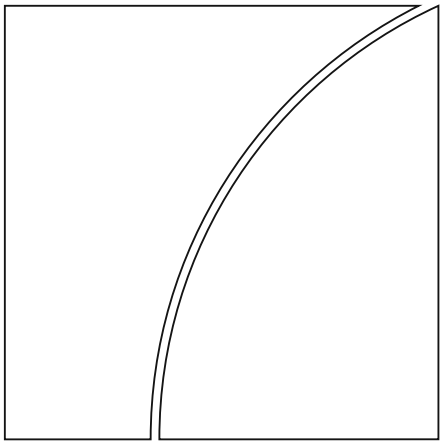


BANK FOR INTERNATIONAL SETTLEMENTS

BIS Working Papers

No 436

Global spillovers and domestic monetary policy

by Menzie D Chinn

Monetary and Economic Department

December 2013

JEL classification: E58, F42

Keywords: balance sheet, money supply, portfolio balance, forward guidance, yield curve, spreads, signaling, capital flows, rebalancing

BIS Working Papers are written by members of the Monetary and Economic Department of the Bank for International Settlements, and from time to time by other economists, and are published by the Bank. The papers are on subjects of topical interest and are technical in character. The views expressed in them are those of their authors and not necessarily the views of the BIS.

This publication is available on the BIS website (www.bis.org).

ISSN 1020-0959 (print)

ISBN 1682-7678 (online)

Global spillovers and domestic monetary policy

The effects of conventional and unconventional measures

Menzie D Chinn[1]

Abstract

I discuss how the unconventional monetary policy measures implemented over the past several years – quantitative and credit easing, and forward guidance – can be analysed in the context of conventional models of asset prices, with particular reference to exchange rates. I then discuss alternative approaches to interpreting the effects of such policies, and review the empirical evidence. Finally, I examine the ramifications for thinking about the impact on exchange rates and asset prices of emerging market economies. I conclude that although the implementation of unconventional monetary policy measures may introduce more volatility into global markets, in general it will support global rebalancing by encouraging the revaluation of emerging market currencies.

JEL classification: E58, F42

Keywords: balance sheet, money supply, portfolio balance, forward guidance, yield curve, spreads, signaling, capital flows, rebalancing

[1] Paper prepared for the 12th BIS Annual Conference "Navigating the great recession: what role for monetary policy?", 20–21 June 2013, Lucerne, Switzerland. I thank Claudio Borio, Andy Filardo, Joe Gagnon, the discussants Leszek Balcerowicz and Rakesh Mohan, and participants at the conference for their helpful comments. I also thank Stephan Danninger and Jamus Lim for providing data.

Correspondence: Robert M La Follette School of Public Affairs; and Department of Economics, University of Wisconsin, 1180 Observatory Drive, Madison, WI 53706-1393. E-mail: mchinn@lafollette.wisc.edu.

1. Introduction

Domestic monetary policy has always had spillover effects. However, questions have surrounded the magnitude and direction of such effects. This degree of uncertainty has been heightened by the implementation of unconventional monetary policy measures in the wake of the Great Recession. With conventional monetary policies – that is, alterations in the policy rate – off the table, analysts have been forced to consider the efficacy and desirability of such unconventional measures, ranging from forward guidance to quantitative/credit easing.

Before 2007, it would be fair to say a good number of macroeconomists held the belief that once the zero lower bound was encountered, monetary policy would be largely if not completely ineffectual. Unable to lower the policy rate, then other asset prices – equities, real estate – would be unaffected by monetary policy. That conjecture extended to the key asset price in international finance – the exchange rate – as well as other asset prices abroad.

In the wake of repeated bouts of easing by way of unconventional monetary policy (UMP) measures in the United States, the euro area, the United Kingdom and Japan, a new consensus has arisen. Not only do most observers now believe that at least certain types of UMPs can affect domestic activity. There is also a growing belief that such measures can have substantial cross-border impacts. The author of one of the earlier studies of credit easing concludes (Neely (2012)):

> "[Large Scale Asset Purchases] buy announcements reduced expected long-term U.S. bond real yields, expected long-term foreign bond real yields in U.S. goods, and the spot value of the dollar."

More recent analyses have led others to make similar conclusions, regarding both announcements and interventions (deeds as well as words, one might say). From Fratzscher et al (2012):

> "…US unconventional monetary policy measures since 2007 have affected capital flows to EMEs in a pro-cyclical manner, and have raised asset prices globally and weakened the US dollar. This suggests that there is indeed an important global dimension to and externalities from monetary policy decisions in advanced economies."

These conclusions based upon statistical analyses have been reinforced by the fairly strong reaction in domestic and international asset markets to the Fed's perceived tightening of monetary policy by way of what has been popularly referred to as the "taper", or termination of asset purchases. To put it plainly, it is hard to argue that unconventional measures such as quantitative/credit easing had no effect to begin with, when the (perceived) announcement of its termination did.

However, even as a consensus has developed that unconventional measures can have an impact on asset prices and economic activity, a formal tracing out of the channels by which these effects on asset prices, let alone the real economy, are propagated has not yet been undertaken.

To highlight this point, consider the relationship between expansions of central balance sheets and exchange rates. A cursory examination of the correlation of exchange rate and money base variables does suggest some relationship. Figure 1 illustrates the relationship of the US dollar against sterling, the euro and yen. An increase in the exchange rate represents a dollar depreciation, so the conventional view asserts a positive relationship with the *relative* money base. While there is no

apparent correlation for the US dollar/UK pound rate, for the euro and the yen bilateral rates, there does seem to be some relationship of the posited form. For instance, the dollar depreciates against the euro and the yen in the wake of the rapid expansion of the Fed's balance sheet in 2008. (In contrast to the ECB and the Bank of Japan, the Bank of England followed the Fed fairly rapidly in expanding the balance sheet, which may explain the relative lack of apparent co-movement.) In general, the US dollar seems to depreciate as the Fed's balance sheet increases, as shown in Figure 2.

That said, the correlation is more pronounced at some times than at others. The co-movement is most pronounced in the wake of the Fed's expansion of the balance sheet. Of course, one would not expect a tight relationship, as many other factors will affect the exchange rate value, such as flight to safety, fiscal and terms-of-trade shocks, as well as perceptions of future monetary policy not accounted for by current movements in balance sheets.

In this paper, I contrast the traditional approach to exchange rate modelling with the implications from recent empirical findings, thereby demonstrating the need for a different empirical framework. Which framework is most appropriate is an important question. The nature of the spillovers might very well differ according to the transmission mechanism.

I then review the empirical evidence regarding the impact of unconventional measures on asset prices, as well as economic activity. Based upon these findings, I then assess the implications for global rebalancing.

2. Unconventional measures and interpreting exchange rate changes in traditional models

The workhorse macroeconomic model of exchange rate determination has been for years the monetary approach.[2] The exchange rate is viewed as the relative price of currencies which depends upon the relative demands and supplies of the stocks of money.

The sticky price variant associated with Dornbusch (1976) and Frankel (1979) imposes purchasing power parity only in the long run, so that the nominal interest rate can move independently of expected inflation. Hence, the exchange rate is a function of money stocks and incomes, the interest rate and the inflation rate.

$$s_t \equiv (m_t - m_t^*) - \varphi(y_t - y_t^*) - \frac{1}{\theta}(i_t - i_t^*) + (\lambda + \frac{1}{\theta})(\pi_t - \pi_t^*) \quad (1)$$

Here (in logs), s is the exchange rate, m is the money stock, y is real GDP, i is the interest rate, φ and λ are the income elasticity and interest semi-elasticity of money demand, respectively.

Because prices are assumed to be sticky in the short run, the interest rate differential differs from the inflation differential. In other words, the real interest rate matters, so that a drop in the real interest rate, holding everything else constant,

[2] This discussion of conventional macroeconomic models is drawn from Chinn (2012).

causes a fall in the currency's value. The interest rate here pertains to a short-term instrument, say a one-period bond.

Formally, this relationship arises due to the Dornbusch overshooting effect. A monetary expansion that lowers the interest rate requires both a long-run depreciation to satisfy purchasing power parity (PPP) and a short-run appreciation over time to satisfy uncovered interest parity (UIP). In the context of the model (as opposed to reality), no flows are necessary – merely a re-equilibration of asset prices and returns so that no excess returns are anticipated.

Historically, the real interest rate differential has been the most dependable way to predict exchange rates. Decreases in real rates in the United States vis-à-vis foreign interest rates were reliably (if not tightly) linked to changes in the dollar's value.

It bears repeating that, with this approach, where money stocks and money demand are the key determinants of interest rates and hence exchange rates, uncovered interest rate parity holds. This is tantamount to assuming that other assets besides money do not matter. In the narrowest two-asset models (money and bonds), government bonds issued by different governments and denominated in different currencies are treated as perfect substitutes by a representative agent.

That's why in these models, *sterilised foreign exchange intervention has no effect on the exchange rate*. Consider this assessment from Humpage (2003):

> [B]ecause sterilized intervention does not affect market fundamentals, it does not afford monetary authorities a means of routinely guiding their exchange rates along a path that they determine independent of their monetary policies. While monetary authorities in large developed countries certainly can affect nominal exchange rates through non-sterilized foreign exchange intervention, doing so either will conflict with their domestic policy objectives or it will be entirely redundant to open market operation in domestic securities. The outcome depends on the nature of the underlying economic shock to their exchange market.

It is a measure of how far the consensus has moved that it is now widely accepted that sterilised intervention can, and does, have large effects, and not only for currencies for countries with the heavy apparatus of capital controls (eg China). Rather, it also applies (or is perceived to apply) to countries with relatively open financial accounts – consider Switzerland's cap on the franc's value.[3] More recently, the G20's insistence that Japan forgo any foreign exchange intervention as part of its newly invigorated monetary policy suggests that the idea of ineffectiveness has been discarded.[4]

For the remainder of this paper, I focus on the unconventional monetary policies that operate on domestic assets (as opposed to foreign exchange reserves). In the context of these monetary models, neither issuance of greater amounts of government debt, nor central bank purchases of that debt, can have an impact on the exchange rate, unless the purchases of debt result in an increase in the money supply. Clearly, given that the increase in the money base due to quantitative easing

[3] This point has been forcefully made by Gagnon (2013).

[4] See, eg, Zuckerman and Chung (2013).

has not been manifested in any corresponding increase in money supply, this interpretation does not make sense.

Of course, it is not possible to rule out a monetary interpretation completely. If the implementation of unconventional monetary policies – either forward guidance or quantitative and/or credit easing – is taken as a signal of future monetary expansion, then a monetary model might be applicable. To see this, consider the following flexible price monetary model, where the exchange rate is the present discounted value of the future stream of monetary fundamentals. Then:

$$s_t = \left(\frac{1}{1+\lambda}\right)\sum_{\tau=0}^{\infty}\left(\frac{\lambda}{(1+\lambda)}\right)^{\tau} E_t \tilde{M}_{t+\tau} \qquad (2)$$

Where $\tilde{M}_t \equiv (m_t - m_t^*) - \varphi(y_t - y_t^*)$

Suppose that the monetary authorities are able to influence expectations such that the level of the money supply in the future is going to be higher than previously thought, but that the *trend* rate of money growth is not increased. In this case, the inflation rate is not increased, merely the price *level* in the future. This results in an immediate depreciation in the currency.[5] Notice that one implication of the model is that interest rates need not necessarily move at the instant the anticipated increase in money supply becomes credible. This sort of logic underpins the fears that some have that quantitative easing will result in the debasement of the currency.

This interpretation of the impact of quantitative easing would be difficult to verify using conventional econometric methods. For instance, the older rational expectations methodology, imposing cross-equation restrictions on the exchange rate equation and auxiliary equations for the fundamentals, relies upon the assumption that the time series processes driving the fundamentals are stable. That is a highly untenable proposition, given the regime change implicit in the adoption of unconventional monetary policies.

The monetary interpretation of the exchange rate effects can be resurrected if these measures – expanding the money base – are taken to signal future policy outcomes. This brings back in the relevance of central bank forward guidance.

3. The potential impact of forward guidance

One component of unconventional monetary policy is the use of forward guidance – in the context of recent years, a commitment to keep future short-term interest rates low; this has been part of the package of policies used by the Fed. Only recently has this approach been adopted, most recently by the Bank of England and the ECB. The use of forward guidance is aimed at driving a reduction of long-term interest rates through the expectations hypothesis of the term structure.

[5] Note that a perceived increase in the future *trend growth rate* of the money supply would result in an immediate increase in the interest rate; that counterfactual prediction seems to make that interpretation less plausible.

As Del Negro and Patterson (2012) have remarked, forward guidance typically exhibits extremely powerful results in New Keynesian dynamic stochastic general equilibrium (DSGE) models, a phenomenon they coin the "forward guidance puzzle". Long-term interest rates respond strongly to a commitment to keeping short-term interest rates low, as do other macroeconomic variables.

If long-term interest rates respond, how do exchange rates? Here there seems to be a dearth of results. Most studies based upon DSGE-based simulations of forward guidance do not allow for exchange rate effects. However, because of the forward guidance puzzle, one would probably look askance at the simulation results even if they existed.

Consequently, one needs to appeal to less formal results. In a study incorporating announcements, Kiley (2013) notes that long-term uncovered interest parity holds even in the recent period encompassing the zero lower bound, confirming results by Chinn and Quayyum (2012). To the extent that the Dornbusch overshooting effect holds, the resulting lower long-term interest rates imply depreciated currency values today.

A more ad hoc approach would drop the parity condition, and accept that the carry trade exists. In this worldview, lower interest rates in the United States and other advanced economies would induce capital flows to the other economies, thereby depreciating advanced economy currencies. Figure 4 depicts the evolution of inflows to emerging markets; there is some slight evidence of surges of capital inflows into the emerging markets during QE2 and QE3. However, a more formal analysis would control for other factors.

4. QE/CE in a portfolio balance model

In order to explain exchange rate movements arising from credit easing, one has to apply models that treat different bonds (of identical default risk) differently. It's easiest to relate this to the literature when talking about government bonds.

The portfolio balance model differs from the monetary model in that it assumes that assets denominated in different currencies are not perfectly substitutable; this means that returns on bonds, when expressed in a common currency, might differ due to a risk premium.[6] For expositional ease, I draw on a model due to Frankel (1984). Here, perfect capital mobility (CIP) holds, while perfect capital substitutability does not. That is, investors view domestic and foreign bonds as imperfect substitutes. Then investor *j* will allocate her holdings in response to expected returns (expressed in a common currency). Aggregating over homogeneous investors yields:

$$B_t \Big/ S_t B_t^* = \gamma(i_t - i_t^* - E_t \Delta s_{t+1}) \tag{3}$$

where B and B^* are net supplies of domestic and foreign bonds, and it is assumed for simplicity that governments issue debt denominated only in their own

[6] Risk premia can arise in models without this particular structure. In more microfounded approaches, the risk premia arises from the correlation of relative returns with consumption growth. The implications of this type of approach are discussed in Section 4.

currencies. The term in the parentheses on the right-hand side of (3) is the deviation from uncovered interest parity, or equivalently, the exchange risk premium on domestic currency. It's clear how credit easing might work in this model – if the central bank were to purchase domestic bonds, this would reduce the stock of bonds held by the private sector.

This expression indicates that holdings of domestic bonds, relative to foreign currency denominated bonds, are a positive function γ of the exchange risk premium. Assuming the functional form for relative bond demand is linear-exponential in γ, then after rearrangement, equation (3) becomes:

$$s_t = \gamma_0 + \gamma_1(i_t - i_t^* - E_t\Delta s_{t+1}) + b_t - b_t^* \quad (4)$$

The difficulty in implementing equation (4) is that the term in the parentheses is unobservable.[7] To obtain an empirically implementable specification, one could assume expected depreciation is zero – an assumption that is consistent with the near-random walk exchange rates. Then (4) becomes:

$$s_t = \gamma_0 + \gamma_1(i_t - i_t^*) + b_t - b_t^* \quad (5)$$

Notice the equation indicates that as b^* increases, s falls (appreciates): as the stock of foreign assets held by home rises, the exchange rate appreciates.

The impact of central bank purchases of bonds has ambiguous effects, as it removes bonds from the private sector, reducing b. In equation (4), that implies an appreciation of the exchange rate, counter to intuition regarding credit easing. However, it's not appropriate to hold all else constant; purchases of bonds will likely reduce the home country interest rate. Moreover, in a more general hybrid monetary-portfolio balance model, money supplies would also matter (as in Frankel, 1984).

In the specification represented by equation (4), it is assumed that all investors have the same portfolio preferences, presumably because they consume the same basket of goods. For the sake of expositional simplicity, I'll retain this assumption. However, there are two complications one would want to address.

The first is, in order to deal with effects at the zero interest rate lower bound, it's not plausible to assume an offsetting interest rate effect. The second complication actually helps with addressing the first – and that is that the distinction of different maturities of government bonds is essential. Then one can view b as a sum of short-term and long-term government bonds, and the interest rates as a weighted average of the corresponding yields, which is likely to be above zero.

How does foreign intervention fit into the model? Dooley and Isard (1982) note explicitly that b is government debt net of purchases via open market operations and foreign exchange intervention. However, foreign exchange intervention does not have the same impact as purchases of domestic bonds, as the currency composition of the holdings of the private sector differs in the two cases.

[7] As in the case of equation (4), one could recursively substitute out for the expected future exchange rate. This would lead to an expression stating that the current exchange rate is determined as a negative function of current and discounted future expected interest rates, and a positive function of current and discounted future expected stocks of domestic currency bonds, relative to foreign-denominated bonds. This expression, likes its monetary counterpart, is not tractable from an empirical standpoint.

While equation (4) is a useful heuristic for considering the impact of credit easing on the exchange rate, it is a very partial equilibrium approach. In particular, one does not know how expected depreciation will evolve.[8, 9]

Neely (2012) deploys a multi-asset portfolio balance model with mean-variance optimisation. The long-run exchange rate value is pinned down by purchasing power parity, combined with the assumption that bond purchases do not affect the long-run price level (the long-run horizon assumed to equal the maturity of the benchmark bonds, 10 years). In this model, designed to motivate the analysis of announcement effects, the exchange rate "jumps" at the time of the announcement, with the magnitude depending upon the covariation of returns, and the coefficient of risk aversion. He finds that the observed exchange rate jumps are consistent with the portfolio balance model he uses.

Neely's framework is quite useful, but in order to obtain some quantitative estimates, he relies upon a fairly simplified framework. A more sophisticated – but difficult to empirically implement – framework recognises that the central bank is operating on *several* different assets, with differing maturities, as noted by Portes (2012). Consider the Fed. In addition to the short-term government bonds and foreign exchange reserves held pre-2008, the Fed now holds long-term government bonds and agency debt and mortgage-backed securities. The impact of purchases of any given category of securities will depend in part upon the substitutability of these assets. In the standard portfolio balance model, purchases of short- and long-term government bonds would change yields relative to foreign short- and long-term bonds. But if home and long-term government bonds are highly substitutable – more so than short-term – then thinking of relative home and foreign bond supplies net of central bank holdings might not be the most useful approach.

This is why it is so difficult to disentangle the theoretical implications of the changes in balance sheets on exchange rates. Perhaps more important than the magnitude of the change in central bank balance sheets are the changes in the composition. Figure 5 highlights this point for the Federal Reserve. The increase in assets on the balance sheet in September 2008 was accounted for by special loans to financial institutions. With the implementation of the Fed's quantitative easing ("QE1") in November 2008 and March 2009, the balance sheet increased modestly in size as emergency loans were wound down and were supplanted by holdings of agency debt and MBS and longer-term debt. Then the second round of quantitative easing ("QE2"), which began in November of 2010, increased the balance sheet and the weighting toward long-term Treasuries.

If the portfolio balance adjustment process is the key factor in exchange rate movements, then it is not surprising that it has proven difficult to trace out the channels of effects. The strength of such individual adjustments will depend not only upon the substitutability of assets issue mentioned earlier, but also on exogenous shifts in private demand for assets, even as central banks undertake

[8] Closing the model formally is possible (eg Blanchard, Giavazzi and Sa (2005)), but would not provide particular illumination for the issues we are concerned with.

[9] It is probably best to think of the portfolio balance approach as a heuristic in general, given the less than complete success encountered by researchers, in particular by those using the mean-variance approach, as in Frankel and Engel (1984). See Engel (1996) for a discussion.

purchase programmes. All these factors are difficult to account for in a structural model.[10]

5. Empirical evidence on international effects

The international repercussions of the impact of advanced economy unconventional measures can be undertaken in a variety of ways, mostly of a non-structural flavour – which makes sense given the preceding discussion. One way is to use event studies to analyse the impact on asset prices, or use other high-frequency information on actual policy interventions. The second is to use lower-frequency data to assess both real and financial effects, but spanning periods of both crisis and tranquillity (or non-crisis).

5.1 Announcement and intervention effects

Since the advent of unconventional monetary policy measures is relatively new (with one or two exceptions), the empirical literature is also fairly small, albeit growing rapidly. One can break the literature down into two main groups. The first is based on an examination of announcement effects. The second augments announcements with actual interventions and news. Most of these early studies fall into the first category, and focused on the impact on domestic assets (and necessarily on the first large-scale asset purchases, or "LSAP") (eg Gagnon, et al (2010); Bauer and Rudebusch (2011)). Hamilton and Wu (2011) examined both LSAP1 and LSAP2.

Neely (2012) examined the impact of the LSAP1 events. He found that the dollar depreciated against foreign currencies upon announcement, with the depreciations ranging from 7.76 ppts to 3.54 ppts (for the euro and sterling) within the one-day window around the announcement.[11] These magnitudes are consistent with the portfolio balance model he forwards combined with the 22% reduction in net bonds implied by the LSAP. The responses of exchange rates are shown in Figure 3.

This finding is of interest because of the inclusion of controls for the element of anticipation, and the fact that the analysis spans a larger number of episodes than the earlier studies. This latter point is of some relevance because some research had shown the decreasing effectiveness of more recent rounds of unconventional measures. This study confirms that the effect remains (although it does not exclude the possibility that the effect has declined over time).

Extending and elaborating on the approach of Gagnon et al (2010), Chen et al (2012) examine the cross-border (Asian) effects of announcements. They find that the two rounds of quantitative easing lowered Asian bond yields, boosted equity prices and exerted upward pressure on exchange rates (against the US dollar). In updated work[12] encompassing the maturity extension program (MEP) and QE3, and

[10] For discussion of additional channels to East Asia, including policy responses and shifts to dollar debt, see He and McCauley (2013).

[11] Neely finds that the changes are slightly larger using a two-day window, suggesting protracted market adjustment.

[12] Personal communication from A Filardo.

including forward guidance statements, the authors find that not all monetary easing policies had the same impact. The MEP had opposite effects from the various rounds of QE on Asian two-year and 10-year bond yields and, interestingly, the exchange rate (the dollar tended to appreciate with the MEP).

Interestingly, they find forward rate guidance seemed to have a noticeable impact on exchange rates. This is one of the rare instances where forward guidance is both examined, and found to have had the expected impact on the dollar's value. (For instance, Campbell et al's (2012) survey of forward guidance does not make any mention of the impact on the dollar.) IMF (2013b) argues that the above event study analyses have to be taken with some caution, as the announcements reflect both the policy decision and an assessment of current economic conditions.

Another problem with the event study approach is that the LSAP announcements (as well as other unconventional measures) could have been partly anticipated. This would mean that market adjustments to the policy measures would be mismeasured, downwardly biasing the estimated impact. Glick and Leduc address this issue by using high-frequency intra-daily data, and use changes in long-term Treasury futures to identify the surprise component of the announcements. In a sample encompassing all three rounds of large scale asset purchases, as well as statements regarding forward guidance and conditional inflation targeting, the authors find that a one standard deviation surprise easing results in a 40 bps decline within an hour. By way of comparison, a one standard deviation surprise easing in the federal funds rate leads to a 6 bps decline. Using a rescaling parameter related to long-term rates, the authors map the unconventional surprises standard deviations into those for conventional surprises, and find that an (adjusted) one standard deviation surprise in unconventional policy has an impact of about 5 to 6 bps, surprisingly similar to conventional surprises.

Are the findings of an impact arising from LSAP's signalling? Bauer and Rudebusch (2012) use a term structure model to decompose changes in long rates into a risk premium component and an expected future interest rate component (associated with portfolio balance and signalling motivations, respectively). They conclude that the expected future short rates effect dominates, hence the signalling effect is of primary importance.

There is another possibility of how signalling is working. It could be that announcement of an unconventional monetary policy could be taken as an indicator that the economic conditions are even worse than previously thought. In this case, reductions in interest rates and currency values would be driven not by anticipation of the impact of future monetary policy, but rather news regarding the state of the economy. Neely observes that the concurrent increase in oil and equity prices is inconsistent with this interpretation. Hence, one can take from this that the "bad news" interpretation of LSAP announcements does not hold up to the data, at least for the sample Neely investigates.

The Glick and Leduc approach addresses the possibility of anticipated policy measures when assessing announcement effects. The examination of announcement effects presupposes that the policies are credible. It is possible that there is an additional effect of these unconventional measures that comes from actual implementation.

In this vein, Fratzscher et al (2012) examine the exchange rate and cross-border implications of quantitative easing measures (QE1 and QE2), but use daily data on both announcements as well as actual implementation as the explanatory variables.

While the included policies include liquidity provision to financial institutions, and to credit markets, in addition to large scale asset purchases, they do not include forward guidance. The announcements analysed include the QE1 and QE2 measures, while the actual market interventions include liquidity support measures, purchases of long-term Treasury bonds, and purchases of mortgage-backed securities.

The dependent variables include data on both asset prices as well as private flows under management by equity and bond funds.[13] Hence the authors are able to measure both quantity (flow) and price responses.

In order to control for anticipation effects, they include country fixed effects, lagged variables to account for financial shocks (VIX, 10-year T-bond yield, and three-month OIS rate-T bill spread), and lagged returns in domestic market returns. It's not clear that these controls will deal with the possibility of anticipated policies, but they are potentially better than no controls at all.[14]

Their analysis covers the January 2007 to December 2010 period, and covers asset prices as well as flows. The key finding they uncover is that there is a distinguishing feature between what happens in QE1 and QE2. QE1 was adjudged to be successful in lowering sovereign yields and raising equity markets in the United States and in 65 countries.

Fratzscher et al conclude that QE1 spurred a portfolio rebalancing, with capital flows moving out of the emerging market economies, and into the advanced economies. By way of contrast, QE2 induced the reverse effect. Capital flows to the emerging markets, and away from the advanced economies, did then increase. In other words, the conventional interpretation of quantitative easing as necessarily triggering capital equity and bond flows to the emerging markets might need some rethinking.[15]

This combined announcement/policy approach yields a particularly interesting point – announcement effects do not tell the whole story. In fact the authors conclude "the impact of Fed operations, such as Treasury and MBS purchases, on portfolio allocations and asset prices dwarfed those of Fed announcements." This result implies that the announcement studies understate the impact of unconventional monetary policy measures.

The cumulative (2007–10) impact of QE1 announcements was to depreciate the dollar by 3.2%. The cumulative impact of Treasury purchases was to depreciate the dollar by 4.8% (interestingly, MBS purchases appreciate the dollar by 5.1%). By way of contrast, QE2 announcements depreciated the dollar by a mere 0.2%.

The results highlight differential impacts on country groups. For instance, QE1 announcements depreciated the dollar much more against advanced economy currencies than against emerging market currencies. The same is true for QE2 announcements, although as noted before, the overall magnitude is much smaller.

[13] The data set is provided by EPFR, and includes data for 16,000 equity and 8,000 bond funds, encompassing about 5–20% of market capitalisation for most countries.

[14] The usefulness of these control variables as proxy for anticipated policies would depend on the consistency and strength of these lagged variables with anticipated policies.

[15] While Fratzscher et al find U.S. monetary policy did drive some of the inflows into emerging markets, other factors are more important. A similar finding, using balance of payments data, is obtained by Ahmed and Zlate (2013).

The cumulated overall impact of US monetary policy (announcements *and* purchases) is shown in Figure 6. The calculations indicate that the cumulated impact on the dollar (vis-à-vis emerging market currencies) was appreciation, while it was depreciation against other advanced economy currencies.

Treasury purchases also had a bigger impact on advanced economy currencies (the study does not distinguish between Treasury purchases under QE1 and QE2). These results run counter to the perception that emerging market currencies came under more pressure than advanced economy currencies as a consequence of US asset purchases.[16]

5.2 Quasi-structural approaches

A different approach is to assume that the relationships that held prior to the global financial crisis and the advent of unconventional monetary policies persisted into the post-crisis period. Chen et al (2012) implement a global vector error correction model which links the US 10-year–three-month term spread to variables at home and abroad. This is an appropriate approach, insofar as one thinks of the relative price of short- and long-term US government securities is the key one.[17]

They estimate the model on monthly data over the 1995–2012 period, and find that there are significant effects on foreign – primarily emerging market – economic variables.[18] As they note, "the impact on the emerging economies is significant and appeared to have been widespread. The US term spread shock affects all variables: real GDP, inflation, stock prices, bank credit, foreign exchange pressure and money growth. This indicates that several different transmission channels may have been at play." (See p 252.) Some of these effects are shown in Figures 7 and 8.

The figures indicate a variety of responses. GDP in particular increases for Hong Kong SAR, Singapore and Malaysia. Interestingly, China's response is fairly small. Stock prices increase substantially for most countries, despite minimal money supply responses; the authors take these varied patterns as indicating different channels are of greater and lesser importance for different countries.

In contrast, the GDP responses for Argentina and Brazil are substantial, despite essentially negative response of money growth and inflation for most countries. And in all four Latin American countries, stock prices rise.

There are two limitations of this approach. The first is that the estimation spans both pre-crisis and post-crisis periods; there is no guarantee that the propagation mechanisms that held during the earlier period hold now. The second potential difficulty is that the approach presupposes that a given amount of quantitative

[16] Interestingly, there seems to be remarkable unanimity among these studies that commodity prices did not rise in response to QE announcements (Glick and Leduc (2012)), or had mixed responses (Chen et al (2013)).

[17] IMF (2013b) forwards a different approach based upon a VaR incorporating sign restrictions. The findings indicate that the impact on output from the term premium is smaller than those arising from lower short rates. However, they do not use a structural model to examine spillover effects.

[18] They also find significant effects for US GDP over the entire sample, but not over the pre-crisis sample. This finding is consistent with those of Chinn and Kucko (2010) who find the predictive power of the term premium rise in the last decade.

easing can be translated into a corresponding reduction in the term premium. This might be a reasonably good approximation, but still might miss some subtleties.

Interestingly, the results of the various tests reported in Section 4 depend upon how governments and in particular central banks respond to the monetary policy measures undertaken in the advanced economies. One way to organise one's thoughts on this matter is to recall the implications of the trilemma. A country can simultaneously opt for two of three policy goals – exchange rate stability, monetary policy autonomy, and capital account openness – but not all three. Each of these dimensions of policy is difficult to measure, but Aizenman, Chinn and Ito (2010) have shown that indeed the trilemma binds, at least according to the indices they construct.[19]

In their global vector error correction analysis of emerging market economy responses, Chen et al (2012) find that Korea, Indonesia and Hong Kong SAR experienced substantial exchange market pressure as a consequence of a term spread reduction. That is, upward pressure on (a weighted average of) the currency's value and reserves occurred. Interestingly, China is one country that did not experience substantial increase in exchange market pressure.

5.3 Central bank responses to changes in the Federal Reserve balance sheet

An alternative means of examining this issue is to estimate a series of simple VaRs, involving money base to GDP and exchange rates, over the period of the unconventional monetary policies, 2008M09-2013M03. Here I am implicitly assuming either that the size of the balance sheet relative to GDP is the key monetary factor, or that changes in the size correlate with changes in the portfolio of holdings by the central bank. As the previous discussion indicates, these are arguable propositions. On the other hand, the balance sheet is a clearly observable and controllable instrument of the central bank – as opposed to the term premium, which represents the interaction of public and private actions. This approach, involving a (perhaps too) parsimonious specification, also has the advantage of being able to focus on the post-crisis period. Hence, one need not assume that the pre- and post- crisis periods exhibit the same behaviour.

First, I examine whether the US money base affects the dollar exchange rate (after controlling for financial stress), and second, whether the US money base affects emerging market economy exchange rates and money base. The money base is an admittedly imperfect proxy measure for central bank policies, but it has the virtue of being closely related to what the central bank itself is doing (in contrast to, for instance, the money supply, which is driven by both central bank and private sector decisions).

In terms of the US dollar's response to the increase in the Fed's balance sheet, I examine the impulse response functions for a trivariate VaR including (the first differences of) the advanced economy financial stress index, log US money base-

[19] See also Klein and Shambaugh (2013) for an analysis of how pegs and capital openness constrain monetary policy.

GDP and log trade-weighted nominal exchange rate.[20] The stress index is included to account for the safe haven effects on the US dollar. In Figure 9, the impulse response functions suggest that an increase in advanced country financial stress appreciates the dollar. Controlling for that effect, an increase in the money base/GDP ratio weakens the dollar at horizons of two to three months. The results are *not* robust to changes in the specification; in particular, the level of statistical significance varies, even if the broad patterns remain in place.

In contrast, euro area and UK exchange rate and money base measures do not respond to US money base changes (results not reported), in accord with the results in Chen et al (2012). Interestingly, Japan's exchange rate appreciates. However, this result does not survive truncating the sample to begin in 2009M01. In other words, some of the apparent impact of money base is driven by the 2008M09 increase in the Fed's balance sheet. In any case, the results are not very robust, suggesting that changes in Bank of England and ECB balance sheet sizes were not driven by changes in the Fed's balance sheet.[21]

Turning to the emerging market economies, I focus on Brazil, Russia, India and China. The hypothesis is that US monetary policy in the form of money base (at least during the sample period) exerts upward pressure on currency values or reserves. The monetary authorities either allow appreciation of the currency, or accumulation of reserves, or a combination thereof. Once one allows for differential responses to these pressures, it should not be surprising to see varied responses in macro variables as documented by Chen et al (2012).[22]

Turning to some emerging market economies, I rely upon a simple three variable, three lag VaR involving US money base, the emerging market nominal effective exchange rate and the emerging market money base. The inclusion of the exchange rate and the money base is reminiscent of Chen et al's use of an exchange market pressure variable, but in this case I allow that the emerging market central bank can either allow appreciation, allow reserve accumulation, possibly sterilising the inflow, or both.

In the case of Brazil (Figure 10), the currency value and money base do not respond in the expected fashion. The Russian currency depreciates three to five quarters in, while money base does not react (Figure 11). Interestingly, for the case of India (Figure 12), no statistically significant responses to the US money base are detected. If these emerging market central banks are forced to respond, it's very hard to discern that in these data.

The case of China (Figure 13) merits some discussion. At the one-month horizon, the currency appreciates in response to a money base increase. That effect dissipates quickly (at least statistically significant responses only show up at the one horizon). Chinese money base increases significantly at the three-month horizon;

[20] The VaR is estimated using six lags, and ordered with the financial stress index, first and money base and exchange rate second and third, respectively.

[21] It's possible that inclusion of additional variables such as GDP growth could uncover a relationship, but the brevity of the post-crisis sample prevents further investigation.

[22] In principle, one would want to control for other factors, including the imposition of capital controls. However, to my knowledge there does not exist a measure sufficiently accurate to capture subtle changes in de facto restrictions.

since the variables are growth rates, this means the level of money base ratio is higher in the wake of a US money base increase.[23]

6. Spillover effects, uncoordinated monetary policy and rebalancing

Several implications flow from this survey. In general, quantitative and credit easing and forward guidance seem to weaken the home currency, at least in some instances (as in LSAP2). This means that countries not matching expansionary monetary policy in the advanced economies will occasionally see their currencies face upward pressure. Policymakers in these countries will then have to decide whether to offset the upward pressure with increased foreign intervention, lower interest rates, or capital controls. *Note, however, that these are the same choices policymakers would face had the monetary loosening been of a conventional nature.*[24]

The consequent policy challenge will vary depending on the situation facing individual countries. Countries already at or near full employment might welcome the resulting appreciation of their currency, as long as they were near external balance. However, for those countries that are far below full employment, such an occurrence will be very unwelcome. (And of course, even countries near full employment might not welcome currency appreciation for reasons of political economy).

In other words, global rebalancing remains important. If the economies facing considerable economic slack (mostly the advanced economies, Figure 14) were to undertake monetary easing as a group, while the emerging market economies (near full employment, Figures 14 and 15) were to allow currency appreciation, this might actually yield a positive outcome.[25]

In the medium to long run, the impact is ambiguous. That is partly because the transmission mechanism involved differs from that related to foreign exchange intervention (at least as far as credit easing goes). To the extent that credit easing lowers interest rates for firms and households, or loosens credit constraints, domestic absorption is raised. This in turn will lead to greater economic activity and hence self-reinforcing growth, as opposed to expenditure switching. Obviously, had foreign exchange intervention been pursued, the boost to economic activity would have more likely come from the respective export sectors.

However, the implications for impacted countries will take on a different complexion depending upon the channel by which exchange rate depreciation occurs. For instance, if the primary effect is through a signalling effect regarding the conduct of future monetary policy – for instance a commitment to low interest rates

[23] The pattern of results does not change substantially with changes in lag structure or ordering. However, starting the sample after 2008M09 does reduce the estimated impact on the Chinese money base.

[24] Consider the episode of the 1990s. Similar complaints regarding the dilemma faced by emerging markets as they confronted surging capital inflows in the wake of reduced US interest rates. See Fernandez-Arias and Montiel (1996).

[25] A similar point is made regarding rebalancing in Chinn (2012).

into the future – then a depreciated exchange rate has a straightforward impact, switching expenditures toward the country implementing the policy.

If the currency depreciation is accompanied by other effects related to portfolio balance motivations, then the implications will vary by country. For instance, if credit easing works by increasing demand (or equivalently by reducing net supply) for US long-term Treasuries, then other assets with returns that are correlated with US long-term Treasuries will also likely react similarly. For instance, as shown in Gagnon et al (2010), yields on long-term securities for the advanced economies all declined when the LSAPs were announced.

This suggests a differential impact for advanced economies versus emerging market economies. Long-term yields for sovereign bonds are all likely to decline in response to purchases of US long-term Treasuries, as they are relatively substitutable. On the other hand, sovereign debt of emerging markets will likely exhibit a more muted effect, and the dollar's decline against those currencies will likely be measurably greater (although Fratzscher et al's results suggests there are no guarantees.)

One perspective on the ongoing programme of monetary expansion by way of unconventional means holds that these measures threaten the stability of the global economy, insofar as the effects are less certain than those arising from conventional monetary policy.[26] Another perspective – the right one in my view – takes the reflationary measures in the advanced economies as a welcome development.

The international dimension of the anxieties is centred, I believe, on the fact that advanced economy measures force a choice upon emerging markets: to accept capital inflows (perhaps offsetting domestic effects by sterilisation), to stem those inflows by way of capital controls, by allowing currency appreciation, or a combination of these measures. The (understandable) fear is that such capital inflows will spark a credit boom-bust cycle. The choices are most stark for small open economies.[27]

However, the benefits of expansionary monetary policy most likely outweigh the costs, especially if monetary policy in the advanced economies is withdrawn in a timely fashion as economic conditions improve.[28] If the advanced economies undertake expansionary policies that tend to weaken their respective currencies, then one is tempted to say that this is a wash, with no advantage conferred on any given country. Yet, if the unconventional measures raise the inflation rate, thereby reducing real interest rates, and spur domestic economic activity, both the advanced economies and the emerging market economies benefit.

It is true that some countries might face upward pressure on currency values; if they resist by way of foreign exchange intervention (as in China's case in the past), they will be forced to engage in ever more extensive sterilisation procedures, or imposition of capital controls. The evidence of the efficacy of the latter, in the face of recent capital inflows from the advanced economies arising from large scale asset purchase, is quite limited (Fratzscher et al (2012); Klein (2012)).

[26] See Williams (2013) for such an argument in the US case. The point is not to refrain from the use of unconventional measures, but rather to use them more sparingly than otherwise.

[27] This is not to diminish the hazards of the boom-bust cycle arising from capital flows, above and beyond net flows. See Borio and Disyatat (2011).

[28] The hazards of extended quantitative easing are highlighted in Borio (forthcoming).

But if they relent on currency values, then this is a partial solution to the problem of global imbalances, whereby the advanced economies will experience slack demand and current account deficits, while many emerging market countries will see excess demand and current account surpluses.[29]

There is a knock-on effect if uncovered interest parity does not hold. As emerging market economy currencies appreciate, presumably expected appreciation will also rise, raising the expected return to assets denominated in those currencies.[30] That will redouble the upward pressure on those currencies.

It would be preferable if a coordinated solution were arrived at: advanced economies with slack synchronising their policies, while emerging market economies in external surplus simultaneously accepting currency appreciation. However, that is not a viable option, and so the choice is between uncoordinated stimuli in the advanced economies versus inaction. It seems the former is a better path, and the one that the global economy has embarked upon (Eichengreen (2013).[31]

7. Conclusion

How do unconventional monetary policies affect exchange rates and other asset prices across borders? With respect to exchange rates, it seems that our conventional models are ill-equipped to deal with the impact of the asset purchases that are associated with credit easing.

There are ways to distinguish between the various channels by which the differing unconventional monetary policy measures affect asset prices. However, sharp inferences are difficult to make, exactly because the experience with these unconventional measures is so limited. That said, it is remarkable how much the profession has changed its view of the effectiveness of asset purchases and balance sheet increases in recent years. Ten years ago, sterilised foreign exchange intervention was viewed as having limited effectiveness. Now it is taken as a given that it can be effective. Moreover, purchases of domestic assets are perceived as having an effect, although of a more uncertain direction.

Apparently, not all episodes of quantitative/credit easing are created equal. This suggests that the effectiveness of such measures may vary with the state of the economy and the financial markets. The differential impacts of QE1 and QE2 have been highlighted by various studies.

A final point bears repeating. If advanced economies were able to implement expansionary monetary policy by conventional means – that is, by lowering the policy rate – similar complaints would arise. In other words, there are two issues at hand. The first is whether the accommodative monetary policy stance in advanced economies complicates stabilisation policy in the emerging economies and

[29] In other words, this is a mechanism whereby which the persistent hoarding problem of creditor countries that Keynes pointed out in the 1940s can be mitigated.

[30] Portes (2012) makes this point. Obviously, such an interpretation presupposes that uncovered interest parity does not hold exactly. For evidence on this point, see the discussion in Chinn (2006).

[31] For a contrasting view, see Caruana (2012).

developing countries. The second one, somewhat distinct from the first, is whether the resort to unconventional measures so complicates the choices faced by policymakers that such measures should be eschewed.

To the extent that the policies, unconventional or otherwise, put upward pressure on the currencies of those countries that are near full employment, and/or have current account surpluses, the implementation of these measures are probably beneficial to the world economy. This is true, despite the fact that there is little coordination in the monetary policies being implemented in the United States, the euro area, the UK and Japan.

References

Aizenman, J, M Chinn and H Ito (2010): "The emerging global financial architecture: tracing and evaluating the new patterns of the trilemma's configurations", *Journal of International Money and Finance*, vol 29, pp 615–41.

Ahmed, S and A Zlate (2013): "Capital flows to emerging market economies: a brave new world?", *International Finance and Discussion Paper*, no 1081, Board of the Federal Reserve System, June.

Bauer, M and G Rudebusch (2011): "The signaling channel for Federal Reserve Bond purchases", *Federal Reserve Bank of San Francisco Working Paper*, no 21.

Blanchard, O, F Giavazzi and F Sa (2005): "International investors, the US current account, and the dollar", *Brookings Papers on Economic Activity*, no 1, pp 1–49.

Borio, C (forthcoming): "On time, stocks and flows: understanding the global challenges", *NIESR Review*.

Borio, C and P Disyatat (2011): "Global imbalances and the financial crisis: Link or no link?", *BIS Working Papers*, no 346.

Campbell, J, C Evans, J Fisher and A Justiniano (2012): "Macroeconomic effects of Federal Reserve forward guidance", *Brookings Papers on Economic Activity*, no 1, pp 1–53.

Caruana, J (2012): "International monetary policy interactions: challenges and prospects", Speech to the CEMLA-SEACEN conference on "The role of central banks in macroeconomic and financial stability: the challenges in an uncertain and volatile world", Punta del Este, Uruguay, 16 November 2012.

Chen, Q, A Filardo, D He and F Zhu (2012): "International spillovers of central bank balance sheet policies", in "Are central bank balance sheets in Asia too large?", *BIS Papers*, no 66, pp 230–74.

Chinn, M (2012): "The global economy: the prospects for imbalances, overheating, and the recovery", in M Obstfeld, D Cho, A Mason and S Lee (eds), *Global Economic Crisis: Impacts, Transmission, and Recovery*, Korean Development Institute and East-West Center.

——— (2006): "The (partial) rehabilitation of interest rate parity: longer horizons, alternative expectations and emerging markets", *Journal of International Money and Finance*, vol 25, no 1, pp 7–21.

Chinn, M and K Kucko (2010): "The predictive power of the yield curve across countries and time", *NBER Working Paper*, no 16398.

Chinn, M and S Quayyum (2012): "Long horizon uncovered interest parity re-assessed", *NBER Working Paper*, no 18482.

Del Negro, M, M Giannoni and C Patterson (2012): "The forward guidance puzzle", *Federal Reserve Bank of New York Staff Report*, no 574.

Dooley, M and P Isard (1982): "A portfolio-balance rational-expectations model of the dollar-mark exchange rate", *Journal of International Economics*, vol 12, pp 257–76.

Dornbusch, R (1976): "Expectations and exchange rate dynamics", *Journal of Political Economy*, vol 84, pp 1161–76.

Eichengreen, B (2013): "Currency war or international policy coordination?", *mimeo*, Berkeley, University of California, January.

Engel, C (1996): "The forward discount anomaly and the risk premium: a survey of recent evidence", *Journal of Empirical Finance* vol 3, pp 123–92.

Fawley, B and C Neely (2013): "Four stories of quantitative easing", *Federal Reserve Bank of St Louis Review*, vol 95, no 1, pp 51–88.

Fernández-Arias, E and P Montiel (1996): "The surge in capital inflows to developing countries: an analytical overview", *The World Bank Economic Review*, vol 10, no 1, pp 51–77.

Frankel, J (1984): "Tests of monetary and portfolio balance models of exchange rate determination", in J Bilson and R Marston (eds), *Exchange rate theory and practice*, Chicago, pp 239–60.

——— (1979): "On the mark: a theory of floating exchange rates based on real interest differentials", *American Economic Review*, vol 69, pp 610–22.

Frankel, J and C Engel (1984): "Do asset-demand functions optimize over the mean and variance of real returns?", *Journal of International Economics*, pp 309–23.

Gagnon, J (2013): "The elephant hiding in the room: currency intervention and trade imbalances", *Working Paper*, no 13-2, Peterson Institute for International Economics, March.

Gagnon, J, M Raskin, J Remache and B Sack (2010): "Large-scale asset purchases by the Federal Reserve: did they work?", *Federal Reserve Bank of New York Staff Report*, no 441.

Glick, R and S Leduc (2013): "The effects of unconventional and conventional U.S. monetary policy on the dollar", *mimeo*, Federal Reserve Bank of San Francisco.

——— (2012): "Central bank announcements of asset purchases and the impact on global financial and commodity markets", *Journal of International Money and Finance*, vol 31, no 8, pp 2078–101.

Hamilton, J and J-C Wu (2012): "The effectiveness of alternative monetary policy tools in a zero lower bound environment", *Journal of Money, Credit and Banking*, vol 44, no 1, pp 3–46.

He, D and R McCauley (2013): "Transmitting global liquidity to East Asia: policy rates, bond yields, currencies and dollar credit", *mimeo*.

Humpage, O (2003): "Government intervention in the foreign exchange market", *Working Paper*, no 03-15, Federal Reserve Bank of Cleveland.

Hodrick, R (1987): *The empirical evidence on the efficiency of forward and futures foreign exchange markets*, Harwood Academic Publishers.

Hooper, P and J Morton (1982): "Fluctuations in the dollar: a model of nominal and real exchange rate determination", *Journal of International Money and Finance*, pp 39–56.

IMF (2013a): *Unconventional monetary policies – recent experience and prospects*, April 18.

——— (2013b): *Unconventional monetary policies – recent experience and prospects: Background Paper*, April 18.

Kiley, M (2013): "Exchange rates, monetary policy statements, and uncovered interest parity: before and after the zero lower bound", *Finance and Economics Discussion Paper*, no 2013-17.

Klein, M (2012): "Capital controls: gates versus walls", *Brookings Papers on Economic Activity*, no 2012.2, pp 317–67.

Klein, M and J Shambaugh (2013): "Rounding the corners of the policy trilemma: sources of monetary autonomy", *mimeo*, July.

Neely, C (2010): "The large scale asset purchases had large international effects", *Federal Reserve Bank of St Louis Working Paper*, no 2010-018.

Williams, J (2013): "A defense of moderation in monetary policy", *Federal Reserve Bank of San Francisco Working Paper*, no 2013-15.

Zuckerman, G and J Chung (2013): "U.S. funds score big by betting against yen", *Wall Street Journal*, February 14.

Data appendix

Money base. Source: IMF, *International Financial Statistics*. IMF definitions for all countries except for China and India, which use national definitions.

Real and nominal GDP. Source: IMF, *International Financial Statistics* and OECD, *Main Economic Indicators*, via FRED.

UK money base proxied by notes and coins and reserves. Source: Bank of England.

Bilateral exchange rates, against US dollar. Source: IMF, *International Financial Statistics*. Quarterly data average of monthly data.

Broad nominal trade weighted exchange rates except for United States. Source: Bank for International Settlements.

US major currencies and broad trade weighted exchange rate: Source: Federal Reserve Board via FRED.

Financial Stress Index, advanced economies. Source: IMF, personal communication.

Output gaps for US, euro area, UK, Japan: IMF, *World Economic Outlook* database, April 2013.

Output gaps for emerging markets. Source: World Bank, *Global Economic Prospects*, June 2013.

Figure 1a

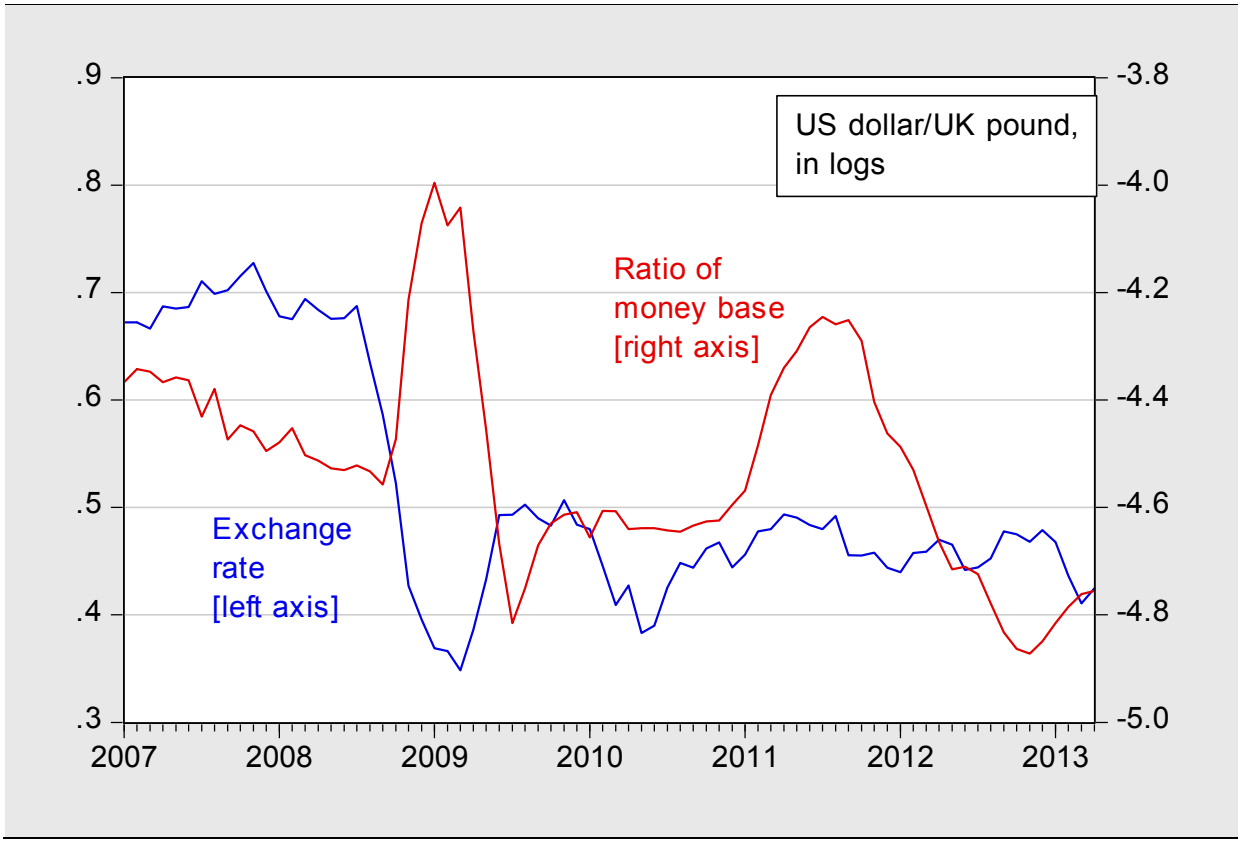


Figure 1b

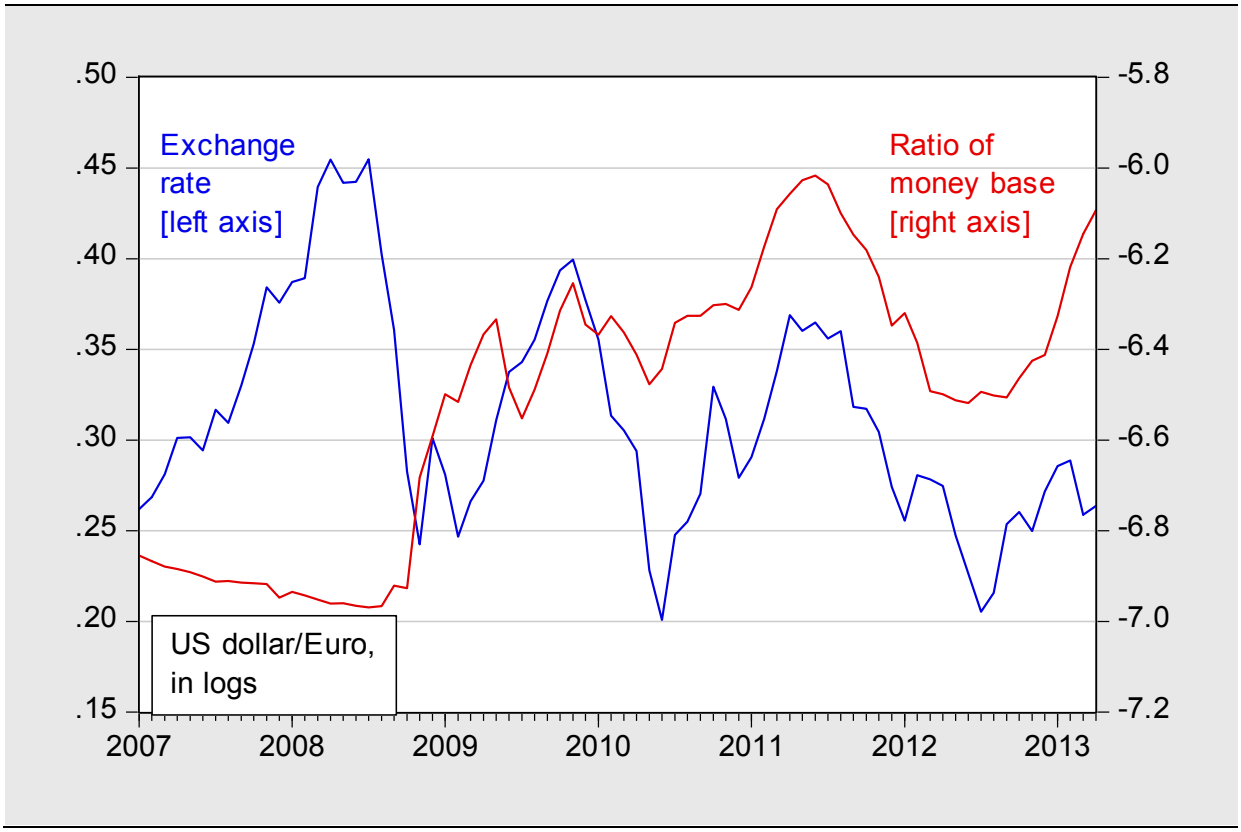
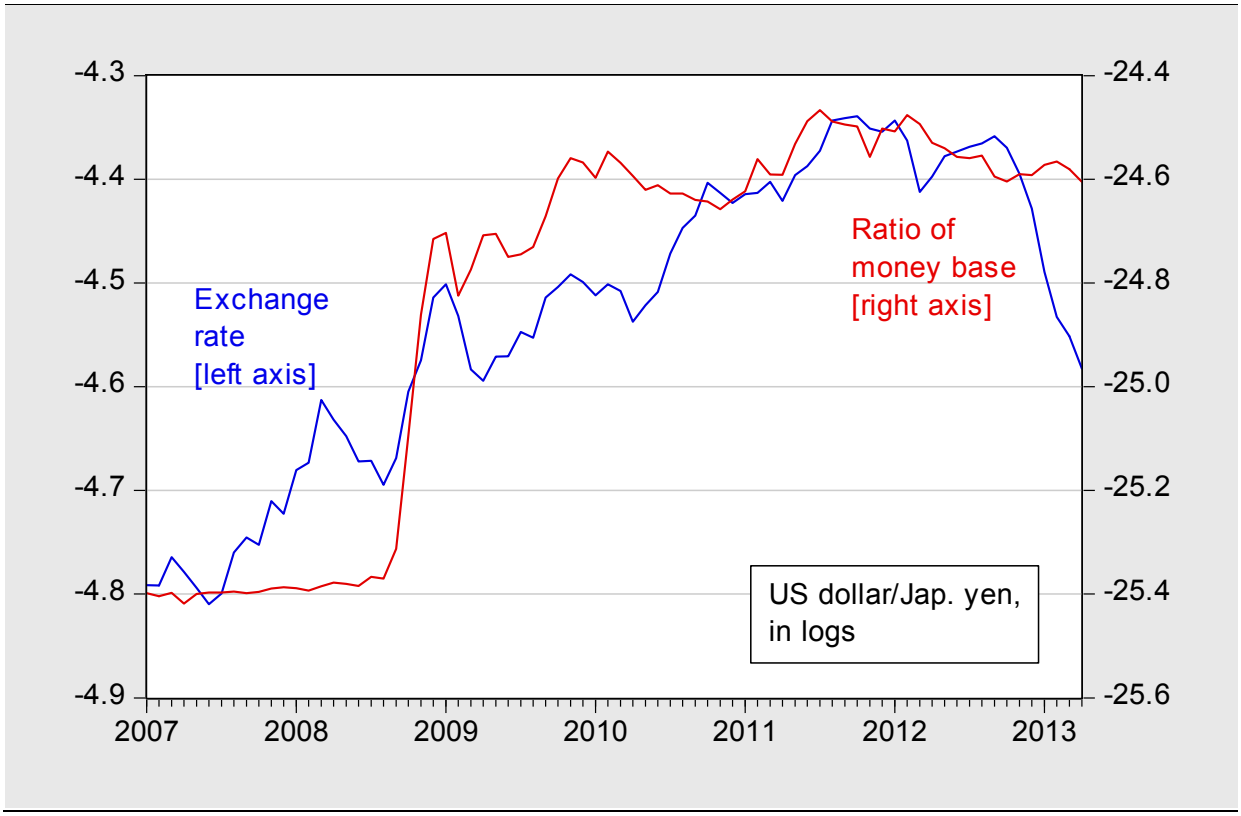
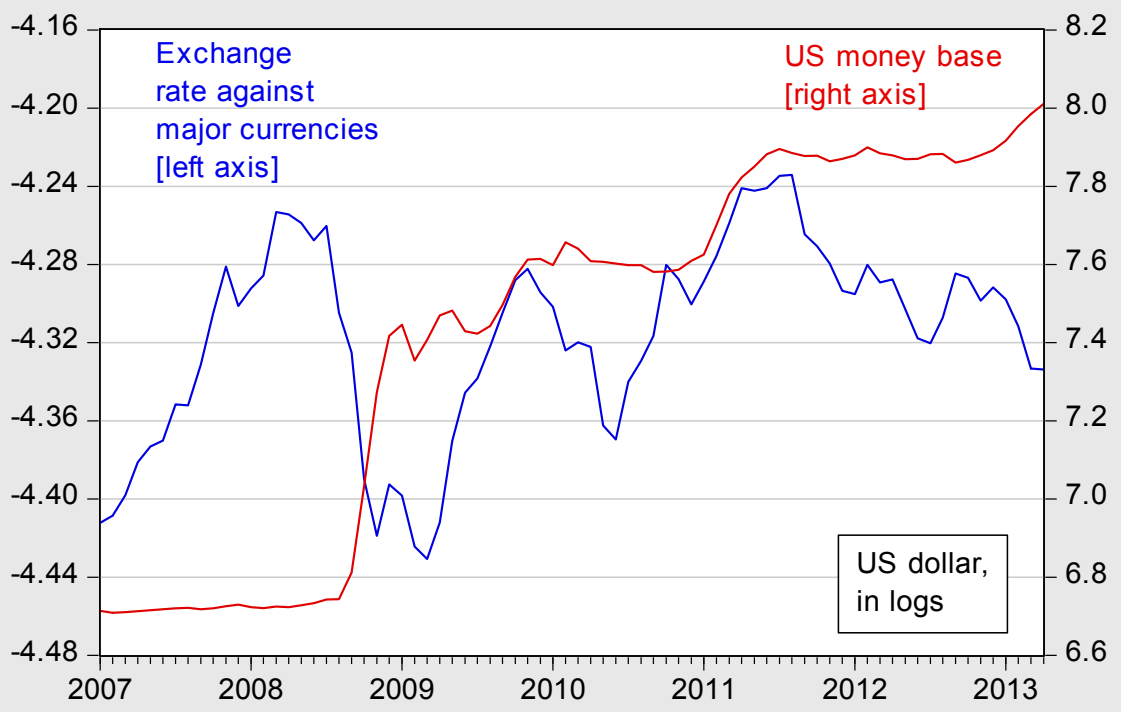


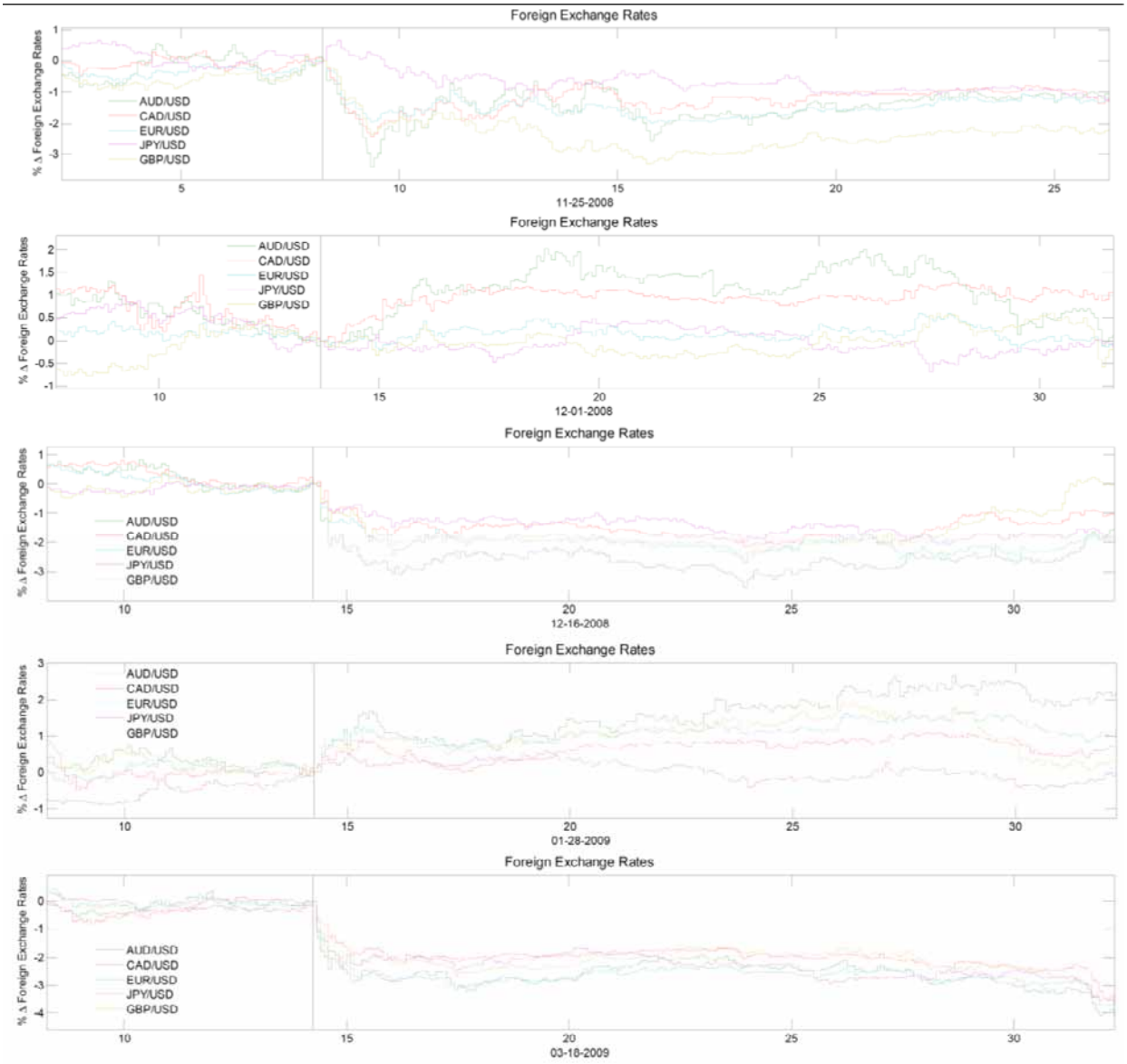
Figure 1c



Log US dollar exchange rate (major currencies index), and log US money base. Figure 2

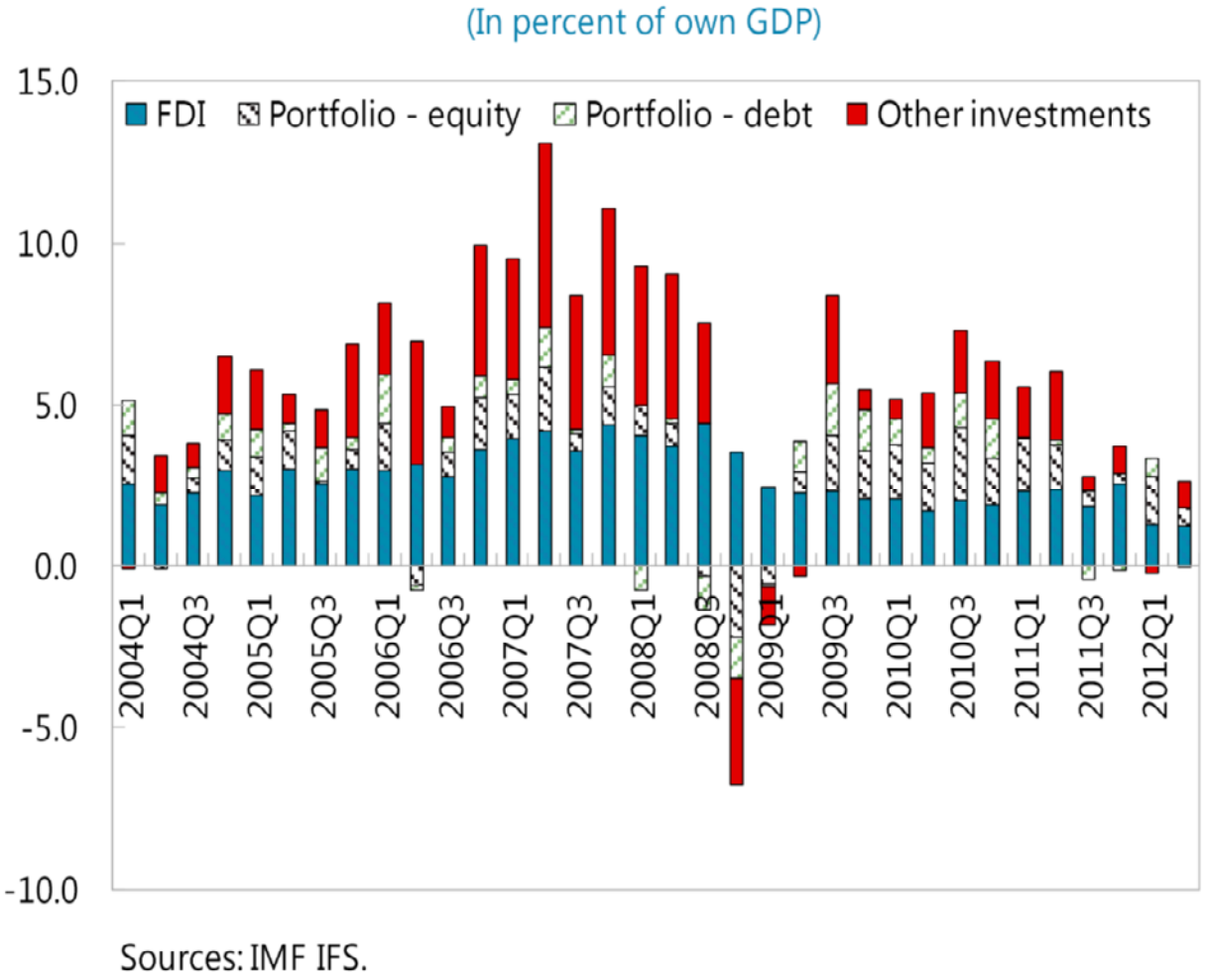


Exchange rate changes on dates of LSAP-related announcements. Figure 3



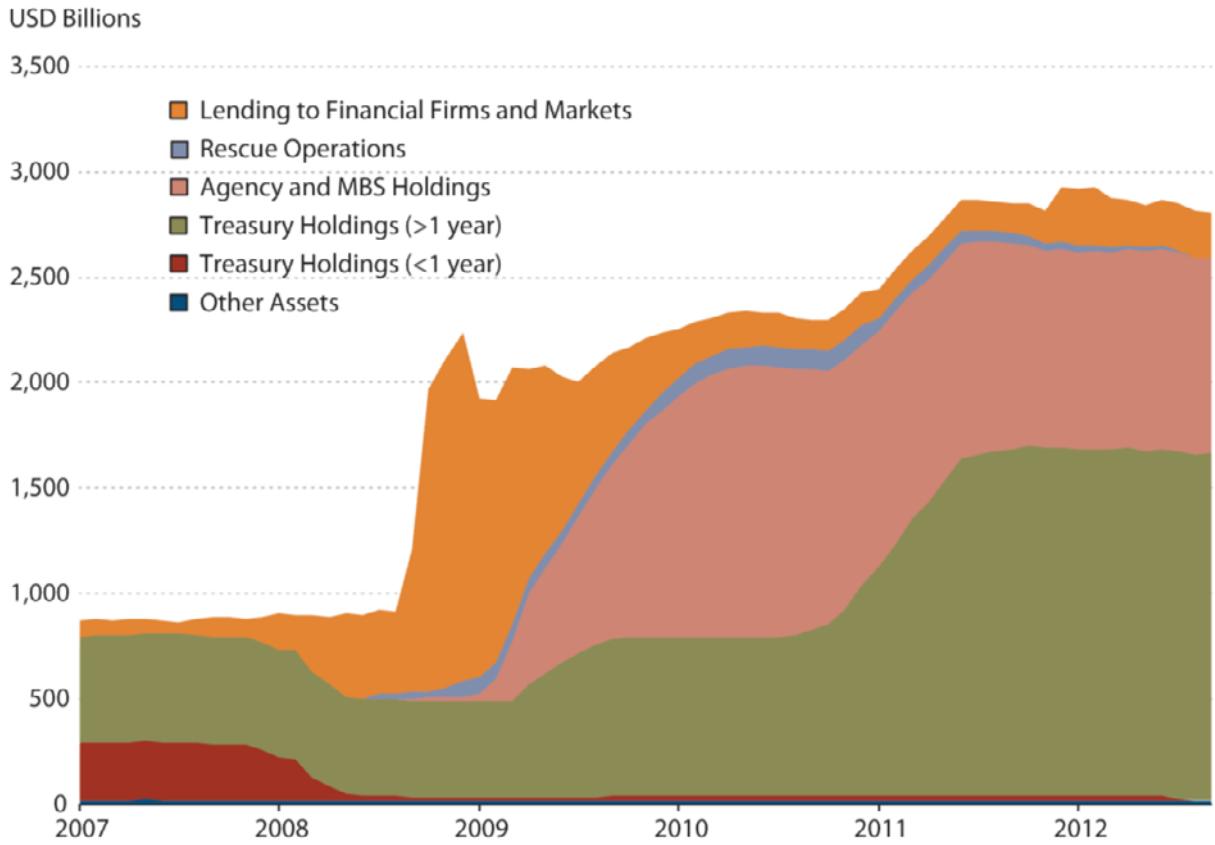
Source: Neely (2012).

Capital inflows to emerging markets. Figure 4



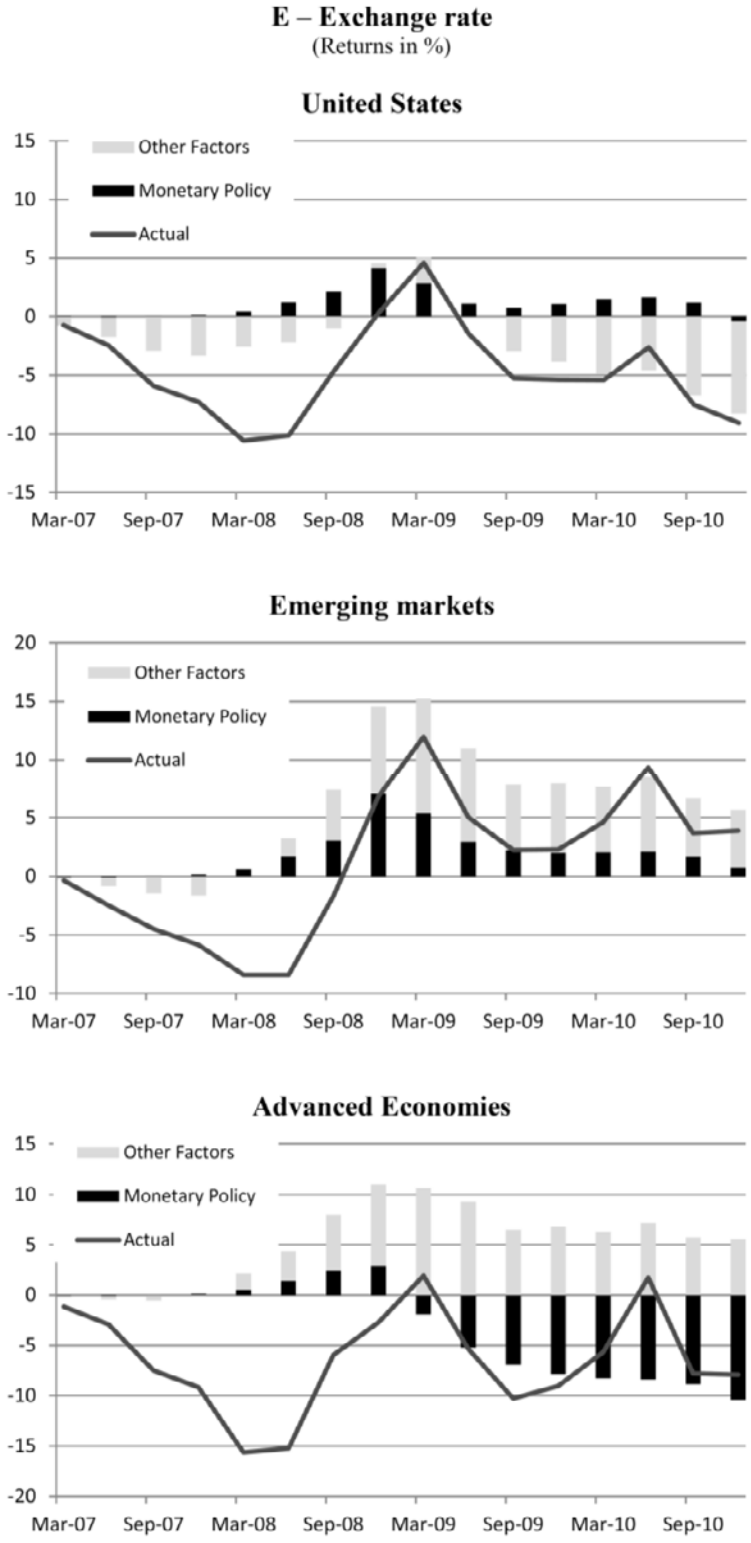
Source: IMF IFS (2013)

Federal Reserve holdings. Figure 5



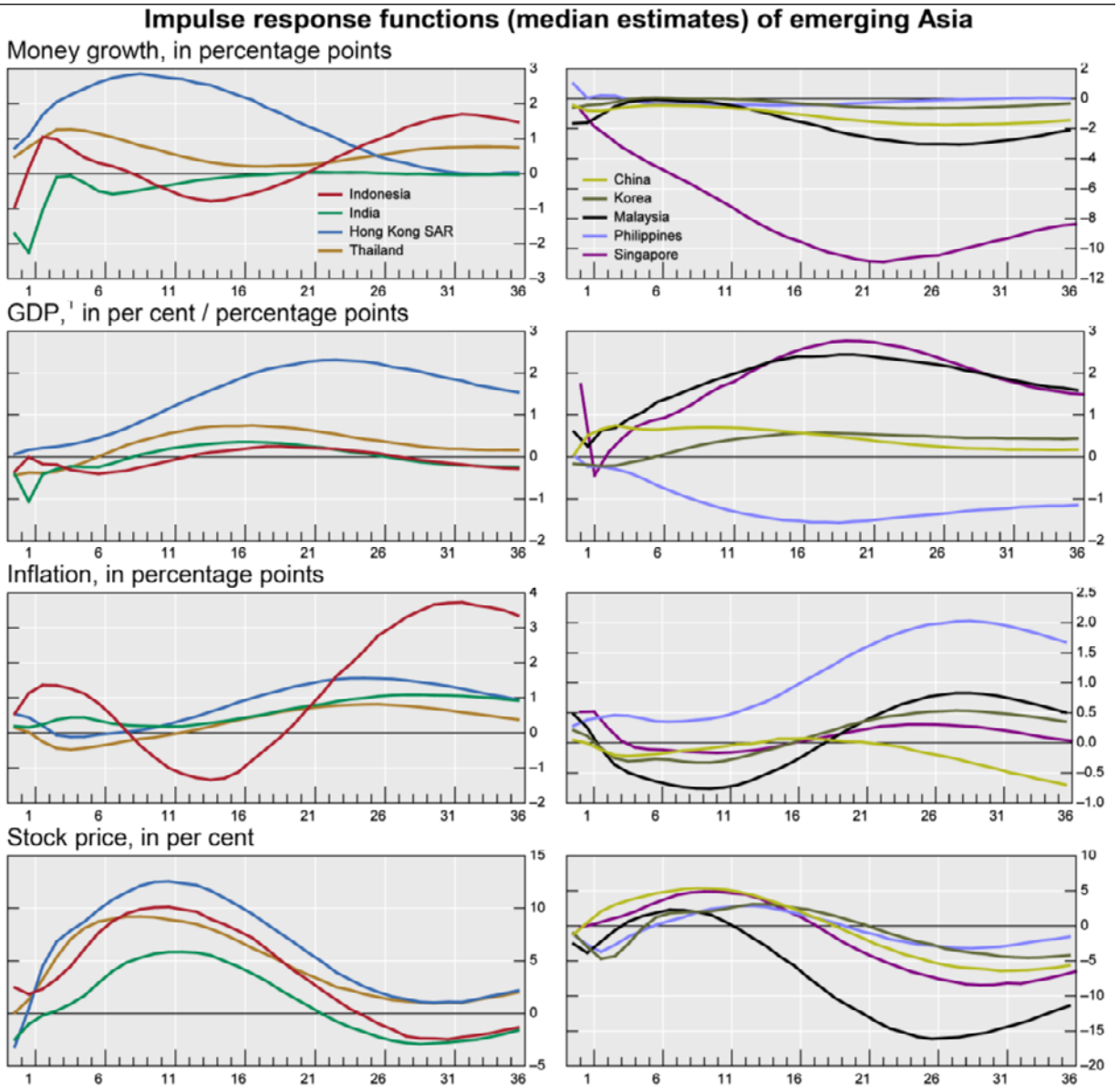
Source: Fawley and Neely (2013).

Cumulative impact on exchange rate from all measures. Figure 6



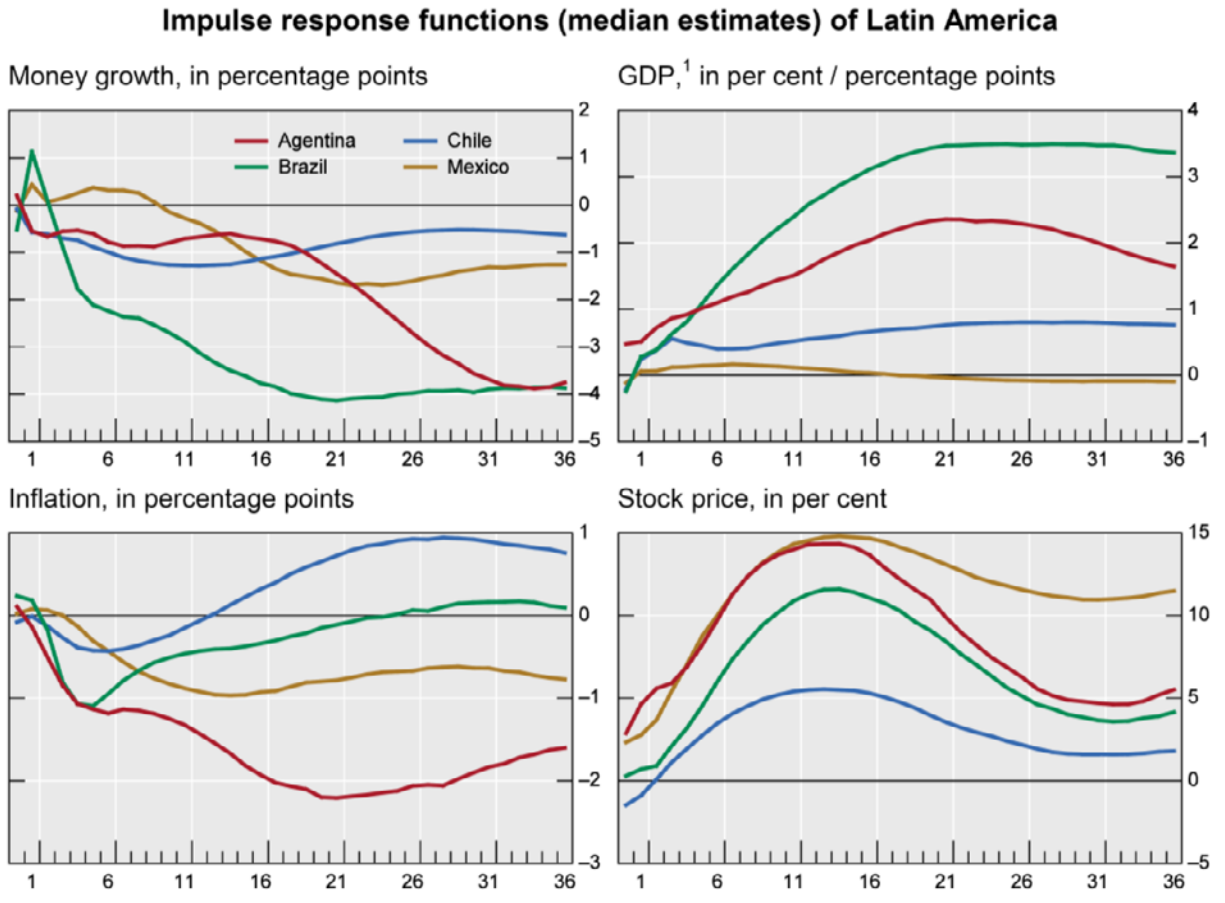
Source: Fratzscher et al. (2012), Table 2.E.

Figure 7



Excerpt from Graph IV.10 from Chen et al. (2012).

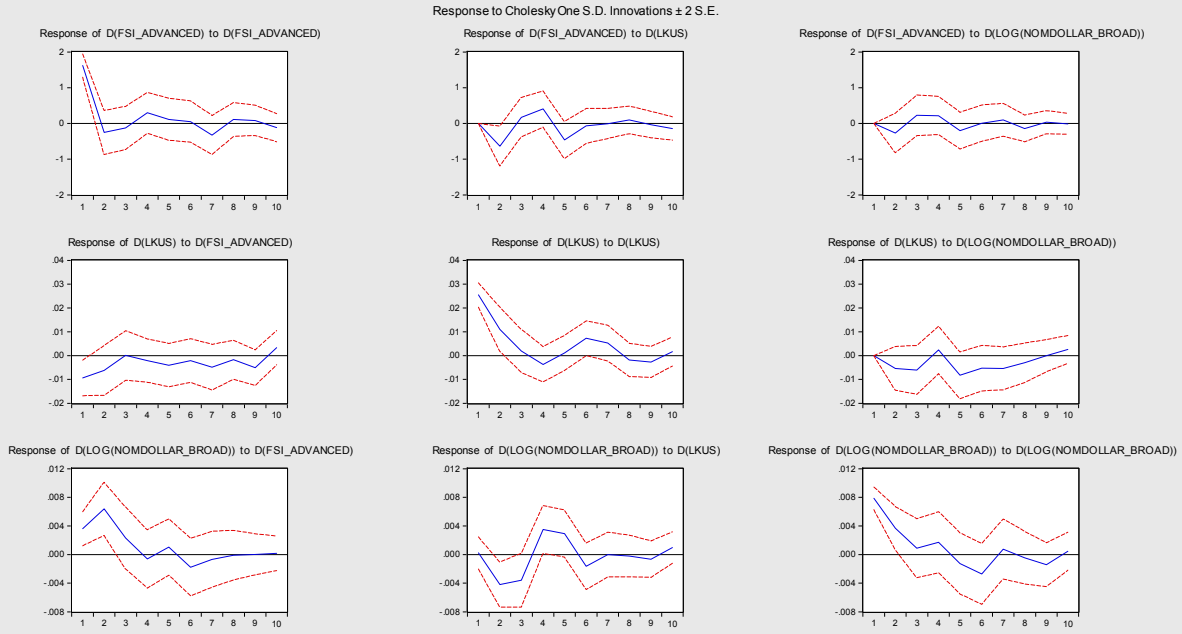
Figure 8



Excerpt from Graph IV.11 from Chen et al. (2012)

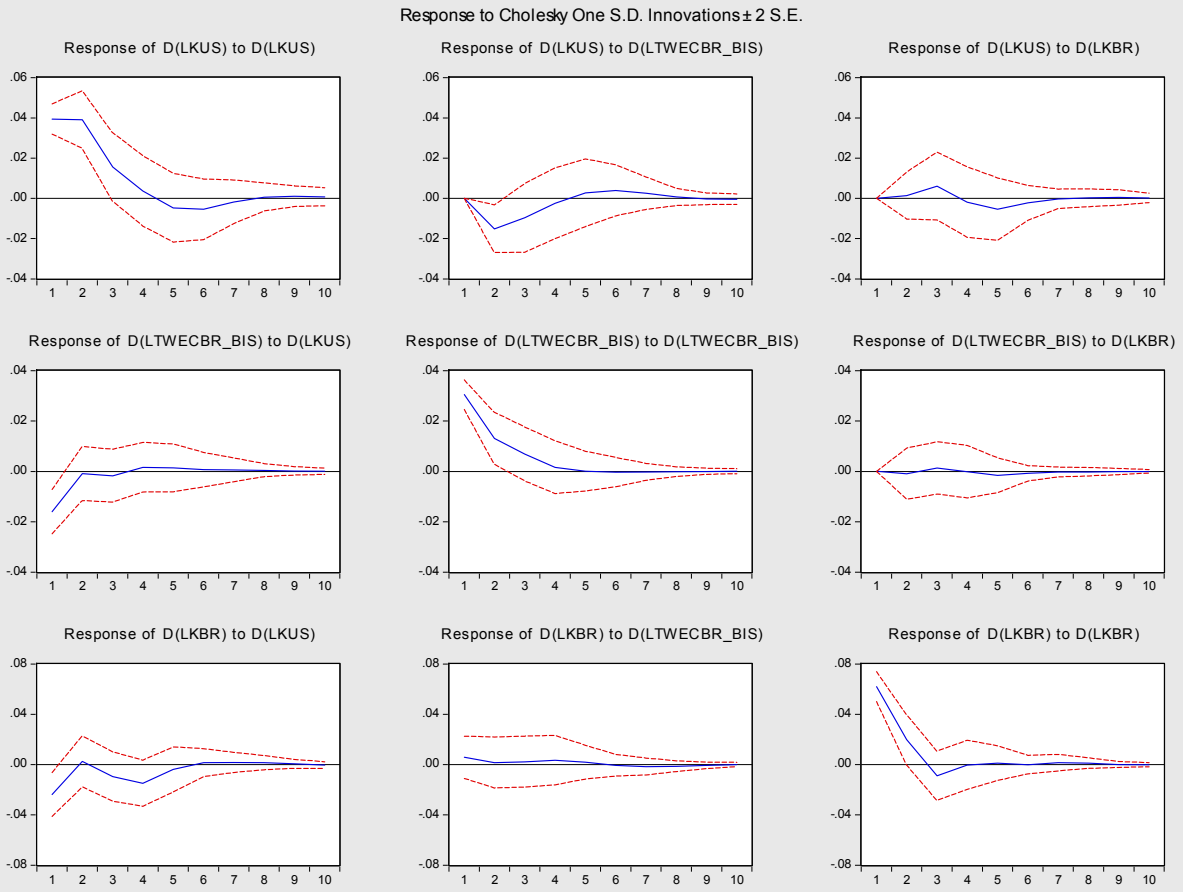
Impulse response functions for FSI, US money base, US dollar, 2008M09-2013M03

Figure 9



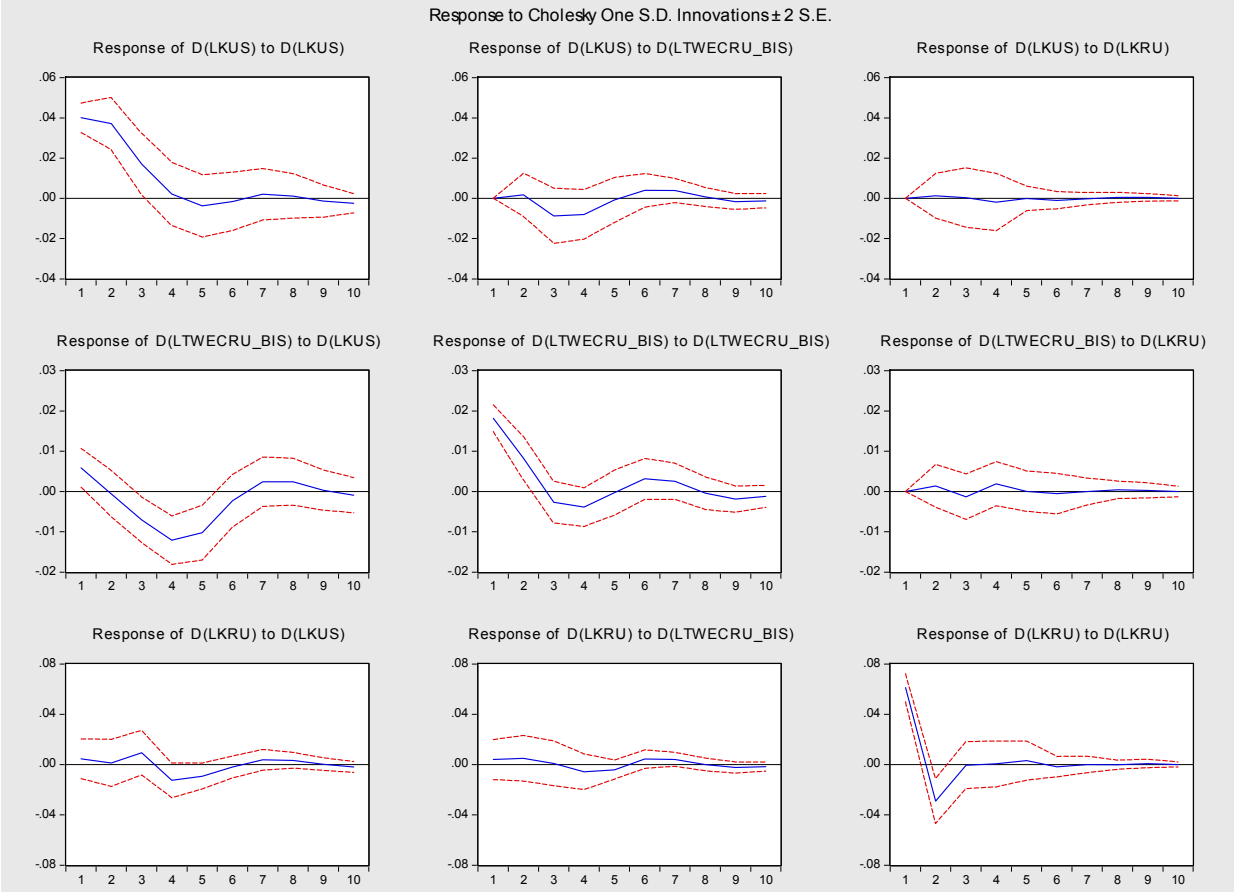
Impulse response function for Brazil's response to US money base, 2008M09-2013M03

Figure 10



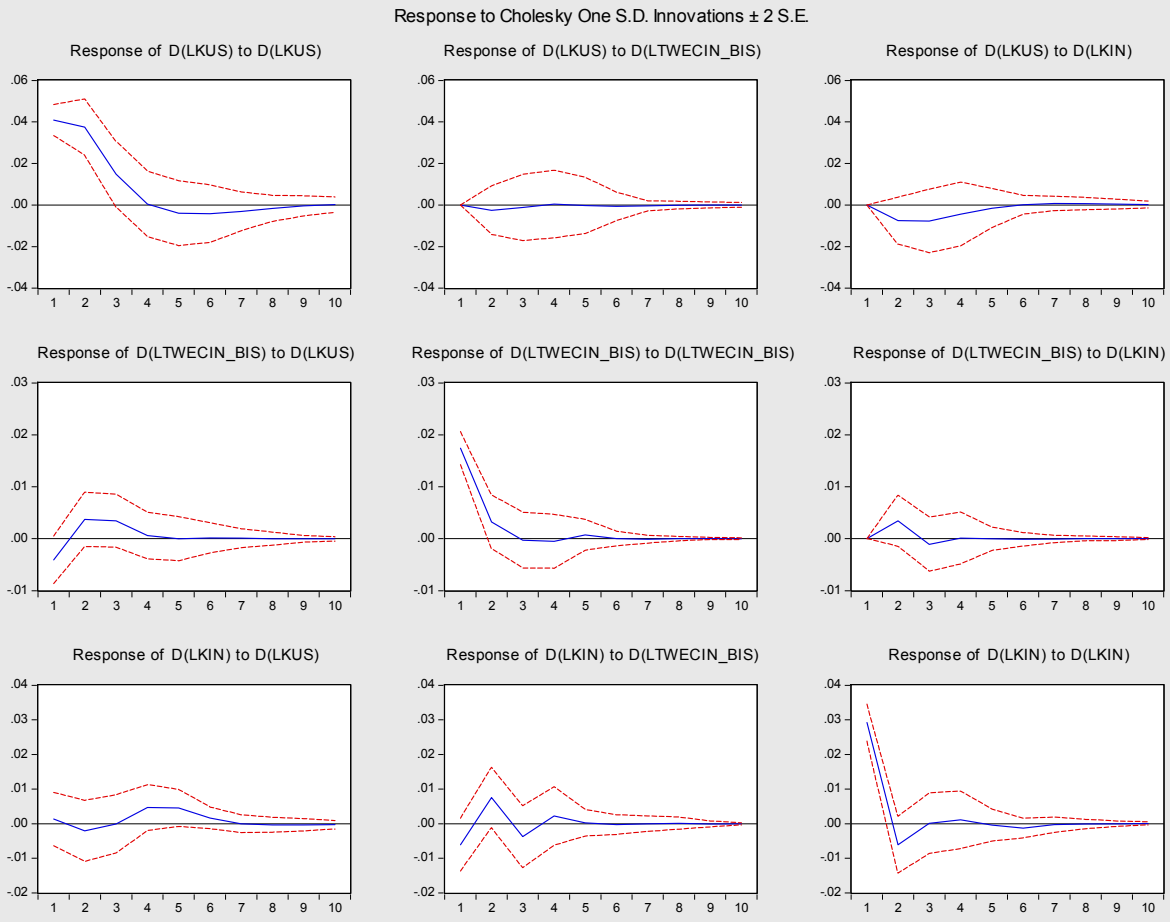
Impulse response function for Russia's response to US money base, 2008M09-2013M03

Figure 11



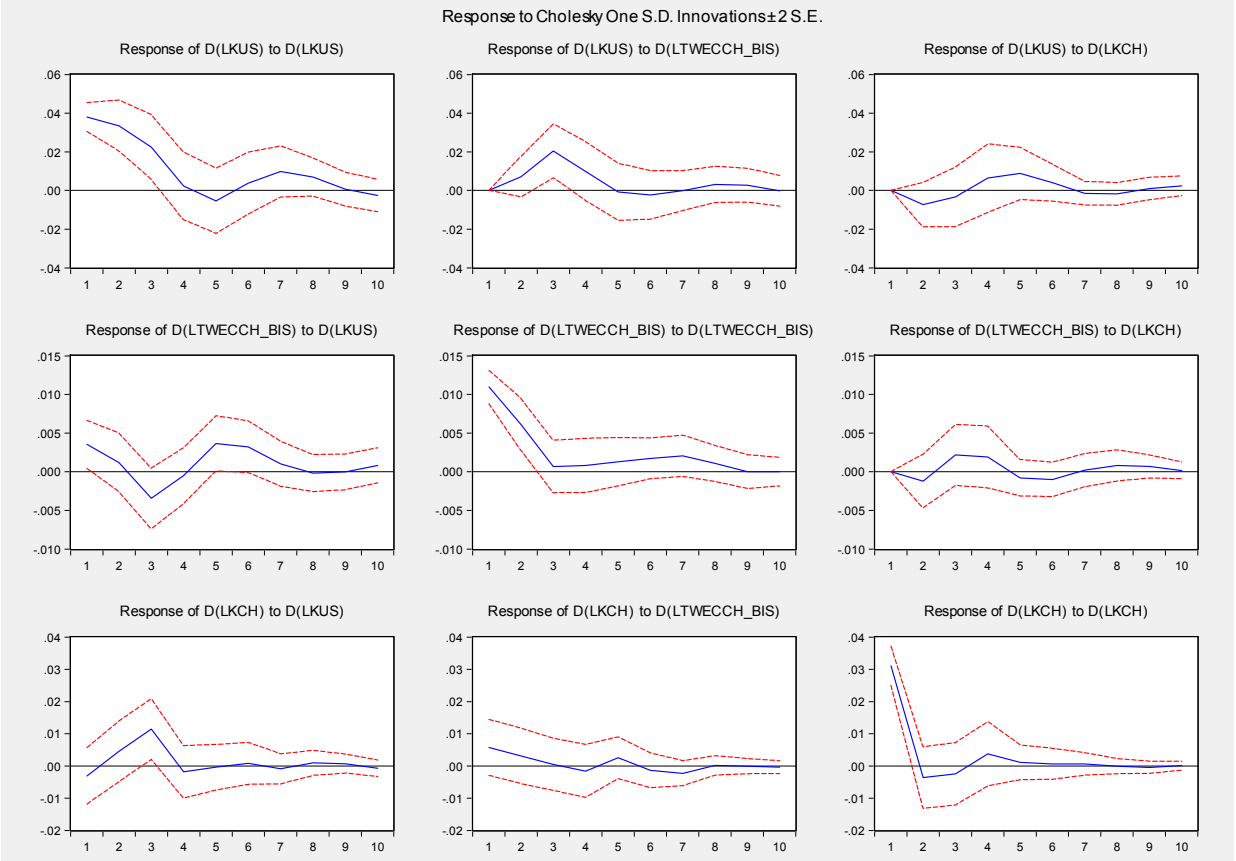
Impulse response function for India's response to US money base, 2008M09-2013M03

Figure 12



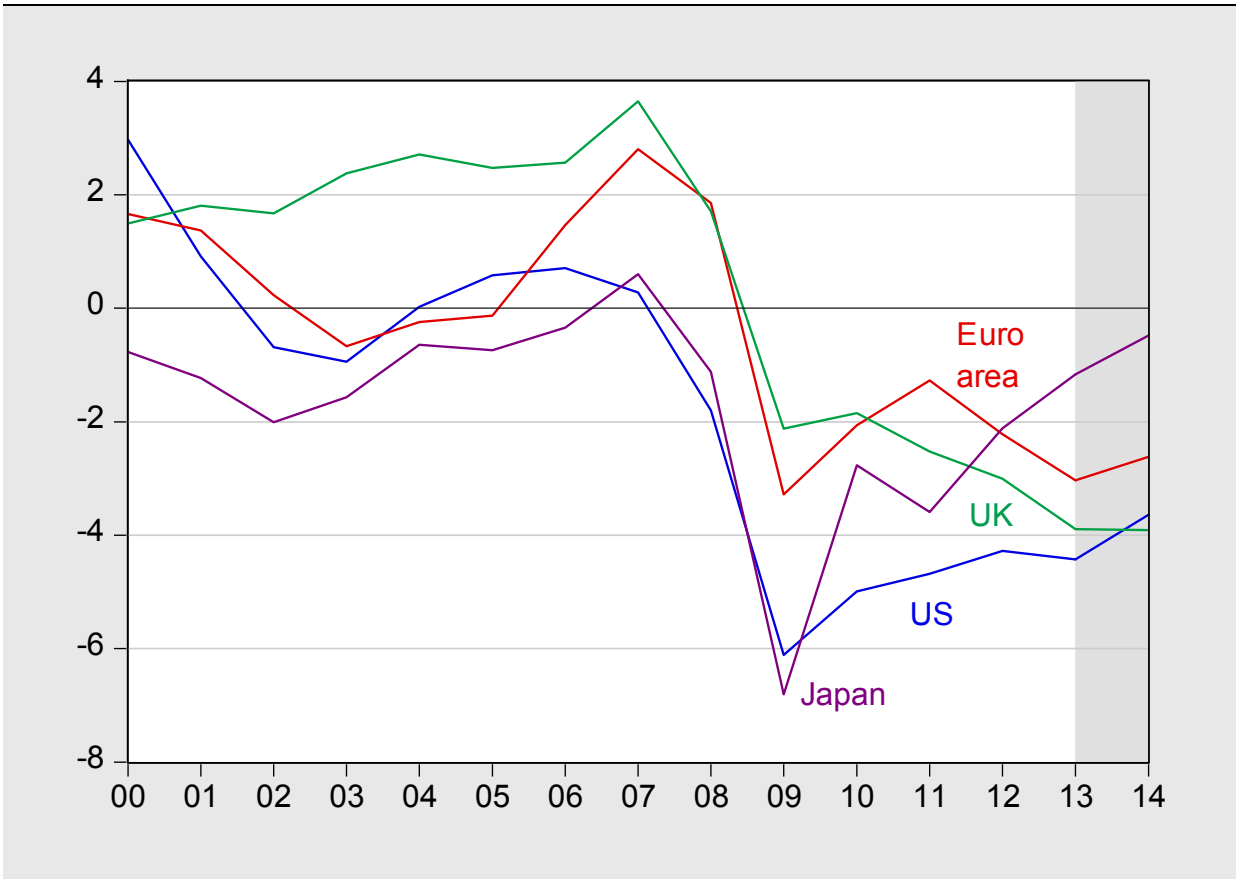
Impulse response function for China's response to US money base, 2008M09-2013M03

Figure 13



Output gaps, as share of GDP.

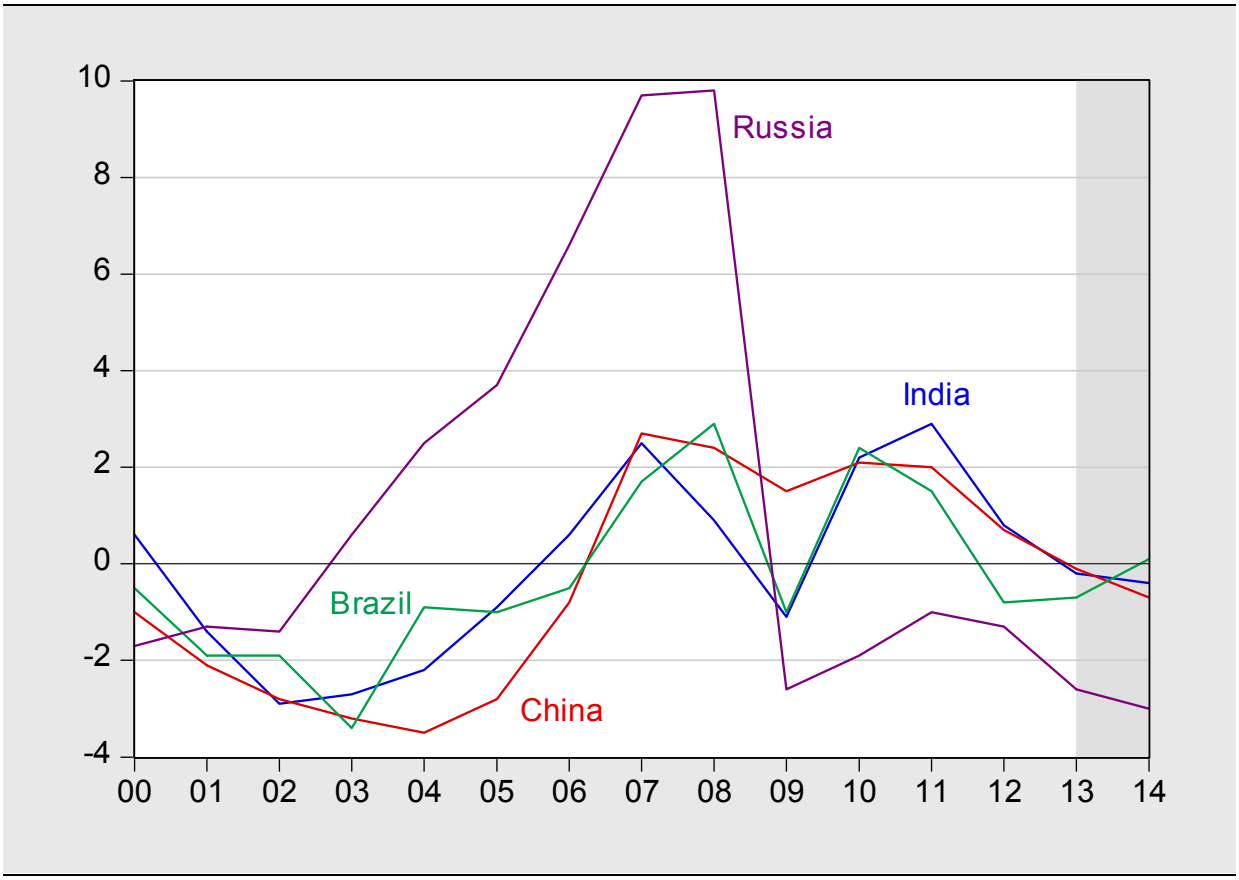
Figure 14



Source: IMF

Output gaps, as share of GDP.

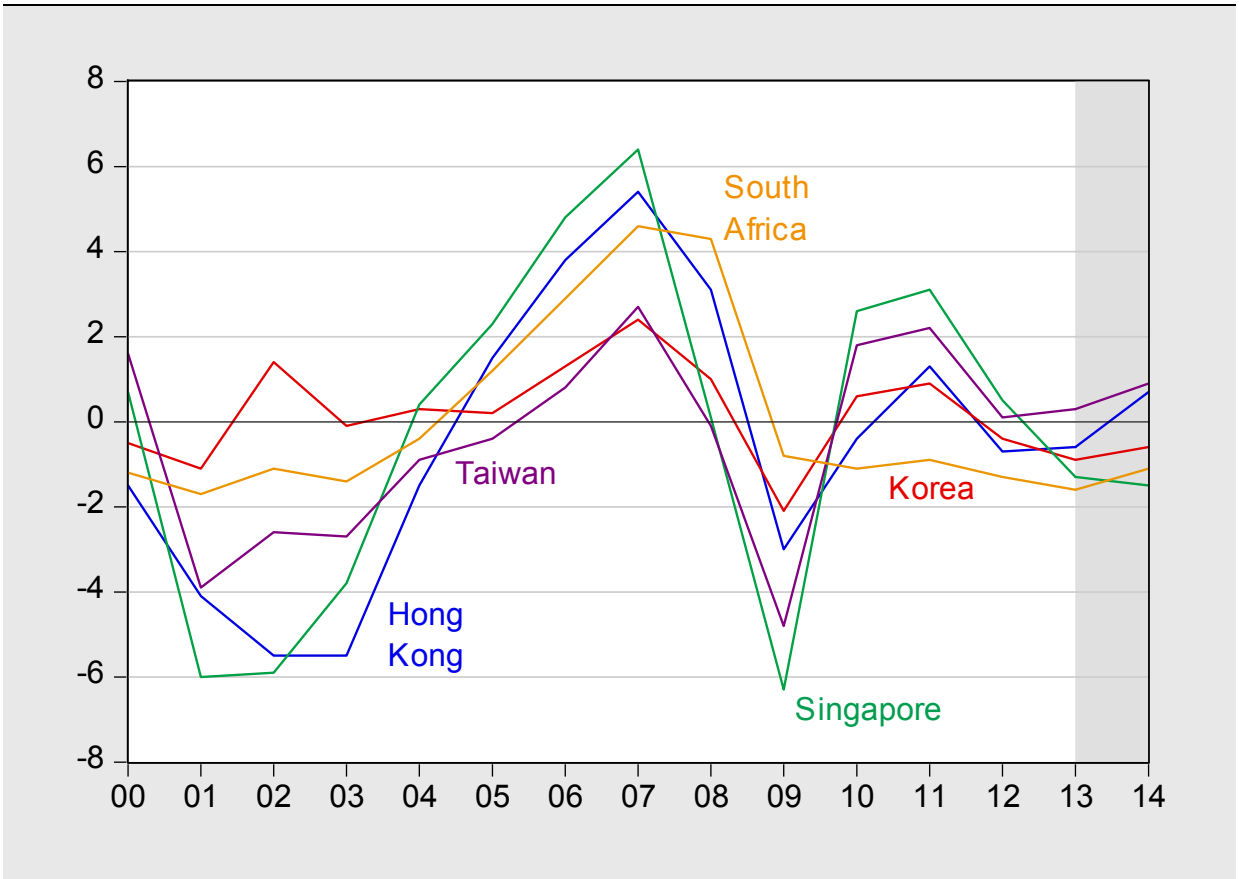
Figure 15



Source: World Bank

Output gaps, as a share of GDP.

Figure 16



Source: World Bank

Comments on Global spillovers and domestic monetary policy by Menzie Chinn (2013)

Leszek Balcerowicz, Piotr Ciżkowicz and Andrzej Rzońca[1]

I. Introduction

The paper deals with a crucially important issue of the effects of the unconventional monetary policy (UMP) of the major central banks, especially the Fed. Its main focus is on the global spillovers of UMP, particularly the impact on the exchange rates and other asset prices in the emerging economies.

The paper:

1. Discusses the possible effects of UMP with the reference to existing theories (models) – Sections 1, 2, 3, 4.
2. Surveys some empirical literature on this topic – Sections 5.1, 5.2.
3. As the author's own contribution to the empirical research, it uses a series of simple VaRs to assess emerging markets' response to UMP by the Fed.
4. Discusses the overall impact of the UMP on the economies of both advanced countries that are applying these policies and other countries that are subject to spillovers from these policies – Sections 6 and 7.

We will comment on Chinn's paper in this order.

II. The impact of non-conventional monetary policies on rates of exchange in the light of existing theories (models)

This section raises several questions or objections:

- The paper claims, that "*Before 2007, it would be fair to say that most macroeconomists (who believed in the relevance of monetary policy) held the belief that once the zero lower bound was encountered, monetary policy would be almost completely hamstrung*."[2] However, the consensus before the crisis seems to have been rather the opposite (for more on this, see, eg Walsh (2009)). There were plenty of papers that used the new Keynesian analytical framework so as to prove that the zero lower bound should not be a serious problem for a credible and sufficiently determined central bank (see, eg Eggertsson and Woodford (2003)). Against this background, it is worth contrasting the aforementioned claim with the paper's remark from Section 3.

[1] Warsaw School of Economics. We were assisted by Grzegorz Parosa.

[2] This claim appears already in the introduction.

that "*forward guidance typically exhibits extremely powerful results in New Keynesian dynamic stochastic general equilibrium (DSGE) models*."

- The paper states that: "*even as a consensus has developed that unconventional measures can have an impact on asset prices and economic activity, a formal tracing out of the channels by which these effects occur has not yet been undertaken*." The first part of this statement overstates the consensus, especially with regard to the impact of unconventional measures on economic activity. Many economists believe (like Chinn) that these measures boost economic activity. However, there are also many economists (and it seems that their number is rather growing than declining) who are concerned about the risks created by these measures in the situation when global economy badly needs more confidence (for more on that see the last part of these comments). The second part of these statement seems to be too pessimistic (see, eg Cúrdia and Woodford (2011) and other applications of their framework).
- According to the paper "*given the increase in the money base due to quantitative easing has not been manifested in corresponding increase in money supply, this interpretation* [ie monetary interpretation of unconventional monetary policy measures' effects on exchange rate] *does not make sense*". However, later this claim is to some extend weakened and the section ends up with the statement: "*The monetary interpretation of the exchange rate effects can be resurrected if these measures – expanding the money base – are taken to signal future policy outcomes.*" However, what, according to the paper, can resurrect the monetary interpretation seems to be a quite standard view of monetary interpretation (see, eg Woodford (2012)).
- The paper states that "*there seems to be a dearth of results*" obtained using new Keynesian analytical framework (DSGE) models with regard to effects of forward guidance on exchange rate. That statement seems to be exaggerated (see, eg Coenen and Wieland (2004)).
- The paper comes to the conclusion that: "*In order to explain exchange rate movements arising from credit easing, one has to apply models that treat different bonds (of identical default risk) differently*." This conclusion is a direct consequence of the criticism, presented earlier in the paper, of standard monetary approach to explain exchange rate changes. It seems to be too strong since this criticism is, as we stress above, debatable.

Finally we think that the author should refer to other reviews and spell out what is his contribution.

III. The survey of empirical literature

The author should also refer to previous surveys of the empirical literature in order to specify what is his contribution to this subject. It appears to us that at least some of them are more comprehensive and detailed, especially regarding the impact of UMP on asset prices (see, eg Cecioni, Ferrero and Secchi (2011); Habermeier et al (2013); or Stone, Fujita and Ishi (2011)). The paper deals with this issue rather perfunctorily, although the issue is announced in the paper's title. Besides, other surveys not only discuss more studies on unconventional monetary policy effects than this paper does but put also more emphasis on the weaknesses of these studies. True, the paper recognises, eg that these studies largely disregard the fact

that the propagation mechanisms that operated before the crisis may have changed after its outburst. However, this is not the only weakness of these studies (for more on this, see, eg Cecioni, Ferrero and Secchi (2011)).

Also, the author should, in our view, not just report the diverging findings of different empirical studies on the same topic (pp 10–13) but should try to explain the reasons for such differences (eg different assumptions, different models, different samples).

IV. The results obtained from estimated simple VaR's

As the author rightly stresses, the results obtained from estimated simple VaRs are not robust. The estimated reaction in case of three out of four countries analysed is either opposite to what is expected or not statistically significant. The assumption that the sample restricted to the post-crisis period is better suited to the aim of the analysis is questionable. The author is right that "*one need not to assume that the pre- and post-crisis periods exhibit the same behaviour*" when restricting the sample. However, a far more intuitive solution in this case would be to estimate the model on the whole available sample, but with a non-linear structure enabling a different reaction of exchange rate to monetary base changes before and during the crisis. This approach is widely used in empirical research focused on differences in economies' responses to impulses in normal times compared to periods of economic slack. More importantly the methodology applied (ie three-variable VaR) seems to be oversimplified and poses the risk that the estimated relations, even if statistically significant, may be spurious and subject to omitted variables bias.

Notwithstanding these remarks on the methodologies, the conclusion drawn from the VaR exercise confirms the expectation that the monetary stimulus produced by the Fed will lead to dollar depreciation and to the efforts of some emerging economies to resist the resulting pressure on their currencies.

V. The overall impact of the UMP

This is, by far, the most important problem, to which the author dedicates only three pages. He makes a strong claim that the UMP pursued by the advanced economies is likely to benefit both these economies and at least some of the emerging countries. However, without excessive oversimplification, one may reduce the whole argument of the paper to one relationship and two assumptions. The relationship is that unconventional monetary policy pursued by major central banks puts appreciation pressure on the currencies of emerging economies. This assertion makes sense and is quite well documented (also in the paper). The first assumption is that there is considerable economic slack in major advanced economies (in spite of current account deficits), while there is near full employment or even excess demand and current account surpluses in emerging economies. This assumption is debatable.[3] It gives rise to the assertion that policymakers in these economies are

[3] Economic slack in advanced economies may be apparent, since a large part of the capital used in sectors that overexpanded before the crisis cannot be used elsewhere (investments are largely

likely to allow their currency to appreciate instead of attempting to offset the appreciation pressure with FX interventions or capital controls. And if they allow their currency to appreciate, global imbalances will be reduced.

On the top of that, the second assumption appears. The paper additionally assumes that domestic demand in emerging economies could benefit from an improvement of economic conditions in the major advanced economies. This line of argument is hardly new. It was developed, with quantitative analysis, when only the Bank of Japan was facing a problem of the zero lower bound (see, eg Coenen and Wieland (2003)). However, the quantitative analyses suggest that domestic demand in emerging economies could indeed increase but mainly as a result of interest rates cuts in these economies, aimed at resisting appreciation pressure put on their currencies by unconventional monetary policy measures undertaken in major advanced economies. Thus, the second assumption implies that central banks in emerging economies would not conduct the monetary policy best suited for their countries without the interventions of major central banks. Such an implication is, at best, patronising.

Most importantly, the author's claim about the benefits of the UMP disregards the long list of risks created by unconventional monetary policy measures. They are analysed in depth, eg by Borio (2012), Hannoun (2012) or White (2012). The paper merely states that "*The (understandable) fear is that such capital inflows* [ie caused by unconventional monetary policy pursued by major central banks] *will spark a credit boom-bust cycle. The choices are most stark for small open economies.*" Yet directly after this remark it adds: "*However, the benefits of expansionary monetary policy outweigh the costs.*" This strong statement is made without any evidence or argument.

The point is that the continued UMP is likely to create increasing risks to longer-term growth, both in the advanced economies which pursue it and – directly and indirectly – for other countries. These risks include: weakening policymakers' incentive to engage in structural reforms, slowing down banks' and companies' restructuring, weakening financial institutions that rely on debt instruments (pension funds, insurance companies), the emergence of new asset bubbles and the risks related to the exit from the UMP. The benefits from the UMP are short-term but the risks and costs it produces are likely to grow in time. The static, short-term models, like the ones discussed in the paper, are not capable of even considering these dynamic effects. However, to disregard the underlying reality with the help of hugely oversimplified models is very dangerous. Wasn't this thoroughly enough demonstrated by the experience of the "Great Moderation"?

irreversible). In turn, the labour employed in these sectors may regain productivity only if workers move to other sectors. However, their reallocation is hampered by, *inter alia*, unconventional monetary policy measures (for more on this see, eg Ciżkowicz and Rzońca (2013)).

References

Borio, C (2012): "The financial cycle and macroeconomics: What have we learnt?", *BIS Working Paper*, no 395.

Cecioni, M, G Ferrero and A Secchi (2011): "Unconventional monetary policy in theory and practice", *Banca d'Italia Questioni di Economia e Finanza (Occasional Papers)*, no 102.

Ciżkowicz, P and A Rzońca (2013): "Interest rates close to zero, post-crisis restructuring and natural interest rate", *Prague Economic Papers* (forthcoming).

Coenen, G and V Wieland (2003): "The zero-interest-rate bound and the role of the exchange rate for monetary policy in Japan", *Journal of Monetary Economics,* vol 50, pp 1071–101.

——— (2004): "Exchange-rate policy and the zero bound on nominal interest rates", *American Economic Review*, vol 94, no 2, pp 80–4.

Cúrdia, V and M Woodford (2011): "The central-bank balance sheet as an instrument of monetary policy", *Journal of Monetary Economics*, vol 58, pp 54–79.

Eggertsson, G and M Woodford (2003): "The zero bound in interest rates and optimal monetary policy", *Brookings Papers on Economic Activity*, no 1, pp 139–233.

Hannoun, H (2012): "Monetary policy in the crisis: testing the limits of monetary policy", speech delivered at the 47th SEACEN Governors' Conference, Seoul, Korea, 13–14 February.

IMF (2013): *Unconventional monetary policies—recent experience and prospects*, April 18.

Stone, M, K Fujita and K Ishi (2011): "Should the recent unconventional balance sheet policies be added to the central bank toolkit? A review of the experience so far", *IMF Working Paper*, no 11/145.

Walsh, C (2009): "Using monetary policy to stabilize economic activity", Paper prepared for the Jackson Hole Symposium on Financial Stability and Macroeconomic Policy.

White, W (2012): "Ultra easy monetary policy and the law of unintended consequences", *Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute Working Paper*, no 126.

Woodford, M (2012): "Methods of policy accommodation at the interest-rate lower bound", paper presented at the Jackson Hole Symposium on "The changing policy landscape".

Global spillovers and domestic monetary policy: an emerging market perspective[1]

Rakesh Mohan[2]

Central banks in the major advanced economies (AEs) have pursued highly accommodative monetary policies since 2008 in response to persistent economic weakness. But near-zero policy rates and large fiscal stimuli have not produced the hoped-for economic recovery, while debt-to-GDP ratios have risen to unsustainable levels. With fiscal room for manoeuvre now limited, the policy focus has again shifted to monetary policy. It was once assumed that, when the zero interest rate bound was reached, monetary policy would become completely hamstrung. The emergence of quantitative easing, credit easing and forward guidance, collectively characterised as unconventional monetary policy (UMP), has now taken monetary policy beyond the zero interest rate bound. The objective of these policies has been to further depress long-term interest rates in the AEs. Discussions in the advanced economies have typically focused on the domestic benefits of UMP with the conventional interest rate being the transmission channel for inducing economic recovery in these economies.

Of less concern was the effect of the UMPs through spillovers on the rest of the world, especially the emerging market economies (EMEs). The resulting volatile capital flows and exchange rate movements are the key spillover channels for the EMEs; at the same time, in view of the limited scope for any further reduction in interest rates in the advanced economies, the exchange rate channel is arguably the more effective channel for transmission in the major advanced economies in the current circumstances. Given the persistent growth and interest rate differentials between AEs and EMEs, this channel poses serious challenges to policymakers in the EMEs. Volatile capital flows, if not managed appropriately, can lead to high volatility in exchange rates and current account positions as well as to booms in credit aggregates and asset prices, and potential financial crises.

Against this backdrop, the paper by Menzies Chinn, with its focus on global spillovers, is welcome as it flags key analytical issues, although its conclusions are debatable. Professor Chinn reviews the existing models to understand the effect of UMPs on EME exchange rates and finds that traditional exchange rate models are ill-suited to elucidating the impact of the UMPs. The paper finds that the UMPs weaken the home currency, with the impact depending on the size of monetary easing relative to other countries. The paper argues that, if the currencies of the AEs (where output is much below full employment) weaken and the EMEs (which are near full employment) allow currency appreciation, this would yield a global positive outcome: activity and net exports would be expected to pick up in the AEs; demand,

[1] Comments on the paper by M Chinn, "Global spillovers and domestic monetary policy: the impacts on exchange rates and other asset prices", 12th BIS Annual Conference, Lucerne, Switzerland, 21 June 2013.

[2] Executive Director, International Monetary Fund, Washington DC. The views expressed in the paper are personal and not necessarily those of the institutions to which he belongs.

net exports and inflationary pressures would ease in the EMEs, and the combined impact would result in global current account rebalancing.

In my remarks today, I will first assess briefly the outcomes of the UMPs and then move to the spillovers to the EMEs and then ask whether the hypotheses advanced by Professor Chinn really hold in the EMEs.

Impact of UMP in AEs

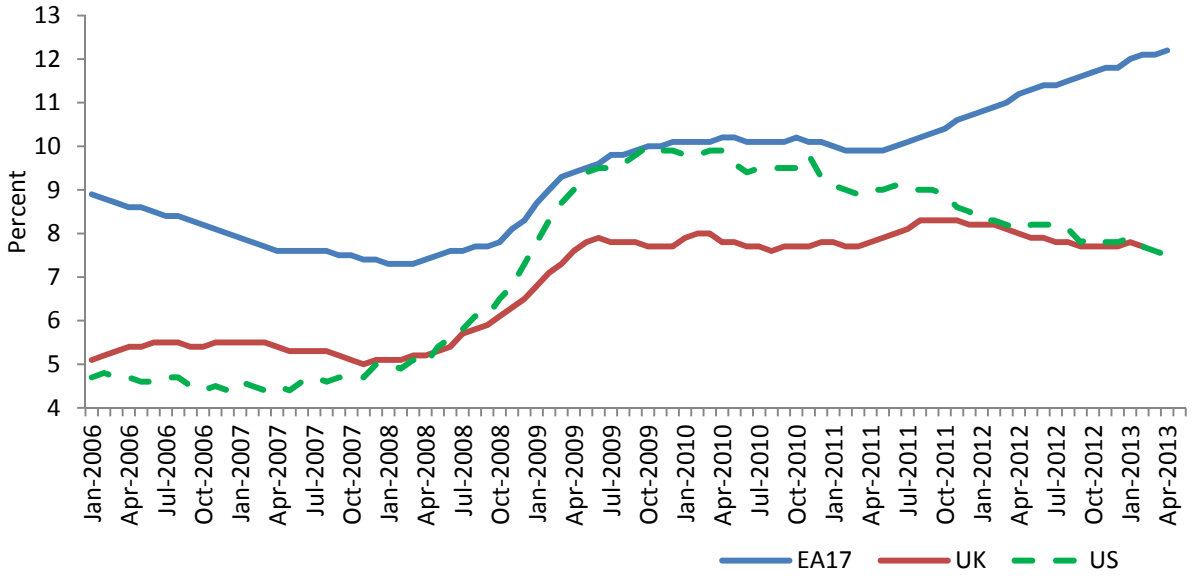
As might be expected, the direct impact of UMP has been the significant expansion of the balance sheets of central banks in the UMP jurisdictions. Correspondingly, base money growth has been very high in the three UMP jurisdictions, especially the United States and the United Kingdom, although much lower in the euro zone (Chart 1). However, growth in the broader credit and monetary aggregates has been anaemic across the board: in fact, there has been almost no growth in the past five years. Outstanding bank credit is almost unchanged in the United States and in the euro area since end-2008 (and up to April 2013), while it was lower by 5% in the United Kingdom. Unemployment remains at elevated levels, and is still increasing in the euro area (Chart 2). In summary, UMP does not appear to have been effective in reflating the real economy in any of the affected jurisdictions, though there are some signs of an incipient recovery in the United States.

Monetary policy actions — Chart 1

Source: Haver Analytics.

Unemployment rates

Chart 2

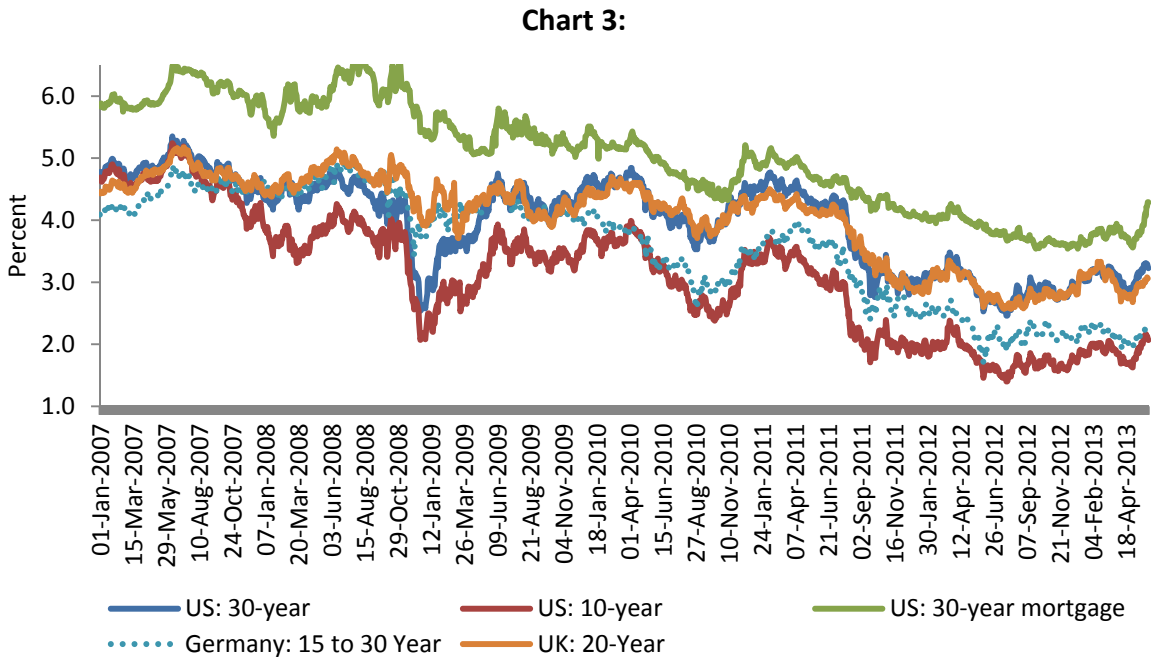


Source: Haver Analytics.

By contrast, UMP seems to have had a significant positive effect on the various segments of the financial markets (Chart 3). Stock markets have recorded large gains and long-term government bond yields have reached historic lows. Mortgage rates have also reached historic lows, and there is some evidence of the beginning of a housing market recovery in the United States.

Long-term Interest Rates

Chart 3



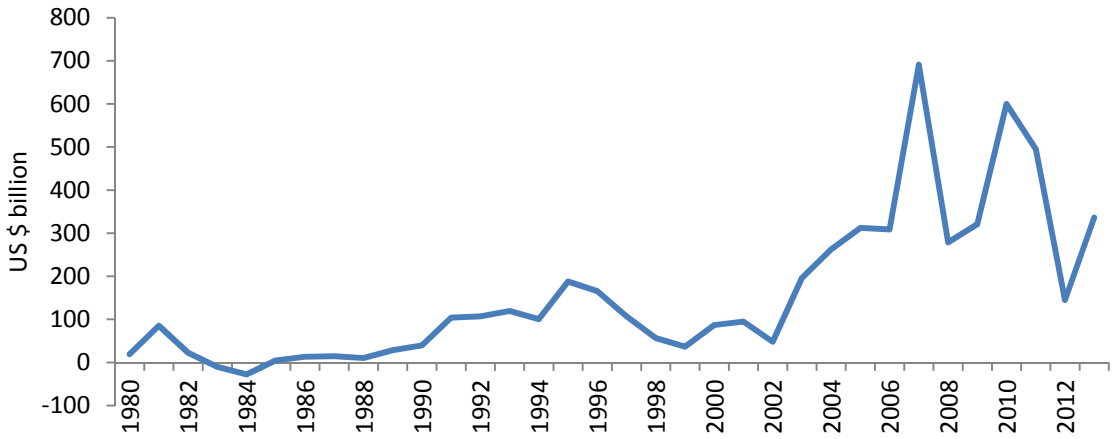
Source: Haver Analytics.

Overall, the direct benefits of the UMP for the real economy in the AEs are questionable, although there is no doubt that the strong monetary policy action did save the AEs from depression in 2008–09.

Global spillovers: capital flows, exchange rates and commodity prices

The key channel for the global spillovers is through capital flows (Charts 4–5), and the impact on exchange rates and other asset prices. The incentive for capital flows from the AEs to the EMEs has increased since the North Atlantic Financial Crisis (NAFC) in view of the record low interest rates in the AEs, while the interest rates in the EMEs remain relatively high. Growth in the EMEs is also high, although well below the pre-crisis trends. Thus, both pull and push factors seem to be at play and both these factors are obviously stronger since the NAFC. However, at the same time, the elevated uncertainty in the global financial markets has led to repeated bouts of risk-on and risk-off, which has imparted high volatility to capital flows to EMEs. Moreover, there is now an additional source of uncertainty in the financial markets due to concerns over the pace and the timing of the exit from the UMP in the United States.

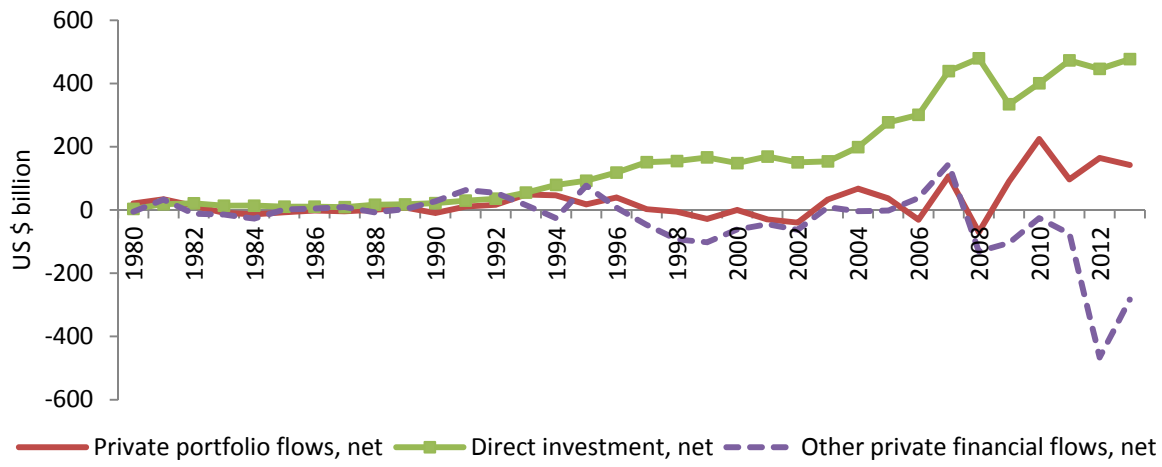
Total capital flows (net) Chart 4



Source: IMF, *World Economic Outlook Database,* April 2013.

Capital flows, component-wise

Chart 5



Source: IMF, *World Economic Outlook Database,* April 2013.

The movements in the exchange rates of the AEs have been broadly consistent with the paper's hypothesis: the exchange rates of the AEs undertaking UMPs have depreciated and the magnitude of depreciation has been higher in the jurisdictions (the United States and the United Kingdom) resorting to more expansionary QE policies. As regards the EMEs, their currencies have generally appreciated in response to the UMP in the AEs, although there are differences across countries reflecting country-specific factors such as the current account balance. Thus, among the major EMEs, Brazil, China and Russia recorded significant real appreciation, while India has witnessed a two-way movement since the NAFC (Table 1).

Real effective exchange rate indices (2006=100)

Table 1

Country	2006	2007	2008	2009	2010	2011	2012	2013 (Jan–Apr)
Brazil	100	108.0	113.3	113.1	129.1	135.1	122.2	123.4
China	100	103.7	112.5	117.4	116.5	119.5	126.6	132.6
India	100	106.5	101.4	95.9	107.2	106.7	100.3	100.5
Russia	100	105.6	112.8	103.1	112.8	117.0	118.5	123.5
Euro area	100	102.3	104.3	104.9	96.4	95.8	91.0	92.7
France	100	100.5	101.0	100.8	96.8	96.0	93.0	93.6
Germany	100	101.4	101.4	101.6	96.1	95.1	91.8	92.9
Italy	100	100.6	101.4	102.1	97.8	97.6	95.8	96.6
Japan	100	91.6	98.3	110.1	110.9	112.3	111.0	91.7
Switzerland	100	95.8	99.6	103.5	107.7	117.8	113.5	111.6
UK	100	101.6	88.2	79.5	80.0	80.3	83.7	81.4
US	100	95.4	91.1	94.8	90.8	86.2	88.2	88.0

Source: Bank for International Settlements.

A key spillover channel of the UMPs, which is not explored by Professor Chinn, is the spillover to commodity prices. Even as global growth remains well below its pre-crisis levels, commodity prices have generally remained elevated. With returns on risk-free assets at historic lows, it appears that commodities have emerged as an attractive investment class and thus commodity prices have remained relatively elevated. Of particular importance has been the continued resilience of high oil prices in the face of the global economic slowdown. Apart from the rising surpluses of the oil-based economies, the boom in commodity prices results in higher headline inflation, adds to the already elevated fiscal burdens and hurts growth; for net commodity importers, it also puts pressure on their current account balance.

Economic situation before and after the NAFC and UMP

The paper's key conclusion is that the UMPs being pursued by the major AEs have been globally beneficial. That is, UMP puts upward pressure on the currencies of those countries [EMEs] that are near full employment, and/or have current account surpluses, and therefore, the UMPs are probably beneficial to the world economy. In reaching this conclusion, Professor Chinn implicitly assumes that all EMEs are overheating and have current account surpluses. But this broad-brush categorisation of EMEs and AEs is incorrect.

First, post-NAFC, real GDP growth in EMEs is substantially lower than the pre-NAFC phase, including the larger EMEs (Table 2). Thus, the presumption that the EMEs are near full employment is subject to debate. Second, inflation in EMEs, on average, is marginally higher than in the pre-NAFC period (Table 3). This is arguably the outcome of higher commodity prices, fuelled by the UMPs – a factor not considered in Professor Chinn's paper. Thus, there are no general signs of overheating in the EMEs.

Real GDP growth (in per cent) Table 2

Country	2003–07	2008–12	Change
Brazil	4.0	3.2	–0.8
China	11.7	9.3	–2.4
India	8.6	6.8	–1.8
Indonesia	5.5	5.9	0.4
Korea	4.3	2.9	–1.4
Malaysia	5.9	4.2	–1.7
Mexico	3.4	1.7	–1.7
Russia	7.5	1.9	–5.6
South Africa	4.8	2.2	–2.5
Thailand	5.6	2.9	–2.7
All EDEs	7.7	5.6	–2.1
Memo:			
World	4.8	2.9	–1.9
Advanced economies	2.7	0.5	–2.2

Source: IMF, *World Economic Outlook Database*, April 2013.

Consumer price inflation (in per cent) Table 3

Country	2003–07	2008–12	Change
Brazil	7.2	5.5	–1.7
China	2.6	3.3	0.7
India	4.9	9.9	5.0
Indonesia	8.6	5.9	–2.7
Korea	2.9	3.3	0.4
Malaysia	2.2	2.5	0.3
Mexico	4.2	4.4	0.3
Russia	11.2	9.2	–2.0
South Africa	4.5	6.7	2.2
Thailand	3.2	2.9	–0.3
All EDEs	6.1	6.7	0.6
Memo:			
World	3.8	4.2	0.4
Advanced economies	2.1	1.9	–0.2

Source: IMF, *World Economic Outlook Database*, April 2013.

Third, many large EMEs have current account deficits, contrary to the paper's assumption (Table 4). These include Brazil, India, Turkey and South Africa. Thus, it is unclear if currency appreciation is the right medicine for all EMEs.

Fourth, the paper implicitly assumes that all AEs have current account deficits, which again is not the case. There is significant heterogeneity across the AEs. Prior to the crisis, the key imbalance was between China and the United States. While the euro area as a whole was largely in balance, it exhibited large internal imbalances. Germany had a large surplus, matched by large deficits in the periphery countries, which eventually proved unsustainable. Post-NAFC, the current account deficit of the United States and the surplus of China have narrowed down, partly reflecting cyclical developments. In contrast, the German current account surplus has increased even further. Real currency depreciation is most likely to increase the German surplus further at the cost of other euro area countries, given the fragmented financial markets and the turbulence in the periphery.

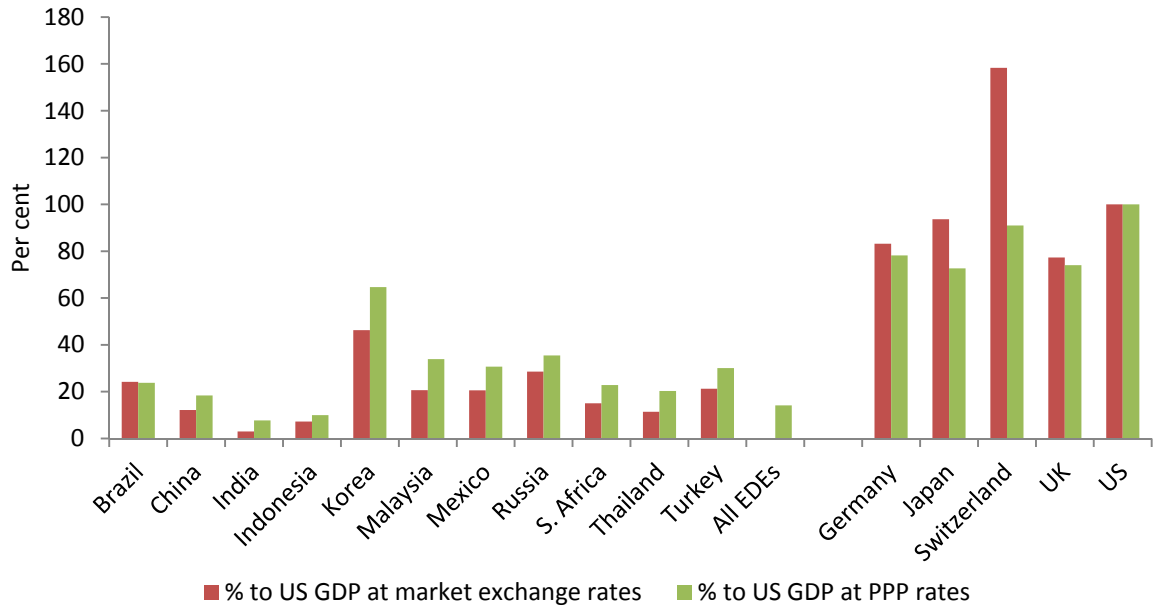
Current account balance (in per cent of GDP) Table 4

Country/Region	2006	2007	2008	2009	2010	2011	2012
Brazil	1.3	0.1	–1.7	–1.5	–2.2	–2.1	–2.3
Canada	1.4	0.8	0.1	–3.0	–3.6	–3.0	–3.7
China	8.5	10.1	9.3	4.9	4.0	2.8	2.6
France	–0.6	–1.0	–1.7	–1.3	–1.6	–2.0	–2.4
Germany	6.3	7.5	6.2	6.0	6.2	6.2	7.0
India	–1.0	–0.7	–2.4	–2.1	–3.2	–3.4	–5.1
Japan	3.9	4.9	3.3	2.9	3.7	2.0	1.0
Korea	1.5	2.1	0.3	3.9	2.9	2.3	3.7
Russia	9.5	5.9	6.2	4.1	4.6	5.2	4.0
South Africa	–5.3	–7.0	–7.2	–4.0	–2.8	–3.4	–6.3
Switzerland	14.4	8.6	2.1	10.5	14.3	8.4	13.4
Turkey	–6.1	–5.9	–5.7	–2.2	–6.2	–9.7	–5.9
United Kingdom	–2.9	–2.3	–1.0	–1.3	–2.5	–1.3	–3.5
United States	–6.0	–5.1	–4.7	–2.7	–3.0	–3.1	–3.0
Advanced economies	–1.2	–0.8	–1.1	–0.1	0.0	–0.2	–0.1
Euro area	0.5	0.4	–0.7	0.2	0.5	0.6	1.8
G7	–1.9	–1.2	–1.3	–0.6	–0.8	–1.0	–1.2
EDEs	4.9	3.9	3.5	1.5	1.5	1.9	1.4
CEE	–6.8	–8.4	–8.3	–3.1	–4.7	–6.3	–4.3
CIS	7.4	4.2	5.0	2.6	3.6	4.5	3.2
Developing Asia	5.8	6.8	5.8	3.7	2.5	1.6	1.1
Latin America and the Caribbean	1.5	0.2	–0.9	–0.7	–1.2	–1.3	–1.7

Source: IMF, *World Economic Outlook Database*, April 2013.

Fifth, Professor Chinn views as appropriate the rebalancing between the AEs and the EMEs due to UMP-induced exchange rate movements. However, the EMEs, despite noteworthy growth over the past decade, are still very poor countries. Per capita income levels in the major EMEs are still less than a fifth of the US levels, and in some countries even lower (Chart 6). Rebalancing ought to take place among countries with equal income levels, not between the rich and the poor countries. In this context, it is relevant to note that Switzerland – a country with per capita income even higher than the United States – is resisting appreciation by opting for a currency peg. Thus, rebalancing is being impeded.

Per capita incomes relative to the United States Chart 6



Source: IMF, *World Economic Outlook Database,* April 2013.

Overall, if the channel of imbalances in the pre-NAFC period was the exchange rate policy of China and other EMEs, as the paper seems to suggest, then why was the overall euro current account in balance? Similarly, why does Germany have a significant and rising surplus? Why did the exchange rate policies of the EMEs, particularly China, impact the United States, but not other major advanced economies such as those of Germany and Switzerland? The current account balance can be seen either as the difference between exports and imports or as the difference between savings and investment. The paper views the CAB from the exports-imports prism; however, from the saving-investment prism, it is apparent that the large current account deficit in the United States in the pre-NAFC period reflected excess domestic demand, caused largely by expansionary domestic macroeconomic policies in the shape of both loose monetary and fiscal policies, which then spilled over into a bloated current account deficit and global imbalances. The question is whether the United States/China rebalancing has taken place due to UMP impacting relative exchange rates, or because the crisis has slowed down the United States economy and hence impacted the current account.

Conclusions

To conclude, the UMP has buoyed up financial markets but its beneficial effects on the recovery of the AE's real economies have been more limited. Meanwhile, the macroeconomic management has been rendered more complex for the EMEs by the effects of volatile capital flows and their impact on exchange rate movements. One key channel of the UMP spillover – international commodity prices – is also

important, although the impact differs across commodity exporting and importing EMEs. While the UMPs have posed significant macroeconomic and financial stability challenges for the EMEs in the past few years, the economic benefits to AEs remain open to question. Furthermore, the EMEs will now have to grapple with the UMP exit jitters. Financial markets are known for their herd-like behaviour, which was vividly shown in the global financial market developments during May-July 2013 when the likely timing of the exit from the UMP was a matter for speculation. EME currencies have come under significant pressure since May 2013, again posing challenges for the EME policymakers as they seek to maintain macroeconomic and financial stability. Overall, it is difficult to argue that the world is a better place due to UMP. While the global financial markets have certainly benefited from the UMP, the issue is how they will cope with the exit from UMP and what will be the spillovers to the EMEs. And, finally, what are the financial stability implications of the extended record low interest rates?