

Morgan, Peter J.

**Working Paper**

## Impact of US quantitative easing policy on emerging Asia

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## **ADB Working Paper Series**

### **Impact of US Quantitative Easing Policy on Emerging Asia**

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Peter J. Morgan

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Peter J. Morgan is a senior consultant for research at the Asian Development Bank Institute (ADBI) in Tokyo.

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Please contact the author(s) for information about this paper.

Email: [pmorgan@adbi.org](mailto:pmorgan@adbi.org)

Asian Development Bank Institute  
Kasumigaseki Building 8F  
3-2-5 Kasumigaseki, Chiyoda-ku  
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500  
Fax: +81-3-3593-5571  
URL: [www.adbi.org](http://www.adbi.org)  
E-mail: [info@adbi.org](mailto:info@adbi.org)

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**Abstract**

The adoption of quantitative easing (QE) policy by the United States (US) Federal Reserve Bank since early 2009 has aroused widespread concerns in Asia and elsewhere regarding its possible impact in terms of the weakening of the US dollar and stimulating capital outflows to emerging economies that might increase inflationary pressures in them. This report investigates possible impacts of US quantitative easing policy on Asian economies and financial markets. Our basic approach is to take the period of November 2009–October 2010, when no quantitative easing took place, as a baseline period against which we can compare the effects of quantitative easing on monetary flows during the “QE1” and “QE2” periods. We estimate that about 40% of the increase in the US monetary base in the QE1 period leaked out in the form of increased gross private capital outflows and about one-third leaked out during the first two quarters of the QE2 period. An excess private financial capital inflow to Emerging Asia of \$9 billion per quarter was estimated for the first two quarters of the QE2 period, which was relatively consistent with the estimated amounts of the excess increases in foreign exchange reserves and the monetary base in the region during that period. However, this amount is small, and hence was unlikely to have a significant impact on financial markets, economic activity or inflation. We also investigate the impacts of QE policy on regional bond yields and exchange rates using event window analysis, and find that the greatest impacts were a stronger Korean won and lower bond yields in Indonesia.

**JEL Classification:** E43, E52, E58, F31, F32

## Contents

1.	Introduction.....	3
2.	Fed Asset Purchase Programs and the Monetary Base.....	3
3.	Impact on Capital Flows.....	6
4.	Effect on Emerging Asia Domestic Liquidity.....	15
5.	Interest Rate and Currency Impacts .....	16
6.	Conclusions .....	17
	References .....	18

# 1. INTRODUCTION

The adoption of quantitative easing policy by the United States (US) Federal Reserve Bank (Fed) since early 2009 has aroused widespread concerns in Asia and elsewhere regarding its possible impact in terms of the weakening of the US dollar (so-called “currency wars”) and stimulating capital outflows to emerging economies that might increase inflationary pressures in them. For example, the vice minister of finance of the People’s Republic of China (PRC), Zhu Guangyao, said on 18 November 2010 that “As a major reserve currency issuer, for the US to launch a second round of quantitative easing at this time, we feel that it did not recognize its responsibility to stabilize global markets and did not think about the impact of excessive liquidity on emerging markets.” (Reuters 2010)

This report investigates possible impacts of US quantitative easing policy on Asian economies. We define US quantitative easing as the Fed’s two major programs of outright purchases of US Treasury notes and bonds. The first block of purchases of \$300 billion of Treasury coupon securities was announced in the Federal Open Market Committee (FOMC) statement on 18 March 2009 (US Federal Reserve 2009), and is referred to as “QE1”. The first operation was conducted on 25 March. Purchases continued at a pace of about \$10 billion per week over the subsequent five months, and then slowed through the end of October 2009. The second tranche of purchases of \$600 billion of Treasuries was announced on 3 November 2010 (US Federal Reserve 2010), and is referred to as “QE2”. These purchases began shortly thereafter, and were completed by the end of June 2011. In contrast, as will be discussed below, the Fed’s balance sheet was reasonably stable between November 2009 and October 2010.

Our basic approach is to take the period of November 2009–October 2010, when no quantitative easing took place, as a baseline period (“No QE”) against which we can compare the effects of quantitative easing on monetary flows during the QE1 and QE2 periods. Although it is also possible to make comparisons with the period before QE1, we argue that market conditions were changing too rapidly as a result of other factors to provide a stable comparison. For market variables such as exchange rates and interest rates, which can be expected to respond to announcements of policy changes, we use event window analysis.

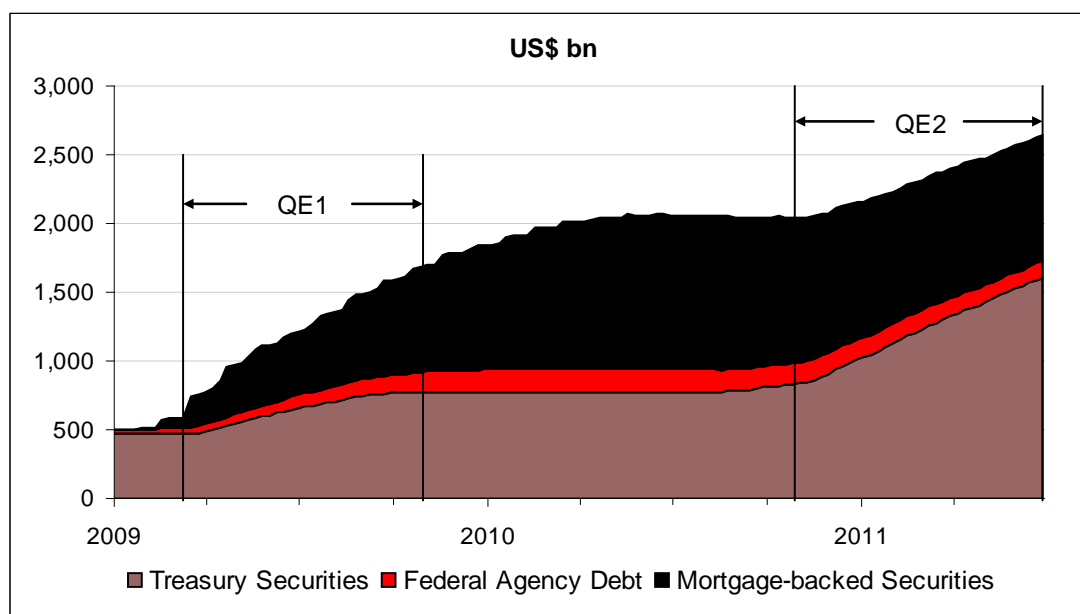
# 2. FED ASSET PURCHASE PROGRAMS AND THE MONETARY BASE

It should be noted that the Fed itself does not characterize its outright purchases of US Treasuries as “quantitative easing.” Instead, it refers to them as part of its “Large-scale Asset Purchases” (LSAP) program, which includes agency securities and mortgage-backed securities as well, and sometimes as “credit easing.” This is because the primary aim of such purchases is to lower bond yields and/or spreads, rather than to target a certain level of reserves per se, although reserves have certainly risen as a consequence of these operations. The impact is seen by the Fed as being similar to that of conventional monetary policy which aims to lower short-term interest rates, the only difference being that, once short-term rates have reached zero, the Fed must aim at pushing down longer-term interest rates instead to have an incremental policy impact (Bernanke 2010).

Figure 1 and Table 1 show the increase in the Fed’s outright holdings of long-term securities as a result of all the LSAP programs. Since January 2009, the Fed has purchased about \$900 billion of mortgage-backed securities, \$90 billion of agency securities, and \$1.17 trillion of Treasury securities, for a total of about \$2.2 trillion. This represents about 28% of the outstanding amount of these securities, a huge amount. Between March and October 2009, the period of the first round of Treasury purchases (QE1), overall purchases under the LSAP

were much larger than the \$300 billion of Treasury purchases, about \$1.1 trillion in all. Between November 2010 and June 2011, the period of the second round of Treasury purchases (QE2), total outright purchases amounted to about \$593 billion, actually less than the total increase in Treasury holdings in this period of \$773 billion, mainly reflecting declines in holdings of asset-backed securities.

**Figure 1: Federal Reserve Outright Holdings of Securities**



Source: St. Louis Federal Reserve FRED data base Available at: <http://research.stlouisfed.org/fred2/> (accessed 22 August 2011)

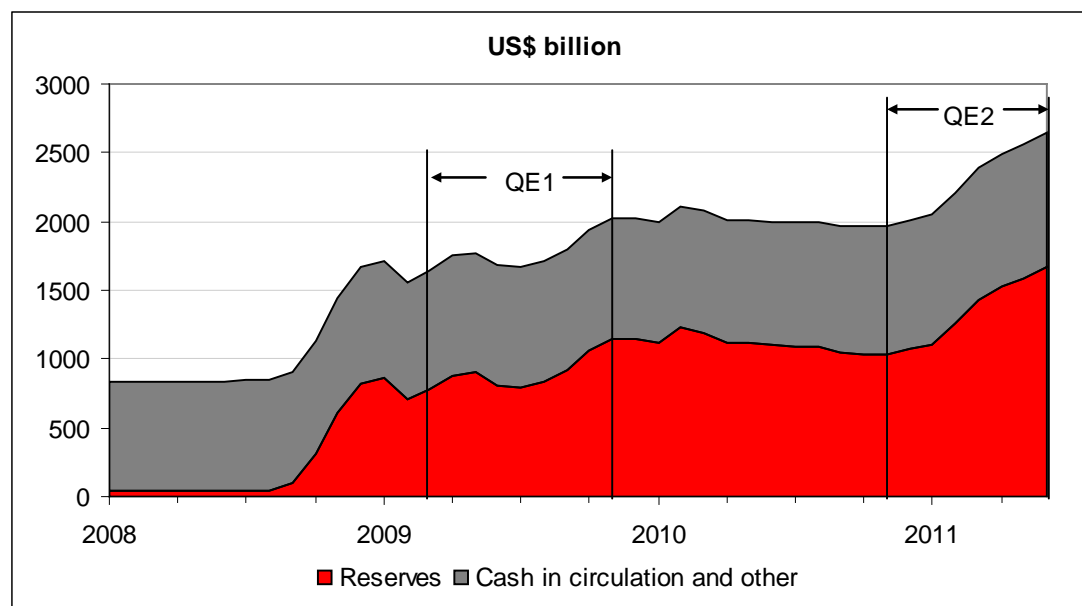
**Table 1: Changes in Federal Reserve Outright Holdings of Securities and US Monetary Base**

US\$ billion	QE1	QE2	No QE
	Mar–Oct 09	Nov 10–Jun 11	Nov 09–Oct 10
Total outright holdings	1,113.1	592.7	351.7
US Treasuries	299.9	772.7	59.7
Federal Agency debt	105.7	-32.6	8.6
Mortgage-backed securities	707.5	-147.5	283.4
Total reserves	355.8	626.3	-17.0
Monetary base	374.1	686.7	25.5

Source: St. Louis Federal Reserve FRED data base Available at: <http://research.stlouisfed.org/fred2/> (accessed 22 August 2011); CEIC Data Company. Available at: <http://www.ceic.com> (accessed 19 Aug. 2011).

Figure 2 shows the corresponding increases of the US monetary base, the vehicle by which liquidity in the overall economy is normally created. From March through October 2009 (QE1), base money rose by \$374 billion, due almost entirely to the rise in reserves held at the Fed (increase of \$356 billion). This was somewhat larger than the amount of Treasury purchases during this period, but much smaller than the total outright purchases, reflecting offsetting declines in some of the Fed's other asset programs, including term auction credit, that were winding down during that period. This shows that the net impact on liquidity should be gauged in relation to all of the Fed's operations, not just Treasury purchases.

**Figure 2: Components of US Monetary Base**



Source: CEIC Data Company. Available at: <http://www.ceic.com> (accessed 19 Aug. 2011).

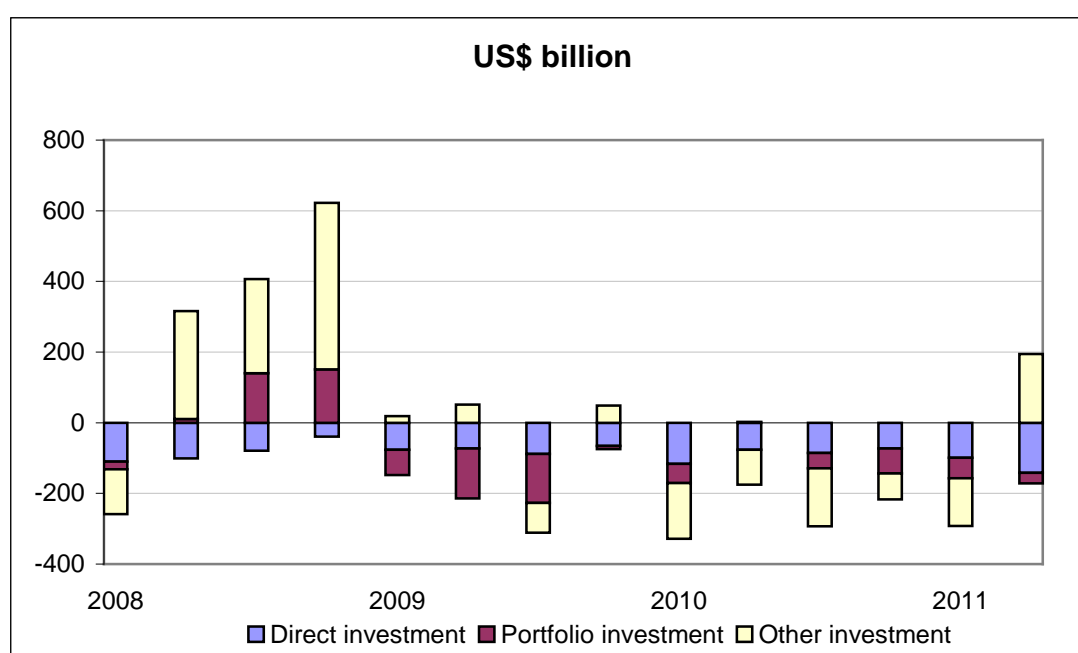
Between October 2010 and June 2011 (QE2), base money rose \$687 billion, almost the same amount as the increase in the Fed's Treasury holdings, and somewhat less than twice the increase seen during the QE1 period. This reflects the fact that, unlike the period of QE1, the Fed had already wound down its other programs for buying short-term and outright assets, so that movements in its total assets essentially tracked those of its outright holdings of Treasuries.



### 3. IMPACT ON CAPITAL FLOWS

The most direct transmission of the quantitative easing impact to Asia is via increased capital flows. How did US capital outflows react during this period? Figure 3 shows that, after large repatriation of flows at the height of the global financial crisis in the three quarters from April through December 2008, US gross capital outflows resumed in January–March 2010, and continued through January–March 2011. However, they returned to a net repatriation of \$23 billion in April–June 2011, mainly due to a massive reverse inflow of other investment of \$196 billion. Remarkably, almost all of this inflow (\$186 billion) came from “Other Western Hemisphere,” i.e., presumably from offshore centers such as the Cayman Islands. This reversal probably reflected increased concerns about the eurozone crisis and signs of weakening growth in the US. Interestingly, this amount was much larger than outflows seen during the peak of the global financial crisis in 2008. This new factor most likely overwhelmed the tendency of the QE2 policy to encourage capital outflows. Unfortunately, it is not possible to trace which countries the funds ultimately were repatriated from, although it seems likely that it was primarily from Europe.

**Figure 3: US Gross Private Capital Outflows**



Source: CEIC Data Company. Available at: <http://www.ceic.com> (accessed 19 August 2011).

Table 2 summarizes the size of US overall private capital outflows by major components during QE1 and QE2 and the interim period of no quantitative easing between them.<sup>1</sup> The figures are adjusted to quarterly average rates to account for the different lengths of the two periods of quantitative easing and the interim (“No QE”) period. Column (3) shows the average rate for just the first two quarters of the second QE period, for reasons which will be explained below. The last three columns of the table show the differences between the values for the two periods of QE policy and those of the “No QE” period, which we take as the “normal” baseline. We interpret these differences as “excess” flows attributable to the QE policy.

<sup>1</sup> Since balance of payments data are quarterly, the correspondence of the quarterly periods to the actual periods of quantitative easing is approximate.

**Table 2: US Gross Private Capital Outflows**

US\$ billion*	QE1	QE2	QE2**	No QE	Difference		
	Apr–Sep 09	Oct 10– Jun 11	Oct 10– Mar 11	Oct 09– Sep 10	QE1	QE2	QE2**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Total</b>							
Direct investment	-80.8	-104.5	-85.9	-86.0	5.2	-18.5	0.1
Portfolio	-74.1	-43.9	-50.8	-37.6	-36.5	-6.3	-13.2
Other private claims	-82.0	-29.5	-141.6	-81.2	-0.8	51.7	-60.4
Total private	-236.9	-177.9	-278.3	-204.8	-32.1	26.9	-73.5
<b>Reference</b>							
Increase in monetary base	--	--	--	--	76.6	229.2	217.1
Total private, % of increase in monetary base	--	--	--	--	41.9	-11.7	33.8

Notes: \*Quarterly average rate. Minus sign indicates outflow. \*\*Only first two quarters of QE2 period.

Source: US BEA Available at: <http://www.bea.gov/international/index.htm#bop> (accessed 1 Oct. 2011)

The question is whether outflows during the periods of quantitative easing were significantly higher than in the interim period. The figures suggest that this was the case during QE1 as the difference or “excess” relative to the “baseline” period shown in column (5) of no quantitative easing is large, especially for portfolio flows. Direct investment declined during QE1, but we would expect that direct investment is less sensitive to the effects of QE policy, being longer-term in nature.

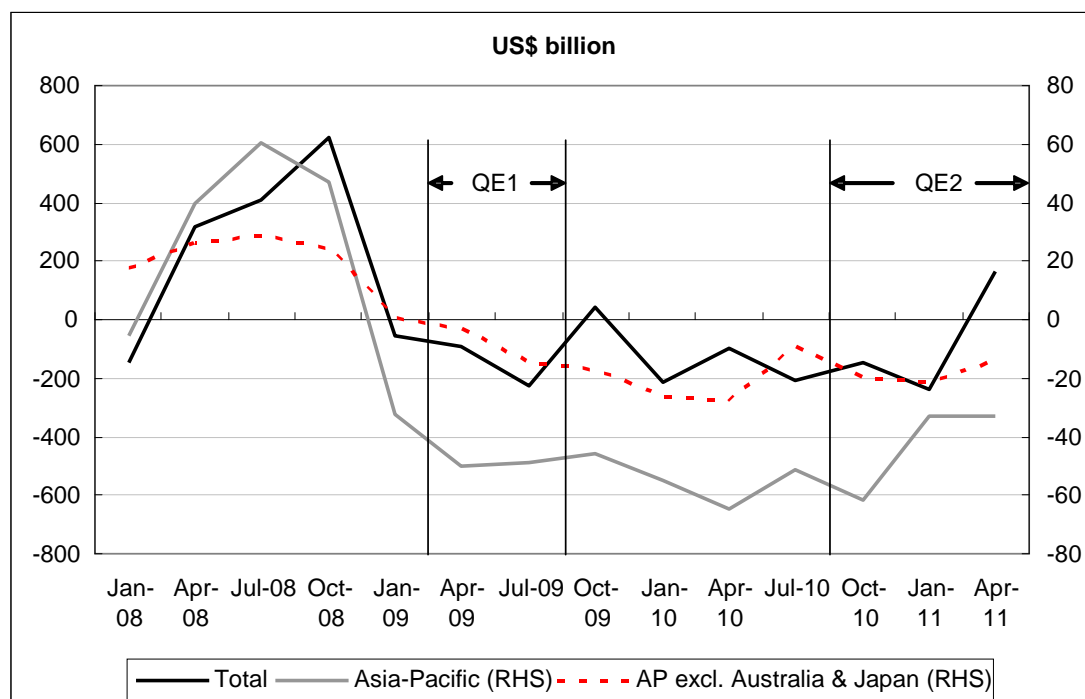
Column (6) shows that there was a negative excess during the QE2 period of \$27 billion per quarter, mainly due to a large negative excess of \$52 billion for other private claims. However, as explained above, this seems likely to have been due to a major shift in market sentiment that started during April–June 2011 as a result of worsening global economic conditions, especially in Europe, which probably swamped the effects of the QE2 policy. Therefore, the figures for the first two quarters of the QE2 period (October 2010 through March 2011) may give a clearer picture of the impacts of the QE2 policy. These outflows are shown as column (3) in the table, and column (7) shows the excesses relative to the baseline. Restricting the window to the first two quarters of QE2 shows a large excess outflow of \$73 billion per quarter, over twice the size seen during QE1. The bulk of these outflows, \$60 billion, came from other private claims, while the excess of portfolio outflows was considerably less than during QE1. This difference in the size of overall outflows is consistent with the relative sizes of the Treasury purchases and increases in base money in the two episodes, although the composition of outflows was different between the two episodes.

The bottom lines of Table 2 show the average quarterly increase in the monetary base during the period and the share of the “excess” capital outflow of this increase. During QE1, 41% of the increase in the monetary base may have leaked overseas, while the ratio for the first two quarters of the QE2 period is somewhat lower at 34%, although still considerable.<sup>2</sup> Of course, these estimates should be regarded as only approximate, because it is difficult to disentangle the effect of QE from the general increase in economic optimism taking place then that also would have encouraged increased capital outflows.

<sup>2</sup> The ratio for the QE1 period may be somewhat overstated, as some of the increase in the monetary base in March 2009 may not have leaked out until the second quarter.

How much of those capital outflows from the US ended up in Asia? Figure 4 shows corresponding aggregate private capital outflow figures for the overall total, the Asia-Pacific region, and Asia-Pacific excluding Australia and Japan (taken as Emerging Asia). The figure shows that the trends for the three regions were broadly similar. From January 2009 through March 2011, total private outflows averaged \$220 billion per quarter, those to Asia-Pacific averaged \$60 billion, and those to Emerging Asia averaged \$22 billion, about 10% of the total. Of course, these figures under-estimate the regional totals somewhat, as they do not capture flows going through offshore centers outside the region, a point we will return to later.

**Figure 4: Gross Capital Outflows from US to Asia-Pacific**



Source: US BEA Available at: <http://www.bea.gov/international/index.htm#bop> (accessed 1 October 2011)

To estimate the excess outflows to Asia attributable to QE policy, Table 3 shows the development of private financial inflows to Asia during the periods of QE1, QE2 and the intervening period of “No QE”, in the same fashion as Table 2. As in Table 2, columns (4) and (5) show the “excess” outflows in the QE1 and QE2 periods relative to the intervening period of “No QE” policy.

**Table 3: Gross Private Capital Outflows from US to Total and Asia-Pacific**  
(US\$ billion\*)

	QE1 Apr–Sep 09 (1)	QE2** Oct 10– Mar 11 (2)	No QE Oct 09– Sep 10 (3)	Difference	
				QE1 (4)	QE2** (5)
<b>Total</b>					
Direct investment	-80.8	-85.9	-86.0	5.2	0.1
Portfolio	-74.1	-50.8	-37.6	-36.5	-13.2
Other private claims	-82.0	-141.6	-81.2	-0.8	-60.4
Total private	-236.9	-278.3	-204.8	-32.1	-73.5
<b>Asia-Pacific</b>					
Direct investment	-7.6	-14.3	-13.3	5.8	-0.9
Portfolio	-13.3	-28.4	-10.2	-3.0	-18.2
Other private claims	-36.1	-19.0	-44.0	7.9	25.0
Total private financial	-56.9	-61.7	-67.5	10.6	5.8
<b>Asia-Pacific, % of Total</b>					
Direct investment	9.4	16.6	15.5	110.7	-1428.2
Portfolio	17.9	55.9	27.1	8.3	138.2
Other private claims	44.0	13.4	54.2	-972.3	-41.3
Total private financial	24.0	22.2	33.0	-33.0	-7.9
<b>Asia-Pacific excl. Australia, Japan</b>					
Direct investment	-4.0	-8.6	-8.8	4.8	0.3
Portfolio	-6.0	-14.1	-0.6	-5.4	-13.5
Other private claims	-2.9	-6.3	-19.4	16.5	13.1
Total private financial	-12.9	-28.9	-28.9	15.9	0.0
<b>Asia-Pacific excl. Australia, Japan, % of Total</b>					
Direct investment	5.0	10.0	10.3	92.6	433.1
Portfolio	8.1	27.7	1.6	14.8	102.3
Other private claims	3.5	4.4	23.9	-2034.5	-21.8

Notes: \*Quarterly average rate. Minus sign indicates outflow. \*\*Only first two quarters of QE2 period.

Source: US BEA Available at: <http://www.bea.gov/international/index.htm#bop> (accessed 1 October 2011)

Somewhat surprisingly, for Asia-Pacific as a whole, there were no excess outflows during either the QE1 period or the QE2 period. These results would hold even if direct investment was excluded. Although there were excess outflows on the portfolio side, especially during QE2, these were offset by larger repatriation of other private claims (mainly loans). The results for Emerging Asia (Asia-Pacific excluding Australia and Japan) are the same—no excess outflows during either QE1 or QE2. Again, excess outflows on the portfolio account were more than offset by repatriation of other private claims.

Table 4 shows the same data for major Asian economies. Only the PRC and Hong Kong, China show significant excess outflows from the US, and this only during the QE2 period. The excess outflows for Hong Kong, China came from large excess portfolio flows. The Republic of Korea (hereafter Korea) had excess portfolio outflows during both QE1 and QE2, but, again, these were offset by other private claims. The figures for Singapore are particularly surprising, as they show repatriation on the portfolio account in all three periods.

**Table 4: Gross Private Capital Outflows from US to Major Emerging Asian Economies**

(US\$ billion\*)

	QE1 Apr–Sep 09 (1)	QE2** Oct 10– Mar 11 (2)	No QE Oct 09– Sep 10 (3)	Difference	
				QE1 (4)	QE2** (5)
<b>PRC</b>					
Direct investment	2.7	-2.9	-1.7	4.4	-1.3
Portfolio	0.7	0.7	1.6	-0.9	-0.9
Other private claims	0.4	-4.2	-2.6	3.0	-1.6
Total private	3.9	-6.4	-2.6	6.5	-3.8
<b>Hong Kong, China</b>					
Direct investment	-1.9	-0.8	-0.8	-1.1	0.0
Portfolio	-3.6	-9.9	-0.1	-3.5	-9.8
Other private claims	-3.4	-4.2	-7.1	3.7	2.8
Total private financial	-8.8	-14.9	-7.9	-0.9	-7.0
<b>India</b>					
Direct investment	-0.8	-1.1	-1.4	0.6	0.3
Portfolio	-0.3	-2.0	-1.5	1.2	-0.5
Other private claims	-0.5	-1.1	-1.2	0.6	0.1
Total private financial	-1.6	-4.1	-4.1	2.4	-0.1
<b>Korea</b>					
Direct investment	-0.9	-0.8	-0.8	-0.2	0.0
Portfolio	-3.4	-3.3	-1.2	-2.3	-2.2
Other private claims	-0.2	3.0	-2.7	2.5	5.7
Total private financial	-4.6	-1.1	-4.6	0.0	3.5
<b>Singapore</b>					
Direct investment	-2.2	-1.3	-2.6	0.5	1.4
Portfolio	3.2	2.2	3.1	0.2	-0.9
Other private claims	0.2	0.3	-3.1	3.3	3.5
Total private financial	1.2	1.3	-2.7	3.9	4.0
<b>Taipei, China</b>					
Direct investment	-0.2	-0.2	-0.3	0.2	0.2
Portfolio	-0.7	0.5	-0.3	-0.4	0.7
Other private claims	0.1	-0.2	-1.0	1.0	0.8
Total private financial	-0.8	0.1	-1.6	0.8	1.7

Notes: \*Quarterly average rate. Minus sign indicates outflow. \*\*Only first two quarters of QE2 period.

Source: US BEA Available at: <http://www.bea.gov/international/index.htm#bop> (accessed 1 October 2011)

Where did the money go? The answer is Europe. Table 5, using the same methodology as previously, shows that excess outflows to Europe during both the QE1 and QE2 period were actually larger than total excess outflows. In particular, excess flows during QE1 to Europe were about four times higher than global excess flows. Large excess flows were seen in both the portfolio and other private claims accounts. Moreover, within Europe the United Kingdom (UK) accounted for two-thirds of Europe's excess outflows during QE1 and about a third during QE2, a disproportionate share in view of its relative size. This suggests that financial markets in Europe, especially London, acted as a conduit for flows to the rest of the world, and hence it is very misleading to look at direct bilateral flows between the US and destination countries to gauge the effects of the QE policies.

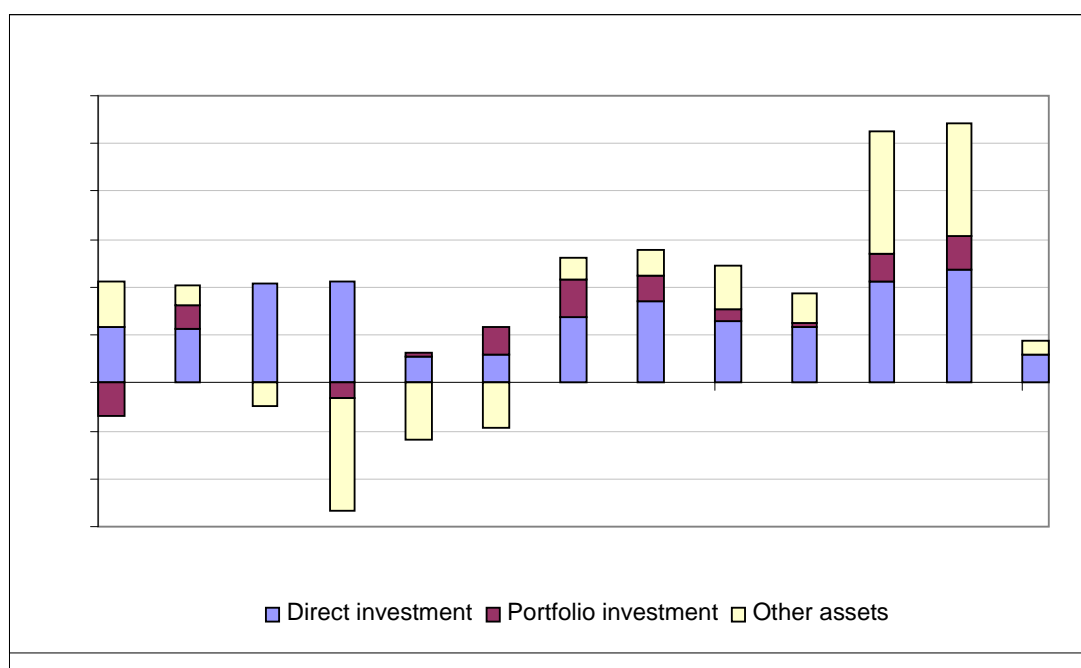
**Table 5: Gross Private Capital Outflows from US to Total and Europe**  
(US\$ billion\*)

	QE1 Apr–Sep 09 (1)	QE2** Oct 10– Mar 11 (2)	No QE Oct 09– Sep 10 (3)	Difference	
				QE1 (4)	QE2** (5)
<b>Total</b>					
Direct investment	-80.8	-85.9	-86.0	5.2	0.1
Portfolio	-74.1	-50.8	-37.6	-36.5	-13.2
Other private claims	-82.0	-141.6	-81.2	-0.8	-60.4
Total private	-236.9	-278.3	-204.8	-32.1	-73.5
<b>Europe</b>					
Direct investment	-44.9	-46.8	-42.6	-2.3	-4.2
Portfolio	-45.2	-14.8	-5.7	-39.5	-9.0
Other private claims	-73.4	-74.5	6.0	-79.4	-80.5
Total private financial	-163.5	-136.1	-42.3	-121.2	-93.8
<b>UK</b>					
Direct investment	-6.1	-6.0	-12.8	6.7	6.9
Portfolio	-29.9	-17.7	0.0	-29.9	-17.7
Other private claims	-86.5	-48.5	-26.8	-59.6	-21.7
Total private financial	-122.4	-72.2	-39.6	-82.8	-32.5

Notes: Quarterly average rate. Minus sign indicates outflow. \*\*Only first two quarters of QE2 period.

Source: \*US BEA Available at: <http://www.bea.gov/international/index.htm#bop> (accessed 1 October 2011)

The alternative approach is to look at total capital inflows of Emerging Asian economies to attempt to gauge the overall impact of the QE policies. Figure 5 shows corresponding aggregate capital inflow figures for the four Asian economies that produce quarterly balance of payments data (Hong Kong, China; Korea; Malaysia; and Singapore), plus the PRC, which produces half-yearly data, and these were allocated evenly between the two quarters. These economies account for over 80% of Asia ex Japan capital inflows. Inflows to Emerging Asia began to recover in January–March 2009, and steadily increased through October–December 2009 before falling off again. There was a significant rise in portfolio inflows in April–September 2009, totaling \$66 billion, compared with only about \$5 billion in the January–March quarter. There were big spikes in capital inflows in the second half of 2010, which will be discussed in more detail below.

**Figure 5: Emerging Asia\* Gross Capital Inflows**

Note: \* PRC; Hong Kong, China; Korea; Malaysia; and Singapore

Source: CEIC Data Company. Available at: <http://www.ceic.com> (accessed 19 August 2011).

In the same way as before, Table 6 shows the development of private financial inflows to Asia during the periods of QE1, QE2, and the “No QE” period, together with the estimated excess inflows attributable to QE policy. Total private financial inflows during the QE1 period were actually significantly lower than in the following period of “No QE” (shortfall of \$54 billion per quarter). This is because the excess portfolio inflows during the QE1 period (\$16 billion) were more than offset by the continued repatriation of other private claims (shortfall of \$70 billion).<sup>3</sup> This probably reflected the slower recovery of lending activity, which did not return to positive inflows until July–September 2009.

<sup>3</sup> The signs are reversed in this table relative to Tables 3–5, since it shows Asian inflows rather than US outflows. In this case, a positive sign for the excess amounts in columns (4) and (5) are consistent with an impact of QE policy.

**Table 6: Gross Private Capital Inflows, FX Reserves and Monetary Base in Emerging Asia (US\$ billion\*)**

	QE1	QE2**	No QE	Difference	
	Apr-Oct 09	Oct 10-Mar 11	Oct 09-Sep 10	QE1	QE2**
	(1)	(2)	(3)	(4)	(5)
Direct investment	49.6	73.4	79.1	-29.5	-5.8
Portfolio	33.0	18.5	17.4	15.6	1.2
Other private claims	-11.7	65.6	58.1	-69.8	7.5
Total private financial	21.3	84.1	75.5	-54.2	8.7
Total capital (incl. direct)	70.9	157.5	154.6	-83.7	2.9
Change in fx reserves	257.5	184.5	168.4	89.1	16.1
Change in monetary base	52.7	74.2	54.9	-2.2	19.2

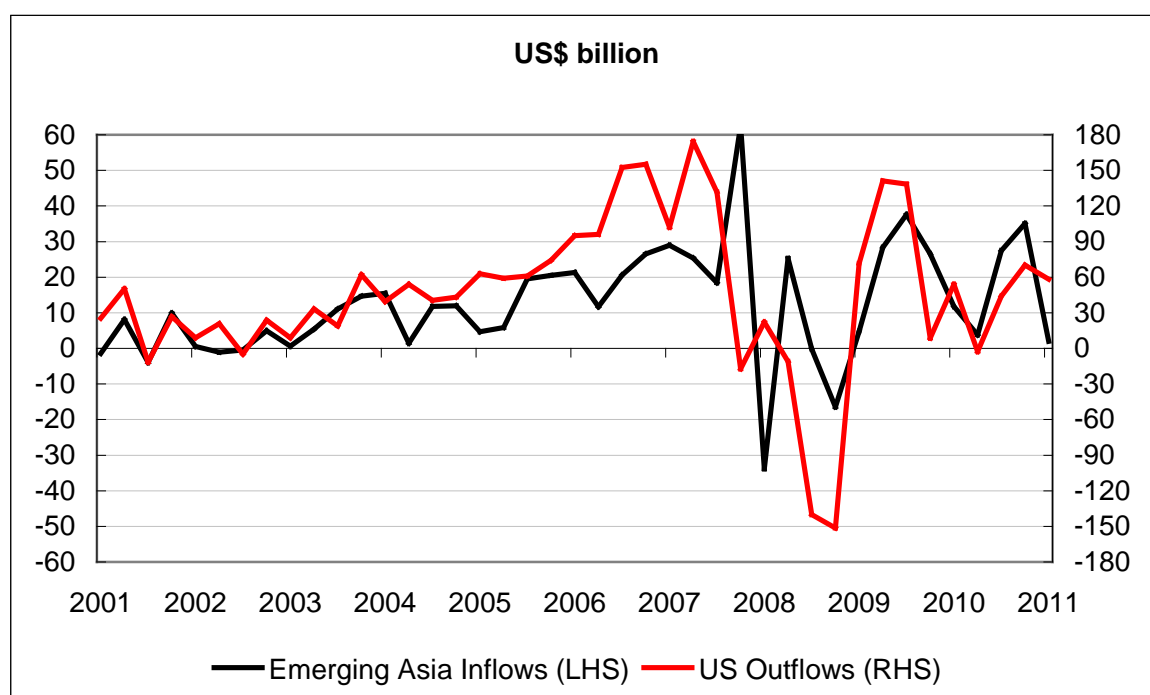
Notes: \*Quarterly average rate. Minus sign indicates outflow. \*\*First two quarters of QE2 period. Total private financial = portfolio + other private claims. Total of PRC; Hong Kong, China; Korea; Malaysia; and Singapore.

Source: CEIC Database Co. Available at: <http://www.ceic.com> (accessed 19 August 2011)

The QE2 period showed only a modest excess of total private financial claims compared with the non-QE period of about \$9 billion, which is almost entirely attributable to other private claims, mainly loans. This is because, as shown in Figure 4, other private inflows in July–September 2010, before QE2 began, were quite large, about the same as in October–December 2010. This mainly reflects very large inflows in the PRC. Since the PRC only reports balance of payments data on a half-yearly basis, it is impossible to know how much of the flows occurred before the QE2 period started and how much came after, so we have simply assumed an equal split between the two quarters.

Comparing total US portfolio and other financial inflows with overall inflows in Emerging Asian portfolio shows that they are highly correlated. Figure 6 shows US portfolio capital outflows (sign reversed) and Emerging Asian portfolio capital inflows. The correlation over the period 2001–2010 is relatively high, about 0.62, assuming a one-quarter lag between US outflows and Emerging Asian inflows. The high level of inflows during the QE1 period in 2009 may mostly have been a reaction to the previous downturn, so it is difficult to identify the incremental effect of the QE1 policy. Comparing Table 2 and Table 6 shows that the estimated excess portfolio inflows of Emerging Asian economies during QE1 were about half of the total estimated outflow from the US, but only about 10% of the total during QE2.

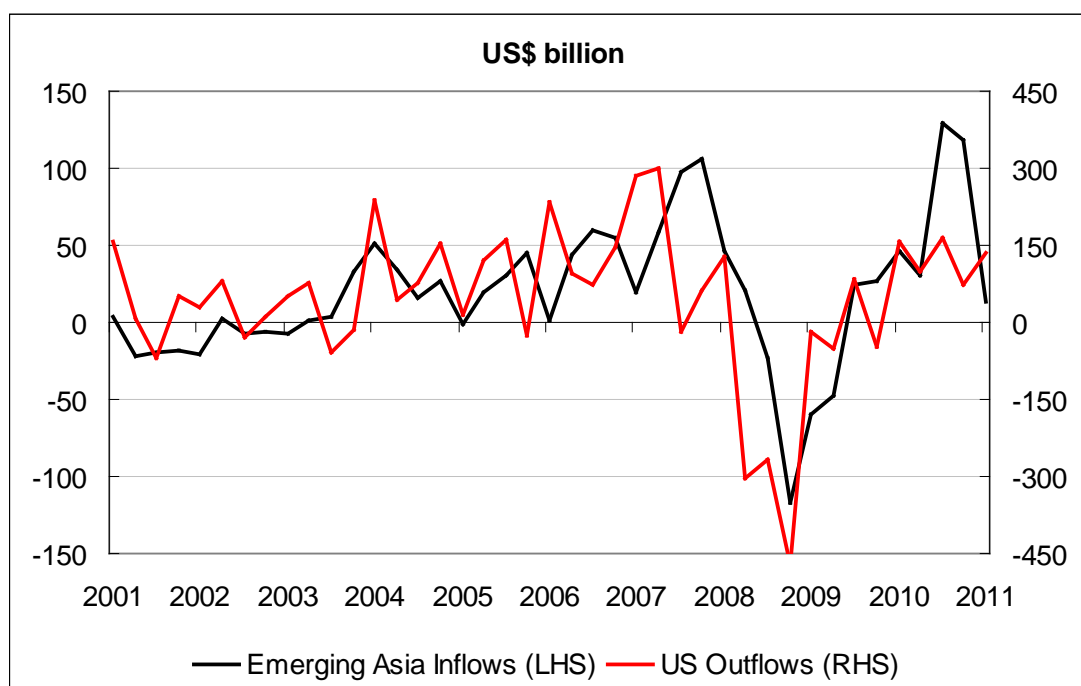


**Figure 6: Portfolio Investment: US Outflows and Asian Inflows**

Note: Asian inflows are sum of: PRC; Hong Kong, China; Korea; Malaysia; and Singapore.

Source: CEIC Data Company. Available at: <http://www.ceic.com> (accessed 19 August 2011).

The pattern for other private claims (mainly loans) is similar (see Figure 7), with Emerging Asian inflows being about a third of US outflows. The correlation is also similar to that for portfolio flows, 0.58, assuming a one-quarter lag. However, the pattern of US outflows in 2010 was somewhat smoother than in the case of portfolio flows, suggesting less influence of the QE policies. Moreover, there is a striking deviation in July–December 2010, when Asian inflows were proportionately much larger than the corresponding US outflows. This was due to the above-mentioned unusually large figures for other asset inflows of the PRC during that period. These are estimated to have been \$94 billion in both the third and fourth quarters of 2010. Therefore, it is difficult to attribute the large PRC inflows to the QE2 policy. Comparing Tables 2 and 6 shows that QE1 had no impact on other private claims, while excess inflows of private claims during QE2 amounted to about 12% of the total.

**Figure 7: Other Private Claims: US Outflows and Emerging Asia Inflows**

Emerging Asian inflows are sum of: PRC; Hong Kong, China; Korea; Malaysia; and Singapore.

Source: CEIC Data Company. Available at: <http://www.ceic.com> (accessed 19 August 2011).

In summary, during QE1 US private capital outflows are estimated to have shown an “excess” outflow of about \$32 billion per quarter, or about 40% of the increase in the US monetary base during that period. During QE2, the corresponding absolute figure was more than twice as large (\$74 billion), but somewhat smaller as a share of the total increase in the monetary base (34%). During the QE1 period, Emerging Asia showed excess portfolio inflows of \$16 billion per quarter, somewhat less than half of total US excess portfolio outflows, but these were more than offset by the continuing decline in other private claims, so probably exerted no significant impact on liquidity conditions in Asia. During the QE2 period, excess private financial inflows in Emerging Asia amounted to about \$9 billion per quarter, only about 12% of the total.

## 4. EFFECT ON EMERGING ASIA DOMESTIC LIQUIDITY

The next issue is to determine the effect of these inflows on domestic liquidity conditions in Emerging Asia. The first stage for these capital flows to enter Emerging Asian economies is an increase in foreign exchange reserves. In April–September 2009, the total foreign exchange reserves of Emerging Asia economies<sup>4</sup> jumped by \$258 billion per quarter (see Table 6), far more than the increase in the previous three months of just \$15 billion. Over 60% of the increase took place in the PRC, followed by increases of 9% in Korea and 8% in Hong Kong, China. The excess increase during QE1 relative to the base period was fairly large at \$89 billion per quarter. However, it is difficult to attribute this increase to the QE1 policy directly, since, as shown in the previous section, no excess capital inflows into Emerging Asia were identified during this period.

During the first two quarters of QE2 (October 2010–March 2011), total foreign exchange reserves of these economies increased by about \$185 billion per quarter (see Table 6). In this case, the estimated excess increase was \$16 billion, relatively close to the estimate of

<sup>4</sup> PRC; Hong Kong, China; India; Indonesia; Republic of Korea; Malaysia; Philippines; Singapore; Taipei, China; Thailand; and Viet Nam.

the excess total private financial inflow of about \$9 billion. This does provide some confirmation of our methodology. However, the key point is that the excess amount is fairly small compared with the overall increase of foreign exchange reserves during the period.

Table 6 also shows the total increase in the monetary base (in US dollar terms) in Emerging Asia during the same periods, and the estimated “excess” increase relative to base period. There was no excess increase during QE1, which is consistent with the finding of no excess increase in capital inflows, although not with the rise in reserves. During the QE2 period, the “excess” increase in the monetary base was \$19 billion per quarter, relatively close to the excess increase of foreign exchange reserves during the period. This suggests that the increase in foreign exchange reserves was not sterilized. However, the key point is that it should have been fairly easy for the monetary authorities to sterilize an amount of that size (\$16 billion per quarter or 1.2% of the total monetary base) if they had wished to do so, since it was relatively small compared with the overall increase in foreign exchange reserves. Thus, on the whole, the direct impact of the QE policies on domestic liquidity in Emerging Asia appears to have been modest and easily contained by sterilization policy.

## 5. INTEREST RATE AND CURRENCY IMPACTS

To be sure, there are other transmission mechanisms of a QE easing shock to Emerging Asian economies, including changes in interest rates, foreign exchange rates, stock prices, and credit spreads. A number of studies have estimated that the Fed’s LSAP program pushed down US Treasury bond yields by a range of 30bps to 100bps, including Gagnon, et al. (2010) and D’Amico and King (2010). Neely (2010) used a portfolio balance model and found that the Fed’s LSAP produced a 90% confidence interval of approximately 20 to 134 basis points—depending on the bond—for the change in the expected real (in US goods) returns to the Canadian, British, Japanese, and German 10-year bond indices. Using a simple two-day window, he also found that the US dollar cumulatively declined by 3.6% to almost 10.8%—depending on the currency—over the five days with significant LSAP purchase announcements—25 November, 1 December, 16 December, 28 December, and 18 March—examined in the study. The use of the event window approach is rationalized by the assumption that the surprise news embodied in these announcements was rapidly discounted by the market.

IMF (2011) finds that, for an economy with average direct financial exposure to the US (about 16%), a one standard deviation unanticipated fall in the US real interest rate—approximately equivalent to 5 basis points—causes a statistically significant additional increase in net inflows in the order of 0.5 percentage point of gross domestic product (GDP) in the first quarter. This increases to 1.25 percentage points of GDP cumulatively after two years. However, these increased flows presumably are already accounted for in our methodology described in the previous sections.

If we use the same approach as in Neely (2010)—a two-day event window for each of the five announcement days—for major developing Asia currencies, three currencies showed significant cumulative impacts. The Korean won had by far the largest impact—a 10 percentage-point cumulative rise—followed by the Singapore dollar (3.3 percentage points) and the Indian rupee (2.1 percentage points). The large impact for the won (similar to that for the Japanese yen) presumably reflects the openness and large-size of Korean financial markets. The lack of significant responses of other Asian currencies during the event window period probably reflects a combination of the effects of foreign exchange intervention and capital inflow restrictions.

A similar analysis of longer-term Asian bond yields (7-year maturity in most cases) identified a significant impact only for Indonesia (cumulative decline of 3.4 percentage points). It is difficult to explain why only Indonesian bonds were affected, but this may be because

Indonesian bonds are popular with foreign investors due to their high yields and Indonesia's relatively open capital account.

## 6. CONCLUSIONS

Much concern has been expressed about the potential inflationary impacts of the US Federal Reserve's Large Scale Asset Program (popularly referred to as QE1 and QE2) on liquidity and inflation in emerging Asian economies. In this paper we have attempted to quantify the direct and indirect impacts of the resulting increase in liquidity in the US on US capital outflows, Emerging Asia capital inflows, Emerging Asia domestic liquidity, exchange rates, and bond market yields. On the whole, we find that the likely excess Asian capital inflows attributable to the QE policy were not large, and easily absorbed by sterilization policies, and that only a few economies experienced significant impacts on exchange rates or bond yields.

The US monetary base rose by \$374 billion during the QE1 period and by \$687 billion in the QE2 period (the latter up \$433 billion in the first two quarters), roughly similar to the increase in outright holdings of US Treasuries by the US Federal Reserve during those two periods. We estimate that about 40% of the increase in the monetary base in the QE1 period leaked out in the form of increased gross private capital outflows (about \$32 billion per quarter) and about one-third leaked out during the first two quarters of the QE2 period (about \$74 billion). Of this, a direct impact of the Fed's quantitative easing policy on Emerging Asian economies during the QE1 period was not identifiable, but an excess private financial capital inflow of \$9 billion per quarter (about 12% of the total excess outflow) was estimated for the first two quarters of the QE2 period, which was relatively consistent with the estimated amounts of the excess increases in foreign exchange reserves and the monetary base during that period. However, this amount is small compared with the overall increases seen in these variables during the period and with the overall level of the monetary base in Emerging Asia, and hence was unlikely to have a significant impact on financial markets, economic activity, or inflation. The main impacts of lower US bond yields on exchange rates and bond yields appear to be a stronger Korean won and lower bond yields in Indonesia. Therefore, it seems that concerns about the effects of the US Fed's QE policies on growth and inflation in Emerging Asia have been exaggerated.

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