The influence of Chinese and US financial markets on Asia-Pacific[3]

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Abstract

This paper presents some early results from ongoing research assessing the impact of China's financial markets on those in other Asian-Pacific economies, and comparing it with that of the United States (Shu, He and Wang, forthcoming). Our analysis suggests that China's influence on the regional stock and FX markets has grown over time, but its bond market is still isolated from those of the United States and Asia. US financial markets remain a strong driver, particularly during times of stress.

Keywords: China's impact, spillovers to Asian financial markets, US, structural VAR, sign restrictions

JEL classification: F20

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Introduction

China has rapidly become an important driver outside the United States for Asian financial markets. Market developments in the United States, whether driven by monetary policy, financial market or political events, have long been a dominant force in the global markets. The financial crisis in 2008–09 and, much more recently, the mid-2013 "taper tantrum", are prime examples of spillovers emanating from the US markets. Meanwhile, though, there have been an increasing number of cases where market moves in China sent shock waves through Asia and beyond. In November 2008, Chinese equities rose by 7.3% after a RMB 4.0 trillion stimulus package was announced. On the same day, Asian shares jumped by 3.4%. China's influence has become such that, apart from policy and macro news, even comparatively small credit events in China can move regional markets. For example, the near default of a Chinese trust product in January 2014 weighed down emerging markets for a number of days until a resolution was reached.

China's increasing regional influence arises, first and foremost, from its strong trade linkages and, to a lesser extent, from its financial linkages with Asia. As the largest trading nation in the world, China trades extensively with other Asian-Pacific economies. This reflects China's significant role in the Asian production chain as well as its expanding capacity in generating final demand for Asian exports. By comparison, China's direct financial linkages with Asian-Pacific economies have been much more modest in scale. This is reflected in China's small international investment position compared to those of the United States and many other economies (Table 1). China's liability in foreign direct investment as a percentage of GDP shows a smaller gap vis-à-vis the United States, as foreign direct investment was the earliest category of investment to be liberalised under the capital account. By contrast, China has limited foreign direct investment assets, and limited assets and liabilities in portfolio investment under more controls in these capital account categories.

As the United States and China have different degrees of integration with Asia, their respective influence on financial markets also differs. With its extensive financial linkages with the Asia-Pacific region, the United States can exert its influence through funding costs, portfolio rebalancing and risk appetite channels. China's strong trade ties yet limited financial linkages with other Asian economies suggest that China's influence is mainly a reflection of its impact on the real side. Its spillovers to regional financial markets may be through expectations and risk appetite channels. In addition, Asian assets are also known to be used as proxy trade for renminbi assets, and thus they are affected by developments in China's financial markets.

The relative influence of the US and Chinese financial markets on Asia-Pacific may be different in stress and tranquil periods. The negative spillovers from the United States can be particularly acute in periods of stress marked by high funding costs and a sharp rise in risk aversion. These conditions are accentuated by the asymmetric international investment positions of Asian economies. On the asset side, the government or government-related securities of advanced economies are held by the official sector, which tends to be a long-term investor. Yet the liability side tends to be dominated by foreign direct investment and portfolio investment held by private investors in advanced economies. This structure is susceptible to "risk-on, risk off" flows, which are often driven by developments in advanced economies, especially when global markets experience stress (McCauley (2012)).

International investment position

End-2013[1], as a percentage of GDP Table 1

	PI asset[2]	PI liability[2]	PI total[2]	FDI asset[3]	FDI liability[3]	FDI total[3]
China	3	4	7	7	26	32
IFCs						
Hong Kong SAR	408	190	598	493	527	1,020
Singapore	295	59	354	169	284	453
Selected Asian economies						
Indonesia	2	20	22	1	24	26
Korea	13	47	60	17	13	30
Malaysia	20	63	83	48	51	100
Philippines	4	29	32	4	11	15
Thailand	8	36	44	15	51	66
Advanced economies						
United States	55	92	147	42	34	77
United Kingdom	161	159	321	74	63	137
Germany	85	97	182	54	38	92

1 End-2012 figures for Indonesia, the Philippines and Thailand. [2] PI refers to portfolio investment. [3] FDI refers to foreign direct investment.

Sources: IMF; CEIC; authors' calculations.

This paper is part of an ongoing project studying the transmission of financial market shocks from the US and Chinese financial markets (including the stock, bond and currency markets) to those in other Asia-Pacific economies (Shu, He and Wang, forthcoming). The US influence on global financial markets has been well documented. Yet, there are few studies about China's impact on regional financial markets. A number of studies assess the renminbi's influence on regional currencies, eg Shu, Chow and Chan (2007), Henning (2012), Subramanian and Kessler (2012), Fratzscher and Mehl (2014), and Shu, He and Cheng (2014). He, Zhang and Wang (2009) examine the impact of US and Chinese financial markets on Hong Kong SAR, covering the stock, bond and FX markets. There is no similar study for the region as a whole.

The rest of paper is structured as follows. The second sectiondescribes the empirical framework and data for studying the influence of US and Chinese financial markets on the Asia-Pacific region. Section 3 reports some initial results. The final section summarises the major findings and considers the implications.

Empirical framework and data

We use a structural vector autoregression (SVAR) to model the complex interactions among the US, Chinese and Asian financial markets. The study is in the spirit of Ehrmann, Fratzscher and Rigobon (2011), who use SVAR models to study financial transmission within and between the United States and euro area, and cover the money, bond, equity and FX markets. Our study focuses on international transmission between financial markets. Our model contains three country/region

blocks, ie the United States, China and Asia, and covers the stock, bond and FX markets.

Specifically, the reduced and structural form vector autoregressions (VARs) are given, respectively, as:

(1) $$B(\mathbf{L})y_{\mathbf{t}} = \varepsilon_{\mathbf{t}},$$

and

(2) $$A(\mathbf{L})y_{\mathbf{t}} = e_{\mathbf{t}}.$$

In equations (1) and (2),

$$y_{\mathbf{t}} = \begin{pmatrix} US\_bond_t \\ US\_stock_t \\ China\_bond_t \\ China\_stock_t \\ RMB/USD_t \\ Asian\_bond_t \\ Asian\_stock_t \\ Asian\_currency_t \end{pmatrix},$$

and A and B are parameter matrices in the model. Also, $\varepsilon_{\mathbf{t}}$ is the innovations of the reduced form in equation (1), and e_t is the normalised and orthogonalised disturbances of the structural form. Based on the Bayesian Information Criteria, the lag length is selected to be 2 for the estimation.

Identification by sign restrictions

This study identifies the SVAR through sign restrictions. The identification procedure establishes the link between parameters in the reduced form and structural VARs, which allows the analysis of VAR dynamics in terms of structural shocks. Unlike the traditional Cholesky method, which requires an arbitrary ordering of the endogenous variables in the VAR, the sign restriction approach allows substantial flexibility in modelling, and permits pairwise interaction among all variables. Identification is achieved by imposing sign restrictions between some pairs of variables and using information from the variance-covariance matrix in the VAR.[4]

The following assumptions are imposed in our study for identifying the SVARs.

- "Cross-country, within-market" spillovers:

[4] This method for SVAR identification is relatively new. After it was introduced by Faust (1998), it has been further developed by Canova and De Nicolo (2002), Uhlig (2005), Hau and Rey (2004). Fry and Pagan (2011) provide a critical review of this approach.

US impact on China and Asia: US stocks have a positive impact on Chinese and Asian stocks. US bond yields have a positive impact on Asian bonds, reflecting the funding cost and "search-for-yield" effects (He and McCauley (2013)). The same effects might not be directly exerted on Chinese bonds, in view of China's capital controls.

China's impact on Asia: Chinese stocks have a positive impact on Asian stocks. In the meantime, the renminbi moves Asian currencies in the same direction, in line with earlier evidence about the renminbi's regional impact by Shu, Chow and Chan (2007), Henning (2012) and Subramanian and Kessler (2012), Fratzscher and Mehl (2014), and Shu, He and Cheng (2014). No assumption is made for the impact of Chinese bonds on Asian bonds.

- "Cross-country, cross-market" spillovers

Spillovers from equities to currencies: Hau and Rey (2002 and 2004) show that a rise in the share of wealth held in foreign assets due to higher foreign equity returns can trigger a relocation of equity funds away from the foreign country to the home country and a home currency appreciation. This reflects the need to reduce foreign currency exposure due to imperfect hedging of currency risks. Thus, a rise in US equity prices might induce a portfolio rebalancing by US-based investors to foreign assets, leading to a strengthening of Asian currencies; and a rise in Asian equity prices leads to a weakening of Asian currencies. The same channel does not apply in China's case with a closed capital account.

US bond shocks on Asian currencies: US bond yields have a positive impact on Asian currencies. Higher US bond yields will attract investment into US bonds, and the resultant falling interest rates in Asian assets leaves Asian currencies weaker.

- **"**Within-country, cross-market" spillovers

Interaction between bond and stock markets: A rise in bond yields leads to a fall in stock returns. A positive bond yield shock indicates a higher funding cost and a worsening of liquidity conditions, which can drive stock prices lower.

Bond yields and exchange rate: Asian bond yields have a negative impact on the exchange rate. That is, bond yields in Asia will attract foreign investment, leading to domestic currency appreciation.

Data

The eight-variable SVAR is estimated using daily data from 1 January 2002 to 30 September 2013. The data are obtained from the CEIC daily database. The data for the Asian block are taken as the simple average of Australia, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

One issue to address in the modelling is the different time zones of the US, Chinese and other Asian financial markets. As Asian trading is ahead of the United States, shocks from Asian markets are always incorporated into US asset prices, while shocks to US markets can only affect Asian trading on the next trading day. Following the practice in the literature (eg Forbes and Rigobon (2002) and Ehrmann, Fratzscher and Rigobon (2011)), we use two-day rolling average returns in the analysis.

Some results

This section reports some initial results of the ongoing research comparing the impact of China and the United States on Asia-Pacific financial markets.

Impulse response

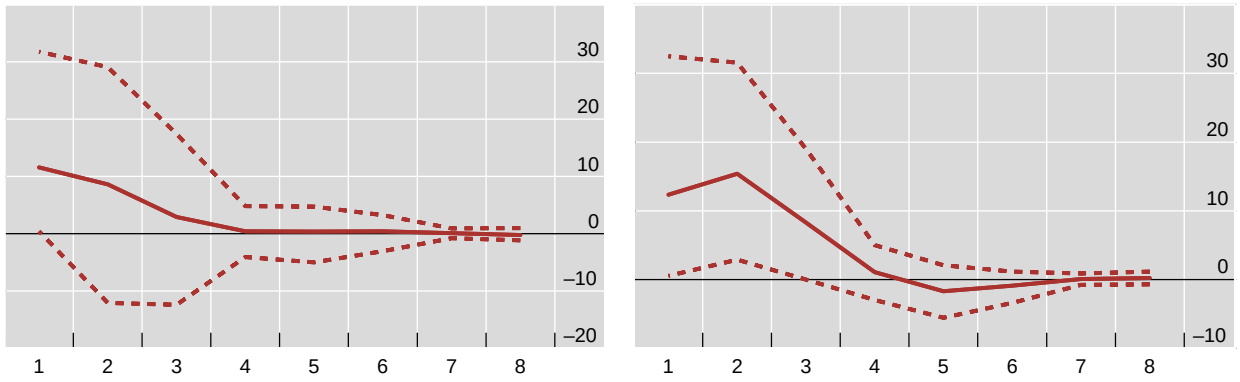
The impulse response results show that, in the case of Asian equities, the initial responses to innovations from the US and Chinese equities are comparable (Graph 1). One unit shock to US equity price (around 0.86%) will lead to a 0.12% rise in Asian equity prices upon impact, which rapidly dies down. Upon one unit shock of Chinese equities (0.96%), the rise in Asian equities lasts longer, and is the strongest on the second day, at 0.15%. The impact dissipates after three days.

Shocks to the RMB/USD rate and US bonds can move Asian currencies (Graph 2). Upon a one-unit shock in US bonds (1.89 basis points), Asian currencies will weaken by over 0.04% each day for two days. The response to a one-unit shock in the RMB/USD rate (0.21%) is around 0.03%, but becomes weaker on the second day. The finding of the renminbi's impact on Asian currency movements corroborates that of earlier research mentioned above.

By comparison, Asian bonds only respond to shocks to US bonds. Chinese bonds and other financial markets have no influence on Asian bonds.

Impulse response of Asian stock

In percentage points — Graph 1

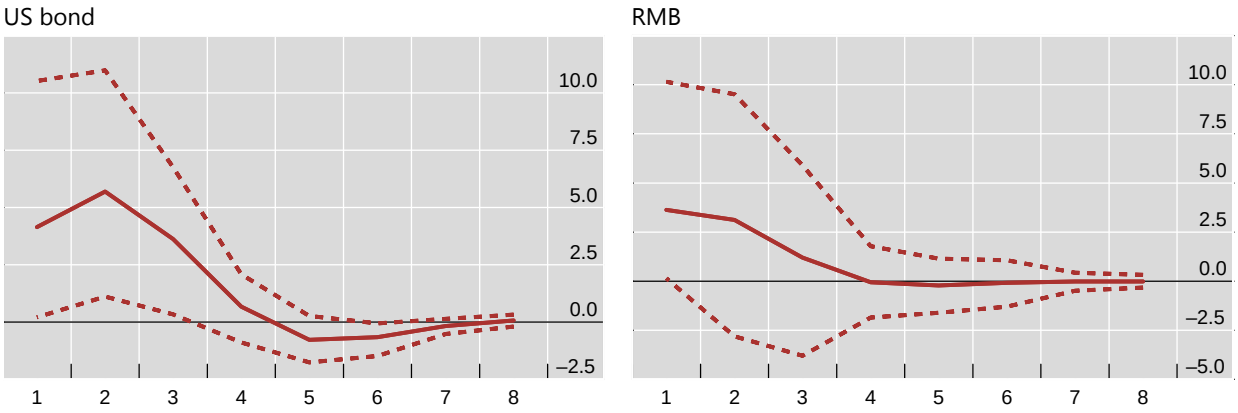


[1] Response to one unit of shock.

Source: Authors' estimates.

Impulse response of Asian currency

In percentage point Graph 2



[1] Response to one unit of shock.

Source: Authors' estimates.

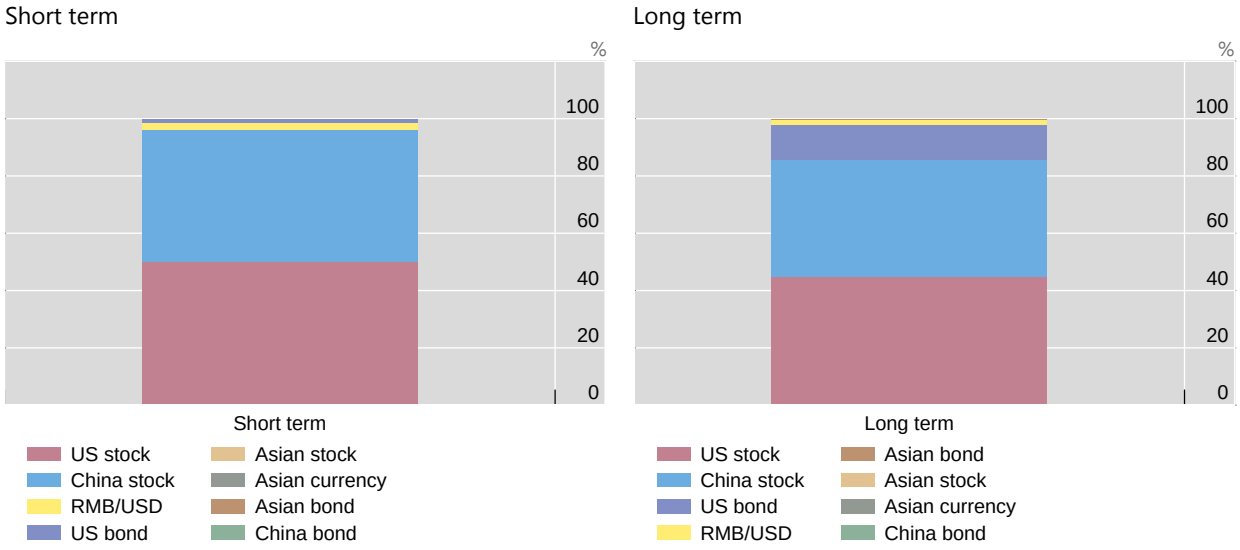
Variance decomposition

Variance decomposition is used to examine the relative importance of different shocks in driving Asian stock, bond and currency market movements. We focus on comparing the relative impact of the US and Chinese markets, and how this has evolved over time and in different market conditions.

Graph 3 shows how the volatility of Asian stock markets is driven by shocks to the eight endogenous variables, namely the US bond yield, US equity price, Chinese bond yield, Chinese equity price, the RMB/USD rate, Asian bond yield, the Asian exchange rate and the Asian equity price itself over the whole sample. The variance decomposition for the first period is referred to as the short term, and that for the fifth period the long term. Impulse responses reported in the earlier section suggest that the impact of shocks tends to dissipate within one to three days. For the overall sample period, the volatility of Asian stock prices is found to be mainly driven by spillovers from US equities (50.1%), closely followed by Chinese equities (46.0%) in the short term. In the long term, the US and Chinese equities remain the two most important drivers, but US bond yields also have some impact.

Asian stock market: variance decomposition

Graph 3



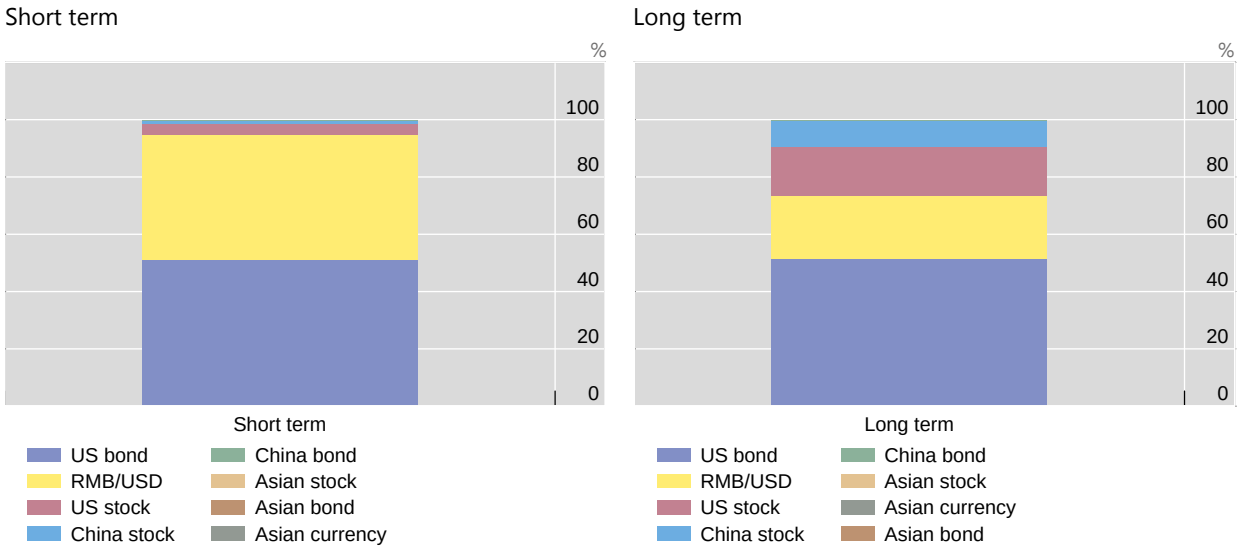
Source: Authors' estimates.

Shocks to US bonds and the RMB/USD rate are the dominant drivers of regional exchange rates, particularly in the short run (Graph 4). The renminbi's impact moderates in the long run, but that of US bonds rises slightly. A wider range of shocks also come into play over the long run, including those to US and Chinese equities.

On the Asian bond market, US bond market movements have a clearly dominant effect. This effect becomes even stronger in the long run. In complete contrast, all the Chinese financial markets, including equities, bonds and the exchange rate, have barely any influence on Asian bond movements.

Asian currency: variance decomposition

Graph 4



Source: Authors' estimates.

Estimation from subsamples shows that the US impact rises during periods of market stress, but the Chinese influence becomes more comparable with that of the United States in non-crisis periods. For example, during the global financial crisis and European sovereign debt crisis, the spillovers from the US equities accounted for two thirds of the variance of Asian equities in the short run, dropping to half over the long run. These compare with around one third in the non-crisis period. By comparison, the contribution of Chinese equities rises from around 20% to around 40% in the non-crisis period in both the short and long run.

China's influence on the regional stock markets and currency movements has been rising. In the period after the European debt crisis, China's stock market explains close to half of the short-run variation in Asian equity prices, compared to around a third before the global financial crisis. Similarly, the renminbi's impact has risen during the same period. China's move to a managed float exchange rate regime in July 2005 played an important role in the case of spillovers in currency movements. Barely having any influence on regional currencies in the early 2000s, the renminbi's impact began to be felt after the move.

Concluding remarks

The paper reports some early results from ongoing research that, for the first time, systematically examines China's impact on Asian-Pacific financial markets. The analysis points to the significant influence of China on the regional equity and FX markets. In normal or non-stress times, China's influence on Asian stock markets rises to a level comparable with that of the United States, although spillovers from the United States to Asian financial markets tend to be stronger than China's influence in periods of stress. The renminbi has also become capable of moving regional currencies after China shifted to a managed float regime in 2005. Nonetheless, China's bond market remains isolated from those of both other Asian countries and the United States.

China's rising influence and its interaction with that exerted by the United States have significant implications for financial markets and capital flows to Asia-Pacific. The influence of the United States on the world markets remains dominant, driving global liquidity conditions and risk appetite particularly during times of stress. Conceivably, the Chinese influence, as an important regional force, may to some extent provide a counteracting factor to capital movements should the US and Chinese markets move in opposite directions, thus moderating volatility in capital movements.

Looking forward, potential increases in the cross-holdings of financial assets within Asia may dampen the relative importance of influence from the United States while raising that of regional factors, which might help reduce volatility in capital flows. With rising income and financial development, cross-border holdings of financial assets and overseas investment by private sector entities are likely to grow (Lane and Milesi-Ferretti (2008a)). Conceivably, these, under the influence of gravity factors, will have a regional focus (Lane and Schmukler (2007); Lane and Milesi-Ferretti (2008b); Park (2013); Park and Mercado (2013)). Intra-regional financial flows may be further promoted by the internationalisation of major regional currencies, especially that of the renminbi. Regional economic and financial factors could start exerting a greater influence on Asian investors, particularly institutions, who might start developing views different from those of advanced economy investors on

global and regional trends. This could, in turn, start to act to counteract or moderate the "risk-on, risk-off" flows driven predominately by the thinking of investors currently located mainly in advanced economies.

References

Canova, F and G De Nicolo (2002): "Monetary disturbances matter for business fluctuations in the G-7", *Journal of Monetary Economics*, vol 49(6), pp 1131–59.

Ehrmann, M, M Fratzscher and R Rigobon (2011): "Stocks, bonds, money markets and exchange rates: measuring international financial transmission", *Journal of Applied Econometrics*, vol 26(6), pp 948–74.

Faust, J (1998), "The robustness of identified VAR conclusions about money", *Carnegie-Rochester Conference Series on Public Policy,* vol 49, pp 207–44.

Forbes, K and R Rigobon (2002): "No contagion, only interdependence: measuring stock market comovements", *Journal of Finance*, vol 57(5), pp 2223–61.

Fratzscher, M and A Mehl (2014): "China's dominance hypothesis and the emergence of a tri-polar global currency system", *Economic Journal*, vol 124(581), pp 1343–70.

Fry, R and A Pagan (2011): "Sign restrictions in structural vector autoregressions: a critical review", *Journal of Economic Literature*, vol 49(4), pp 938–60.

Hau, H and H Rey (2002): "Exchange rate, equity prices and capital flows", *NBER Working Paper*, no 9398.

——— (2004): "Can portfolio rebalancing explain the dynamics of equity returns, equity flows, and exchange rates?" *American Economic Review*, vol 94(2), pp 126–33.

He, D, Z Zhang, and H Wang (2009): "Hong Kong's financial market interactions with the US and Mainland China in crisis and tranquil times", *HKMA Working Papers*, no 10/2009.

McCauley, R (2012): "Risk-on, risk-off flows", *BIS Working Paper*, no 382.

Lane, P and S Schmukler (2007): "The evolving role of China and India in the international financial system," *Open Economies Review*, vol 18(4), pp 499–520.

Lane, P and G Milesi-Ferretti (2008): "The drivers of financial globalization", *American Economic Review*, vol 98(2), pp 327–32.

Park, C-Y (2013): "Asian capital market integration: theory and evidence", *Asian Development Bank Economics Working Paper*, no 351.

Park, C-Y and R Mercado (2013): "Determinants of financial stress in emerging market economies", *Asian Development Bank Economics Working Paper*, no 356.

Shu, C, D He and X Cheng (2015): "One currency, two markets: The renminbi's growing influence in Asia-Pacific", *China Economic Review*, 33, 163-78..

Shu, C, D He, H Wang and J Dong (forthcoming): "Regional pull vs global push factors: China and US influence on Asia-Pacific financial markets".

Shu, C, N Chow, and J-Y Chan (2007): "Impact of the renminbi exchange rate on Asian currencies", *China Economic Issues*, vol 3(7).

Subramanian, A and M Kessler (2012): "The renminbi bloc is here: Asia down, rest of the world to go?", *Peterson Institute for International Economics*.

Uhlig, H (2005): "What are the effects of monetary policy on output? Results from an agnostic identification procedure", *Journal of Monetary Economics*, vol 52(2), pp 381–419.