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Abstract

This paper examines the influence of monetary shocks in China on the U.S. economy over 1996-2012. The influence on the U.S. is through the sheer scale of China's growth through effects in demand for imports, particularly that of commodities. China's growth influences world commodity/oil prices and this is reflected in significantly higher inflation in the U.S. China's monetary expansion is also associated with significant decreases in the trade weighted value of the U.S. dollar that is due to the operation of a pegged currency. China manages the exchange rate and has extensive capital controls in place. In terms of the Mundell–Fleming model, with imperfect capital mobility, sterilization actions under a managed exchange rate permit China to pursue an independent monetary policy with consequences for the U.S.

Keywords: International monetary transmission, China's monetary aggregates

JEL Codes: E42, E52, F41, F42

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Chinese monetary expansion and the U.S. economy

1. Introduction

This paper examines the influence of monetary policy shocks in China on the U.S. economy over 1996-2012. The topic is of interest given the growing importance of China in the world economy. In 2009 China's M2 measured in U.S. dollars surpassed that in the U.S. for the first time and by the end of 2012 exceeded that in the U.S. by 50%. The growing importance of China's money supply is illustrated in Figure 1. Given these developments, does a monetary expansion in China affect the U.S. economy?

Intertemporal models by Svensson and Van Wijnbergen (1989) and Obstfeld and Rogoff (1995) suggest that monetary expansion in a large open economy such as the U.S. will decrease world real interest rates and stimulate global aggregate demand in the U.S. and non-U.S. countries. Support for an interest rate mechanism of monetary expansion in the U.S. causing economic expansion in the non-U.S. G-6, Canada, and Latin America is confirmed by Kim (2001a), Holman and Neumann (2002), and Canova (2005), respectively.

China operates a dollar peg and has extensive capital controls in place. How then would China's monetary policy influence the U.S. economy? In Keynesian models with prices inflexible in labour or goods markets, as in the Mundell–Fleming model, a fixed exchange rate ties domestic to foreign interest rates when there is arbitrage in asset markets. A monetary expansion starts a temporary fall in the domestic interest rate relative to foreign interest rates, with the resulting loss of foreign exchange reserves leading to a reversal in the fall of the domestic interest rate. The impossible trinity holds, in that it is not possible to simultaneously have a fixed exchange rate, perfect capital movement and autonomous monetary policy. In the Mundell–Fleming model with imperfect capital mobility, sterilization actions under a fixed exchange rate permit an independent monetary policy for as long as foreign exchange reserves permit.

Goodfriend and Prasad (2007) argue that capital controls provide room for monetary policy independence in China even though the central bank manages the exchange rate. Sun (2009) argues that China operated an independent monetary policy during the fixed exchange rate period 1998 to 2005. Up until 2005 China's renminbi was pegged to the U.S. dollar. Since 2005 the renminbi has been allowed to float in a narrow margin around a fixed base rate determined with reference to a basket of major currencies with undisclosed weights. This is illustrated in Figure 2, with a tendency for a fall in the China/U.S. exchange rate since 2005 as the U.S. dollar weakened against other currencies.

The influence on the U.S. is through the sheer scale of China's growth through effects in demand for imports, particularly that of commodities.[1] China's growth influences world commodity prices and this is reflected in significantly higher inflation in the U.S. China's monetary expansion is also associated with significant decreases in the trade weighted value of the U.S. dollar. With domestic expansion and an increase in imports, China intervenes in the foreign exchange market to stabilize the exchange rate and sells foreign currency. The net effect of these actions by China on the real trade-weighted U.S. dollar exchange rate would depend on the origin of the goods imported by China, on the mix of foreign currencies sold in the foreign exchange market by China, and on the nature of the peg operated by China. Pre 2005 with the Renminbi pegged to the U.S. dollar, the effect of a monetary expansion in China would be a decline in the real trade-weighted U.S. dollar since China's currency is stabilized by the net sale of U.S. dollars.

[1] China has a 6% annual growth rate in petroleum consumption since 1998. Hamilton (2011) notes that the newly industrialized economies, among which China has a leading role, have absorbed over two-thirds of the increase in world oil consumption since 1998. Radetzki (2006) notes that between 2000 and 2005 China's share of global demand growth for petroleum was 28%, for aluminium was more than 50%, for steel was more than 84%, and for copper was 95%. Radetzki (2006) surmises that in developing Asian countries a dollar added to the GDP uses more than twice the quantity of commodities as does a dollar added to the GDP in OECD countries. China's oil intake is forecast to be 17.5 million barrels per day by 2030, overtaking the United States as the world's largest oil consumer (World Energy Outlook 2012). To be found at http://iea.org/publications/freepublications/publication/English.pdf.

Recent empirical studies by Cai et al. (2012) and Fang et al. (2012) show that post 2005, consideration of the parity of the exchange rate of the renminbi against the U.S. dollar dominates the influence of the other currencies in determining the overall value of the renminbi with reference to a basket of major currencies. This tendency, together with the rising weight of China in the global economy, means that monetary expansion in China is associated with a decline in the real trade-weighted U.S. dollar exchange rate post 2005.

In this investigation we developed a novel approach to test the impact of foreign monetary aggregates shocks on the U.S. economy. The effects of monetary policy shocks in China on U.S. output, inflation, monetary aggregates, interest rate, and exchange rate are examined. The model is discussed in section 2, empirical results are presented in section 3 and section 4 concludes.

2. The Methodology

Using monthly macroeconomic variables for the U.S, economy, we introduce the effect of Chinese monetary aggregates by constructing a structural vector autoregressive model (SVAR). Monthly variables selection is based on Sims and Zha (1995) and Kim and Roubini (2000) to the extent possible. The variables are: China's M2 $(China\ M2_t)$ in U.S. dollars, the short term U.S. interest rate $(US\ IR_t)$, U.S. M2 $(US\ M2_t)$, the U.S. consumer price index $(US\ CPI_t)$, the U.S. industrial production $(US\ IP_t)$, oil prices in U.S. dollars (OP_t) (or global commodity price index in U.S. dollars), the real effective trade-weighted U.S. dollar exchange rate $(US\ TWI_t)$. Fan et al. (2011) finds that the growth rate in money supply (M2) plays a crucial role in fine-tuning China's economy, while official interest rates played a very passive role. Koz´luk and Mehrotra (2009) and Johansson (2012) use M2 as the measure of China's monetary policy in studies on the influence of China on East and Southeast Asian economies.

The SVAR model is expressed in matrix form as (for simplicity the constant term is omitted):

$$B_0X_t = \sum_{i=1}^{j} B_iX_{t-i} + \sum_{i=1}^{j} EIP_{cej,t-i} + \sum_{i=1}^{j} EM2_{ej,t-i} \ \varepsilon_t \qquad (1)$$

Where:

$$X_t = \begin{bmatrix} \Delta\log(China\ M2_t), US\ IR_t, \Delta\log(US\ M2_t), \Delta\log(US\ CPI_t), \\ \Delta\log(US\ IP_t), \Delta\log(OP_t), \Delta\log(US\ TWI_t) \\ \end{bmatrix} \qquad (2)$$

where j is the optimal lag length, determined by the Akaike information criterion (AIC) (three lags in this case), X_t is vector of endogenous variables, EIP_{cej} are the individual vectors of country-individual industrial production of China, Euro area and Japan (cej) and $EM2_{ej}$ are vectors of the country-individual M2 for Euro area and Japan (ej). Those exogenous vectors are introduced to the model to tackle the possible problem of omitted variables bias as U.S. industrial production may be correlated with China, Euro area and Japan industrial production and both China and U.S. M2 may be correlated with Euro area and Japan's M2. Equation (2) is shown with oil price representing commodity prices. Results are not affected if a global commodity price index replaces oil price in the SVAR.[2] Finally, ε_t is an error term vector, which is serially and mutually independent.

2.1. Identification strategy

In line with Bernanke (1986), Sims and Zha (1995), Kim and Roubini (2000) and Kim (2001a; 2001b) non-recursive identify restrictions are proposed in the contemporaneous structure. The contemporaneous matrix B_0X_t can be express as:

[2] In SVAR models Christiano et al.'s (1999) (for the U.S.) and Dedola and Lippi (2005) (for five OECD countries) utilize a global commodity price index as a variable and Kim and Roubini (2000) (for industrial economies) utilize oil price.

$$B_0 X_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & a_{12} & 0 & a_{14} & 0 & a_{16} \\ 0 & a_{21} & 1 & a_{24} & a_{25} & 0 & 0 \\ 0 & 0 & 0 & 1 & a_{34} & a_{35} & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{pmatrix} \varepsilon^{Chinese\ M2} \\ \varepsilon^{US\ IR} \\ \varepsilon^{US\ M2} \\ \varepsilon^{US\ CPI} \\ \varepsilon^{US\ IP} \\ \varepsilon^{Oil\ prices} \\ \varepsilon^{US\ TWI} \end{pmatrix} \quad (3)$$

The restrictions in equation (3) are essentially those in Kim and Roubini (2000) but with China's M2 entered as contemporaneously exogenous to the other variables. Kim and Roubini (2000) assume real output and oil prices (in the fifth and sixth equations respectively) are contemporaneously exogenous to all variables in the model due to information delay. The delay in the transition of the Chinese M2 and oil prices are substantiated by the fact that these variables are exogenous to the U.S. economy. However, previous studies have restricted real output in two different ways; Kim and Roubini (2000) and Kim (2001b) allows real output to depend contemporaneously on oil prices while Bagliano and Favero (1998) and Anzuini et al. (2012) treats real output as contemporaneously exogenous of all variables.[3] Using a log likelihood ratio test for over-identification restrictions, results for our data support restrictions in favour of real output to be contemporaneously exogenous.[4]

Consistent with Sims and Zha (1995)'s dynamic stochastic general equilibrium model, the monetary policy feedback rule is based on the recognition of information delays that do not allow the monetary policy to respond within the month to price level and output events. The monetary policy rule only responds contemporaneously to U.S. M2, oil prices and the real effective trade-weighted U.S. exchange rate. Following the literature, the M2 monetary aggregate responds contemporaneously to the domestic interest rate, inflation and industrial production implying that real demand for money depends on the interest rate and real income.

[3] Note that Bagliano and Favero (1998) use commodity prices instead of oil prices.
[4] The Chi-square value for treating real output as contemporaneously exogenous is 10.5, while the Chi-square value for assuming real output depends contemporaneously on oil prices is 9.98.

In line with Kim and Roubini (2000) and Kim (2001a; 2001b) inflation is affected contemporaneously by real output and oil prices consistent with the notion of contemporaneous demand pull and cost push inflation forces. The real effective trade-weighted U.S. exchange rate responds contemporaneously to all variables but Chinese M2 given its forward-looking properties and the fact that exchange rates operate daily looking at current data and economic activity.[5] Alternative identification strategies are explored in examination of the robustness of results.

2.2. The Data and unit root test

The data are monthly from 1996:1 to 2012:12. The starting date is dictated by the first monthly observation of Chinese M2 reported by People's Bank of China. The People's Bank of China stopped bank credit targeting in 1998 and started concentrating on balance sheet adjustment for the conduct of monetary policy (Johansson (2012)). Monetary aggregates, industrial production indexes, U.S. CPI, interest rate, oil prices (West Texas Intermediate crude oil) and commodity price data are from the Federal Reserve of St. Louis (FRED), while Chinese M2 is from People's Bank of China.

To avoid spurious regression problem, we test the data for unit root process. Table 1 reports test results for unit roots in the variables over 1996:1-2012:12. The null hypothesis for the Augmented Dickey-Fuller (ADF) test is that the variable has a unit root and the null hypothesis for the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test is that the variable is stationary. The first difference of the series is indicated by Δ. The lag selection criteria for the ADF test is based on Schwarz information Criteria (SIC) and for the KPSS is the Newey-West Bandwidth with constant and linear trend. In table 1, the Augmented Dickey Fuller test (ADF) unit root tests reveals that the logs of all endogenous variables in the model are only first difference stationary. These results are confirmed by Kwiatkowski-Phillips-Schmidt-

[5] See for example Bagliano and Favero (1998), Kim and Roubini (2000) and Kim (2001a; 2001b).

Shin (KPSS), where the inverse null hypothesis is tested.[6] Consequently, and following the literature using mostly data the model is estimated in first difference.

3. Empirical Results

3.1. The impulse response results

Figure 3 shows the dynamic response or impulse response function of the U.S. variables in the SVAR in equation (3) to one percentage change in China M2 shocks. The dashed lines represent a one standard error confidence band around the estimates of the coefficients of the impulse response functions.[7]

In the first row in Figure 3, the short term U.S. interest rate does not respond significantly to innovations in China's M2. An unanticipated positive increase in China's M2 has a negative effect on U.S. M2 that is statistically significant. This latter result is consistent with a defensive response by the U.S. to a stimulus by China, which boosts U.S. CPI inflation and industrial production and weakens the U.S. dollar as discuss later. A positive innovation in China's M2 has statistically significant positive effect on the U.S. CPI. The effect builds up over five months and then persists.

In the second row in Figure 3, U.S. industrial production is positively affected by positive innovations in China's M2, but the effect is not statistically significant. A positive shock in China's M2 has a positive and statistically significant effect on oil price that builds up rapidly over three months and then persists for twenty months. In results not shown, if a global commodity price variable replaces the oil price variable in the SVAR in equation (2) results are similar. A positive innovation in China's M2 has a positive and statistically significant effect on commodity price that rises sharply over three months, peaks at about five

[6] Results are also supported by the Dickey Fuller GLS (DF-GLS) and the Phillip-Perron (PP) which are available upon request. In addition, all exogenous variables in the model are also first different stationary (data available upon request).

[7] The confidence bands are obtained using Monte Carlo integration as described by Sims (1980), where 5000 draws were used from the asymptotic distribution of the VAR coefficient.

months, and then persists for twenty months. The response effects of the real trade-weighted U.S. dollar to shocks to China's M2, is shown in the last diagram in Figure 4. A rise in China's M2 is associated with a statistically significant negative effect on the real trade-weighted U.S. currency after two months that persists for twenty months.

3.2. Monetary expansion and the exchange regime

The float of the renminbi around a fixed base rate determined with regard to a basket of currencies (dominated by the U.S. dollar, Euro, Japanese yen and South Korean won) began on July 21, 2005. Prior to this date China's currency was pegged to the U.S. dollar. A rise in China's M2 facilitates domestic growth and increases demand for imports. The currencies of the countries supplying imports to China experience upward pressure. To stabilize the pegged exchange rate, China must intervene in the foreign exchange market and sell foreign currency. The net effect of these actions on the real trade-weighted U.S. dollar exchange rate depends on the countries of origin of imports to China, the foreign currencies sold by China in the foreign exchange market, and the weights assigned to currencies in the reference basket of major currencies to which the renminbi is allowed to float within a narrow margin.

Prior to 2005, with the renminbi pegged to the U.S. dollar, the consequence of an increase in China's M2 would be a devaluation of the U.S. dollar relative to other countries. Since 2005, with the renminbi tied to a band around a basket of world currencies, this consequence of an increase in China's M2 might be expected to be less marked. However, it should be noted that the scale of China's influence on the global economy in the last half of the sample is much greater than in the first half of the sample, and research by Cai et al. (2012) and Fang et al. (2012) and others show that post 2005, considerable weight has been given to the U.S. dollar in the basket of major currencies around which central parity the value of renminbi is allowed to vary. In results not reported, it is found that when the sample is broken in July 2005, a positive innovation in China's M2 is associated with a statistically significant negative effect on the real trade-weighted U.S. foreign exchange rate post July 2005.

3.3. Robustness and alternative identification strategies

We now investigate the robustness of the results using alternative specifications to the SVAR reported in equation (3). We investigate four alternative non-recursive identification restrictions in the contemporaneous matrix restriction to that shown for B_0X_t in equation (3). The alternative identification schemes based on equations (1) and (2) are the following:

$$B_0X_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{10} & 1 & a_{12} & 0 & a_{14} & 0 & a_{16} \\ a_{20} & a_{21} & 1 & a_{24} & a_{25} & 0 & 0 \\ a_{30} & 0 & 0 & 1 & a_{34} & a_{35} & 0 \\ a_{40} & 0 & 0 & 0 & 1 & 0 & 0 \\ a_{50} & 0 & 0 & 0 & 0 & 1 & 0 \\ a_{60} & a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{pmatrix} \varepsilon^{Chinese\ M2} \\ \varepsilon^{US\ IR} \\ \varepsilon^{US\ M2} \\ \varepsilon^{US\ CPI} \\ \varepsilon^{US\ IP} \\ \varepsilon^{Oil\ prices} \\ \varepsilon^{US\ TWI} \end{pmatrix} \tag{4}$$

$$B_0X_t = \begin{bmatrix} 1 & a_{01} & 0 & a_{03} & a_{04} & 0 & 0 \\ 0 & 1 & a_{12} & 0 & a_{14} & 0 & a_{16} \\ 0 & a_{21} & 1 & a_{24} & a_{25} & 0 & 0 \\ 0 & 0 & 0 & 1 & a_{34} & a_{35} & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{pmatrix} \varepsilon^{Chinese\ M2} \\ \varepsilon^{US\ IR} \\ \varepsilon^{US\ M2} \\ \varepsilon^{US\ CPI} \\ \varepsilon^{US\ IP} \\ \varepsilon^{Oil\ prices} \\ \varepsilon^{US\ TWI} \end{pmatrix} \tag{5}$$

$$B_0X_t = \begin{bmatrix} 1 & a_{01} & a_{02} & a_{03} & a_{04} & a_{05} & a_{06} \\ 0 & 1 & a_{12} & 0 & a_{14} & 0 & a_{16} \\ 0 & a_{21} & 1 & a_{24} & a_{25} & 0 & 0 \\ 0 & 0 & 0 & 1 & a_{34} & a_{35} & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{pmatrix} \varepsilon^{Chinese\ M2} \\ \varepsilon^{US\ IR} \\ \varepsilon^{US\ M2} \\ \varepsilon^{US\ CPI} \\ \varepsilon^{US\ IP} \\ \varepsilon^{Oil\ prices} \\ \varepsilon^{US\ TWI} \end{pmatrix} \tag{6}$$

$$B_0X_t = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & a_{12} & 0 & a_{14} & 0 & a_{16} \\ 0 & a_{21} & 1 & a_{24} & a_{25} & 0 & 0 \\ 0 & 0 & 0 & 1 & a_{34} & a_{35} & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ a_{60} & a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & 1 \end{bmatrix} \begin{pmatrix} \varepsilon^{Chinese\ M2} \\ \varepsilon^{US\ IR} \\ \varepsilon^{US\ M2} \\ \varepsilon^{US\ CPI} \\ \varepsilon^{US\ IP} \\ \varepsilon^{Oil\ prices} \\ \varepsilon^{US\ TWI} \end{pmatrix} \tag{7}$$

In system (4), the U.S. variables respond contemporaneously to China's M2. In system (5), China's M2 responds to U.S. domestic variables in the same way that U.S. M2 does. In system (6), China's M2 responds contemporaneously to all U.S. domestic variables. Finally, in system (7) the real trade-weighted U.S. dollar responds contemporaneously to China's M2.

The estimation of the SVAR models outlined in equations (4), (5), (6) and (7) results in impulse response of the U.S. economic variables to positive shocks to China's M2 that are very similar to those shown in Figure 3. In all models a positive innovation in China's M2 is associated with:

1. a positive and statistically significant effect on oil price (or on commodity prices) that builds up rapidly over three months and then persists for twenty months;
2. a positive and statistically significant effect on U.S. CPI inflation that builds up over about six months or so and then persists;
3. a statistically significant depreciation of the real trade-weighted U.S. currency after about two or three months that achieves maximum absolute value after five to eight months and that then persists.

In Table 2, the log likelihood ratio for over-identification test Chi-square values are reported for each of the five models shown in equations (3) – (7). The highest value for over-identification test restriction is for our model of choice in equation (3), indicating that the restriction cannot be rejected at a higher significance level than for the other models.

4. Conclusion and discussion

The major finding of the paper is that China's monetary expansion has a spill over effect on the U.S. through the effects on world commodity markets and through the exchange rate regime followed by China. Increases in monetary aggregates in China significantly increase the world prices of oil and commodities, significantly increases U.S. CPI inflation, and significantly decreases the real trade-weighted value of the U.S. dollar. These findings are robust to a number of model specifications including different assumptions about whether commodity or oil prices appear in the model, when U.S. variables to respond contemporaneously to Chinese M2, when China's M2 may respond to all U.S. domestic variables, and when the real trade-weighted value of the U.S. dollar responds contemporaneously to China's M2.

The inclusion of China variables in analysis of the international transmission of monetary shocks is an appropriate specification given the tremendous impact of China on the global economy in recent years. It is now clear that China's economy has achieved a scale such that China's monetary policy and exchange rate policy have influence on the U.S. economy. China's growth influences world commodity/oil prices and this is reflected in significantly higher inflation in the U.S. China's monetary expansion is also associated with significant decreases in the real trade weighted value of the U.S. dollar that is due to the operation of a pegged currency. China pegs its currency to a basket of currencies in which the U.S. dollar has considerable weight and also has extensive capital controls in place. To maintain the value of its currency at a time of monetary expansion, China in effect takes steps that result in a devaluation of real trade-weighted value of the U.S. dollar. In terms of the Mundell–Fleming model, with imperfect capital mobility, sterilization actions under a fixed exchange rate permit China to pursue an independent monetary policy with consequences for the U.S.

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Table 1: Test for unit roots 1996:1-2012:12:

Endogenous variables					
Variables	ADF	KPSS	PP	ADF	KPSS
$\log(China\ M2_t)$	0.999	1.793***	$\Delta\log(China\ M2_t)$	0.0399***	0.312
$\mathrm{U.S.IR}_t$	0.733	1.022***	$\mathrm{U.S.IR}_t$	0.000***	0.068
$\log(U.S.M2_t)$	0.975	1.796***	$\Delta\log(U.S.M2_t)$	0.000***	0.077
$\log(U.S.CPI_t)$	0.892	1.805***	$\Delta\log(U.S.CPI_t)$	0.000***	0.062
$\log(U.S.IP_t)$	0.119	0.946***	$\Delta\log(U.S.IP_t)$	0.011***	0.234
$\log(OP_t)$	0.650	1.639***	$\Delta\log(OP_t)$	0.000***	0.036
$\log(U.S.TWI_t)$	0.786	1.343***	$\Delta\log(U.S.TWI_t)$	0.000***	0.194

Notes: The variables are China M2, short term U.S. interest rate (U.S. IR), U.S. M2, U.S. consumer price index (U.S. CPI), U.S. industrial production (U.S. IP), global oil price (OP), and real effective trade-weighted U.S. foreign exchange rate (U.S. TWI). The null hypothesis for the Augmented Dickey-Fuller (ADF) test is the variable has a unit root and the null hypothesis for the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test is the variable is stationary. The first difference of the series is indicated by Δ.The lag selection criteria for the ADF is based on Schwarz information Criteria (SIC) and for the KPSS is the Newey-West Bandwidth. ***, **, * indicates rejection of the null hypothesis at 1%, 5% and 10%, levels of significance.

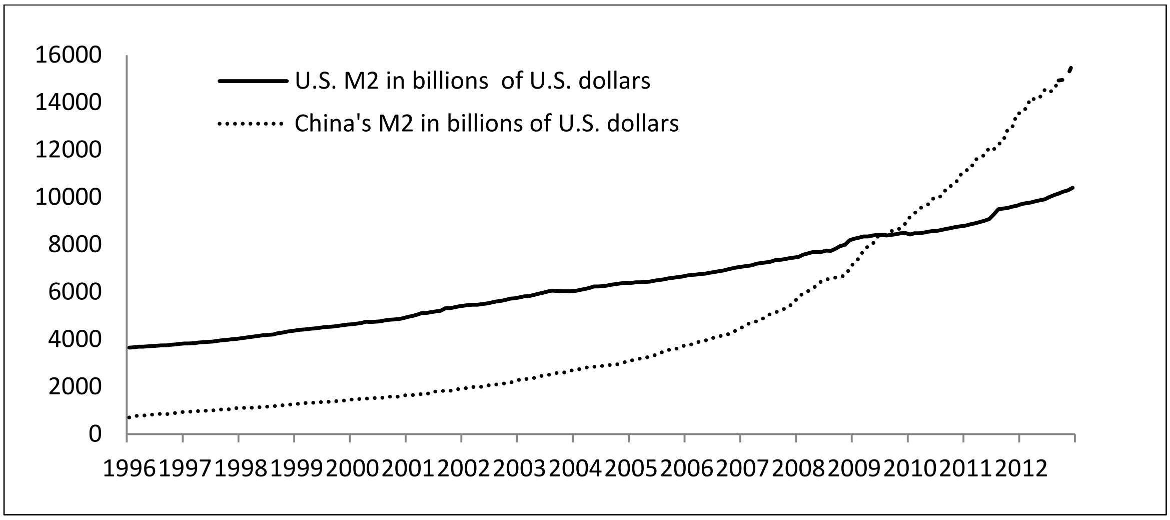
Table 2: Log likelihood ratio test for over-identification restrictions

Null Hypothesis : Restrictions are valid

Model restrictions	3	4	5	6	7
Chi-square value	10.5	8.16	4.49	6.89	9.01

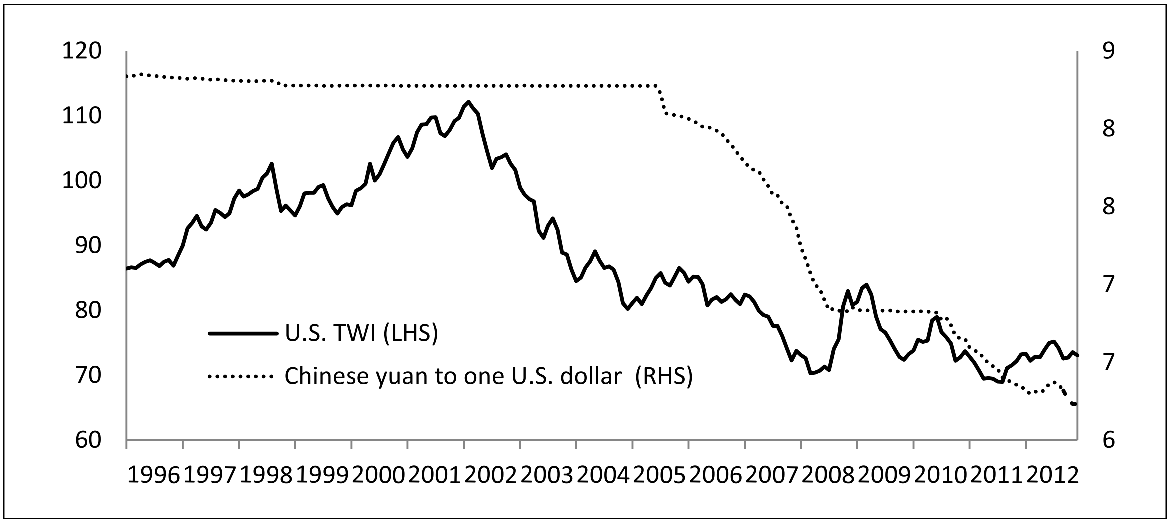
Notes: Log likelihood ratio for over-identification test Chi-square values are reported for each of the five models shown in equations (3), (4), (5), (6) and (7). The test is for non-recursive identification restrictions in the contemporaneous matrix restrictions in equations (3), (4), (5), (6) and (7), based on equations (1) and (2). The highest value for over-identification test restriction is for model of choice in equation (3), indicating that the restriction cannot be rejected at higher significant level than for the other models.

Figure 1: Monetary aggregate M2 in billions of U.S. dollars for China and the U.S.



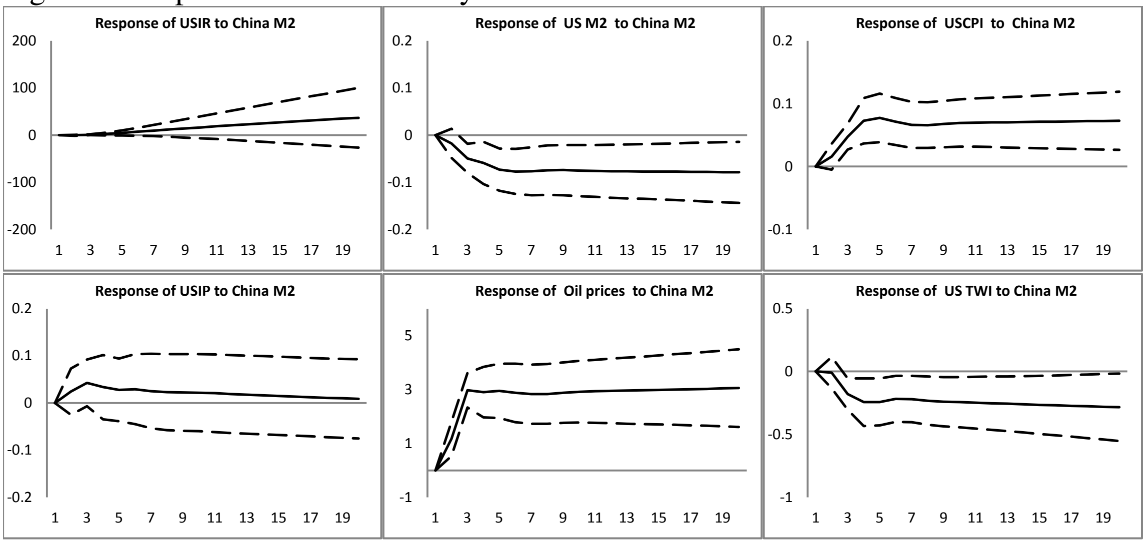
Notes: U.S. M2 data are from the Federal Reserve of St. Louis (FRED) and China M2 data are from People's Bank of China.

Figure 2: China/U.S. exchange rate and real effective trade-weighted U.S. dollar



Notes: China/U.S. exchange rate and real effective trade-weighted U.S. dollar (U.S. TWI) from the Federal Reserve of St. Louis (FRED).

Figure 3: Response of U.S. economy to China M2 shocks: 1999:1-2012:12



Notes: Figure 3 shows the dynamic response or impulse response function of the U.S. area variables in the SVAR model to China M2 shocks. The confidence bands are obtained using Monte Carlo integration as described by Sims (1980), where 5000 draws were used from the asymptotic distribution of the VAR coefficient. The variables are China M2, short term U.S. interest rate (USIR), U.S. M2 (USM2), U.S. consumer price index (US CPI), U.S. industrial production (US IP), global oil price (OP), and real effective trade-weighted U.S. dollar exchange rate (US TWI).