to international influences. Therefore, rather than treating foreign output as a homogenous whole, a study of New Zealand permits the influences of each of the two leading world economies to be distinguished within a modelling framework. From the perspective of the world economy it is important to understand the drivers of the exchange rate for small commodity produce exporters, such as New Zealand, since Chen et al. (2010) show that these exchange rates contain predictive information for future world commodity price movements, while the recent analysis

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[1] Projections in the database accompanying the International Monetary Fund (2012) show China accounting for just over 18% of world GDP (based on a purchasing power parity valuation) in 2017, with a slightly smaller value for the US. The 1990 and 2012 figures for China are also from this source, which shows the US share of world GDP declining from 25% to 19% over the same period.

[2] China is Australia's most important trading partner, accounting for 26% of exports, compared with 5% to the US, in 2012 (Australian Government, 2013); the comparable figures for New Zealand are 14% and 9%, respectively (New Zealand Government, 2013).

[3] Australia is New Zealand's major trading partner and accounted for 22% of exports in 2012. From the perspectives of both exports and imports, Australia, China and the US are the country's three major trading partners (New Zealand Government, 2013).

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of Dungey et al. (2014) establishes the strong response of commodity prices to demand from China.

This paper quantifies the impact of growth in each of China and the US on key macroeconomic variables for New Zealand, explicitly taking account of transmission through commodity prices and allowing these world effects to operate indirectly through Australia as well as directly to New Zealand. For this purpose, we employ a structural vector autoregressive (SVAR) model, imposing the usual contemporaneous causality restrictions between domestic GDP growth, inflation, interest rates and the exchange rate, with exogeneity restrictions for foreign variables. We allow for ambiguity in the contemporaneous causal order between the US and China by investigating the robustness of responses to the ordering assumption, while time-variation since the mid-1980s is investigated through moving window estimation of the SVAR parameters.

Our key finding is that although the US has larger growth spillovers to New Zealand GDP than China, nevertheless China has larger effects on the New Zealand real exchange rate, with the latter effects operating directly as well as through the commodity price channel. We believe this may help to explain the Chen et al. (2010) result that exchange rates of small commodity exporters have predictive information for future commodity prices. In addition, we find evidence that the responses of both commodity price inflation and the New Zealand real exchange rate to China growth shocks exhibit trend increases from the early 1990s onwards, emphasising the growing international role of that country.

Using the foreign sector of the SVAR, the paper also examines the effects of growth in these two leading world economies on world commodity prices. Although the sub-indices we employ focus on New Zealand export products, our results largely confirm those of Roache (2012), namely the US has a stronger impact on short-run price movements. However, dairy products provide an important exception, where China plays a stronger role relative to the US than with other commodity groups examined.

More generally, this paper contributes to the surprisingly small empirical literature that examines the role of China for international growth. Previous results are also somewhat ambiguous, with Arora and Vamvakidis (2011) finding large growth spillovers from China to both the rest of Asia and the world over the last two decades, while Sato et al. (2011) conclude that growth in China plays a smaller role for other East Asian countries relative to the US. On the other hand, Sun (2011) finds that 'emerging Asia' (including China) plays a stronger role than the US for Australia in the decade from 2000, but only an indirect impact through Australia is detected from that region to New Zealand. Dungey et al. (2014) focus on Australia and detect evidence of 'Dutch disease' for that resource-rich economy, with a China demand shock ultimately leading to lower domestic output. Finally, in the only paper of which we are aware that explicitly models interactions between China and the US as two large open economies, Sun and An (2012) find US shocks to have relatively little influence on China, but supply shocks from China affect US demand.

The present paper is organised as follows. Section 2 discusses methodological issues and specifies the SVAR used in our analysis. This is followed by a discussion of the data employed, including some preliminary analysis, in Section 3. Section 4 uses impulse response analysis to examine both effects on New Zealand from China and the US and also world commodity price responses to shocks in each of these large economies. The following section then focuses on changes over time, with conclusions drawn in Section 6.

2. Model specification

In line with many other empirical studies of international effects of growth in leading economies (including Bayoumi and Swiston, 2009; Sato et al., 2011; Dungey et al., 2014), our analysis employs an SVAR model. Using a generic notation, this can be represented as the stationary system

$$\mathbf{B}(L)\mathbf{y}_t = \mathbf{u}_t \tag{1}$$

in which $\mathbf{y}_t$ is an $n \times 1$ vector containing all the variables of the model, while $\mathbf{B}(L) = \mathbf{B}_0 - \mathbf{B}_1 L - \ldots - \mathbf{B}_p L^p$ is a matrix polynomial in the lag operator L. The $n \times n$ matrix $\mathbf{B}_0$ captures the contemporaneous interactions such that the disturbance vector $\mathbf{u}_t$ has mean zero and diagonal covariance matrix. Although omitted from the representation of Eq. (1), in practice all equations in our model include intercepts.

The observation vector is partitioned as $\mathbf{y}_t = (\mathbf{y}_t^{G'}, \mathbf{y}_t^{R'}, \mathbf{y}_t^{D'})'$, where the sub-vectors of global, regional and domestic variables, $\mathbf{y}_t^G$, $\mathbf{y}_t^R$ and $\mathbf{y}_t^D$, respectively, contain n_G, n_R and n_D elements, respectively, with $n = n_G + n_R + n_D$. Each matrix coefficient of Eq. (1) has the form

$$\mathbf{B}_i = \begin{bmatrix} \mathbf{B}_i^{GG} & 0 & 0 \\ \mathbf{B}_i^{GR} & \mathbf{B}_i^{RR} & 0 \\ \mathbf{B}_i^{GD} & \mathbf{B}_i^{RD} & \mathbf{B}_i^{DD} \end{bmatrix}, \quad i = 0, \ldots, p \tag{2}$$

in which $\mathbf{B}_i$ $(i = 0, 1, \ldots, p)$ is partitioned conformably with $\mathbf{y}_t$. This specification imposes block exogeneity restrictions, with no feedback from the small domestic economy to any global or regional variable. Within the diagonal blocks of Eq. (2), identification is achieved through contemporaneous ordering restrictions with each block for $i = 0$ being lower triangular with unit diagonal elements; we return to the issue of ordering later. In total our specific model is comprised of $n = 8$ variables, with $n_G = 3$ global variables, $n_R = 1$ regional variable and $n_D = 4$ domestic variables, as explained below.

Zero block restrictions as imposed in Eq. (2) were popularised by Cushman and Zha (1997) in the context of modelling Canada in relation to the US; Zha (1999) illustrates the undesirable implications an SVAR can yield when these exogeneity restrictions are not imposed. A number of previous SVAR studies of New Zealand also impose such exogeneity restrictions, including Buckle et al. (2007) and Dungey and Fry (2009). Our interest focuses on the separate effects of growth in China and the US on the New Zealand economy, and hence the global variables of $\mathbf{y}_t^G$ include GDP growth in each of these major economies. In recognition of its key role for commodity exporters such as New Zealand and Australia (Bowman and Conway, 2013; Dungey et al., 2014), real world commodity price inflation is also included in the global variable block. As noted in the Introduction, Australia is a key market for New Zealand, and GDP growth in Australia captures relevant regional influences in our model as $\mathbf{y}_t^R$, which is consequently a scalar. The specification of Eq. (2) implies a clear causal ordering, with no feedbacks permitted from New Zealand to the global variables or to its larger neighbour, and also no feedbacks are allowed from Australia to the major international economies of the US and China or to world commodity prices.

As noted by Bayoumi and Swiston (2009), the contemporaneous causal ordering of variables within the domestic block $\mathbf{y}_t^D$ is relatively clear, but ordering across large countries in $\mathbf{y}_t^G$ is less so. Dungey and Osborn (2014) confront this problem when modelling interactions between the US and the Euro area, and, although they order the US first for output, they note that this assumption has a fairly small impact on their results. Similarly, Sun (2011) finds growth spillovers to be robust to the ordering between the US and 'emerging Asia'. On the other hand, where Sun and An (2012) impose restrictions on contemporaneous coefficients, these imply causality running from the US to China. Our view is that the increasing role of China in the world economy casts some doubt on this assumption and hence we present results that embody both causal orders between US and China growth. These two countries are contemporaneously ordered above world commodity price inflation, reflecting the assumption that demand arising from economic growth in these major international economies drives commodity price changes, rather than vice versa.

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