

Currency intervention and the global portfolio balance effect:
Japanese lessons

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Abstract: This paper shows that the Japanese foreign exchange interventions in 2003/04 seem to have lowered long-term interest rates in a wide range of countries, including Japan. It seems that this decline was triggered by the investment of the intervention proceeds in US bonds and that a global portfolio balance effect spread the resulting decline in US yields to other bond markets, thus easing global monetary conditions.

Keywords: Intervention, portfolio balance effect, Japan

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1. Introduction

Policy developments can require a rethinking of long-held propositions about policy. So it is with the effects of foreign exchange interventions, changes in official reserve management practices and large scale asset purchases.

These require us to rethink the proposition dating back to Joan Robinson's 1937 essay that currency depreciation (or resisting currency appreciation) is a beggar-thy-neighbour policy. This phrase condemns currency depreciation in a world of insufficient effective demand as a case of robbing the foreign Peter to pay the domestic Paul: cheaper exports of the home country increase output and employment at the expense of sales and jobs in competing countries.

However, policy developments mean that this analysis has become incomplete and misleading. Foreign exchange reserve management has shifted its investment focus from gold in the 1930s and Treasury bills in the 1950s to bonds today. We argue in this paper that as a result currency intervention today bears similarities to the large-scale asset (bond) purchases (LSAPs) that have recently become a popular unconventional monetary policy tool.¹

LSAPs targeted at bonds can ease monetary conditions through either market liquidity effects or portfolio balance effects. In the latter case, if market participants that have sold bonds to the central bank purchase substitutes (or are expected to do so), prices of those latter bonds broadly go up and yields down (see e.g. Bernanke and Reinhart (2004), Bernanke et al (2004), Sack (2009), Bernanke (2010) and Bernanke (2012)). Lower bond yields resulting from this portfolio rebalancing can stimulate interest-sensitive investment and raise asset prices, inducing wealth effects.² Indeed, Neely (2010) documents a drop in international bond yields in response to the Federal Reserve's LSAP in 2008-09, suggesting a global portfolio balance effect.

To our knowledge, there is only one paper that examines the impact of interventions on the government bond yields of the target currency. Bernanke et al (2004) establish that US government bond yields declined during the period of Japanese foreign exchange intervention in 2003-04.³ They argue that this happened because the Japanese Ministry of Finance (MoF) invested the freshly purchased US dollars in US government bonds.

We add to their analysis by carefully considering the series of decisions between MoF intervention and investment in US bonds and then by establishing that the same intervention

¹ One important difference is that currency intervention amounts are not announced beforehand, whereas the eventual size of LSAP or quantitative easing measures is often announced in advance.

² This portfolio balance effect should work also at a policy rate well above the zero lower bound. See the argument over the "bills only" doctrine within the Federal Reserve in the 1950s in Ritter (1980).

³ Also related to our paper are Warnock and Warnock (2009) in their international perspective. They show that a broad range of US interest rates declines when foreigners purchase US government bonds.

also caused a decline in long-term interest rates around the world. In particular, ten-year government bond yields in other industrialised countries declined, as did ten-year interest rate swap rates in a variety of currencies. We also identify a decline in bond yields of emerging market economies whose bond markets are more globally integrated. This suggests a broadly based portfolio balance effect driven by close substitutability of similar bonds for the particular bonds purchased. Indeed, even Japanese interest rates seem to have decreased in response to the interventions.⁴

Our main conclusion is that a “beggar-thy-neighbour” charge, which concentrates on trade effects, overlooks the monetary easing caused by the investment of the proceeds of intervention that occurs abroad and then at home. In times when policymakers of different countries simultaneously attempt to loosen monetary conditions, this may be a welcome mechanism. However, when global growth is uneven and economies are out of synch so that some economies require unchanged or tighter monetary conditions, global diffusion of monetary easing through integrated bond markets may be unwelcome. Corrective domestic action may be called for.

The rest of the paper proceeds as follows. Section 2 presents a short macroeconomic backdrop to the interventions. We then turn in Section 3 to the regressions that identify the impact of interventions on US Treasury holdings and on government bond yields and interest rate swap rates. The last section concludes.

2. Macroeconomic background

Japanese property prices began collapsing in 1991, and the economy has since been marked by low growth and phases of moderate deflation. The Bank of Japan cut interest rates to close to zero in 1999 and adopted quantitative easing in 2001. In January 2003, the MoF began to intervene in the foreign exchange market to counter an appreciation of the yen against the US dollar that had begun a year before. Its entry into the market was quiet – “stealth interventions” as market participants later dubbed them. Initially, market participants were left to infer the interventions from the monthly disclosure of a Bank of Japan account linked to currency operations (Ito, 2005, p 224). On 8 May 2003, the MoF published daily data for the first calendar quarter that showed the full extent of its dollar-buying.

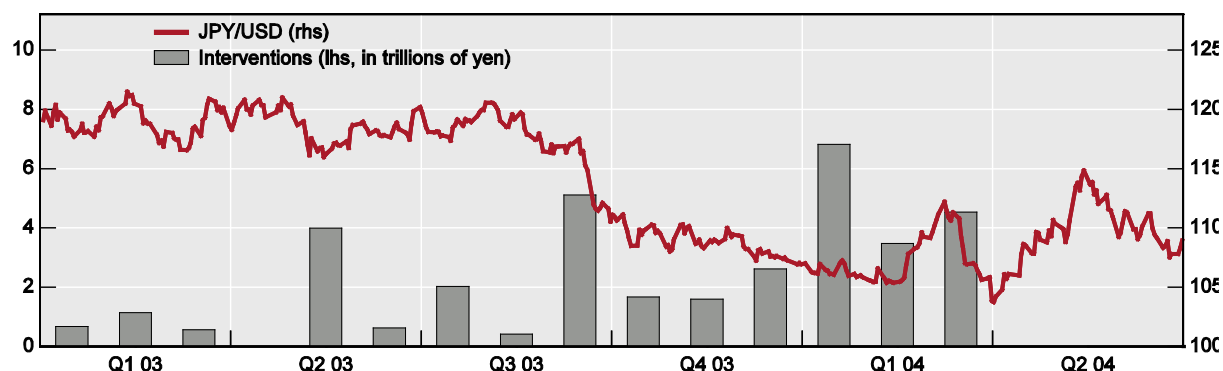
Graph 1 shows the intervention data together with the JPY/USD exchange rate. The MoF managed to hold the yen roughly stable mostly in the 117-120 range against the US dollar until August 2003.⁵ However, the exchange rate came under increasing upward pressure as international investors again began buying Japanese equities and in the process bid for yen.

⁴ In a related paper, we also examine the effect of the Swiss interventions of 2009/10 (Gerlach-Kristen et al, 2011). Since no official intervention data are available for Switzerland, that analysis is more tentative. Nevertheless, we also find an effect of interventions on bond yields there as well.

⁵ There is a large number of papers studying whether the interventions successfully influenced the exchange rate. See Fatum (2010), Fatum and Hutchison (2003, 2005 and 2006), Ito (2003, 2004 and 2005), and Sarno and Taylor (2002) for the Japanese case and Neely (2005) for a general discussion. On the issue of sterilisation, see also Ito (2004), Fatum and Hutchison (2005), Watanabe and Yabu (2011) and Gerlach-Kristen et al (2012).

Graph 1

MoF's interventions



Sources: Japanese Ministry of Finance; national data.

Moreover, the G7 called for more exchange-rate flexibility in September 2003, adding to the pressure for the yen to appreciate. On 16 March 2004, at an exchange rate of 106, the MoF quietly stopped intervening. By then, it had acquired JPY 35 trillion (USD 340 billion) over the fifteen months of intervention. This amounted to roughly 7% of Japanese GDP.

3. Global monetary easing effects of the foreign exchange intervention

In this section we study the impact of interventions. We first establish that the US dollar purchased by the MoF seem to have been invested fully over time in US bonds. Having studied the quantities, we turn to the price effect and show that US Treasury yields, as well as the yields of close international substitutes, declined after Japanese interventions.

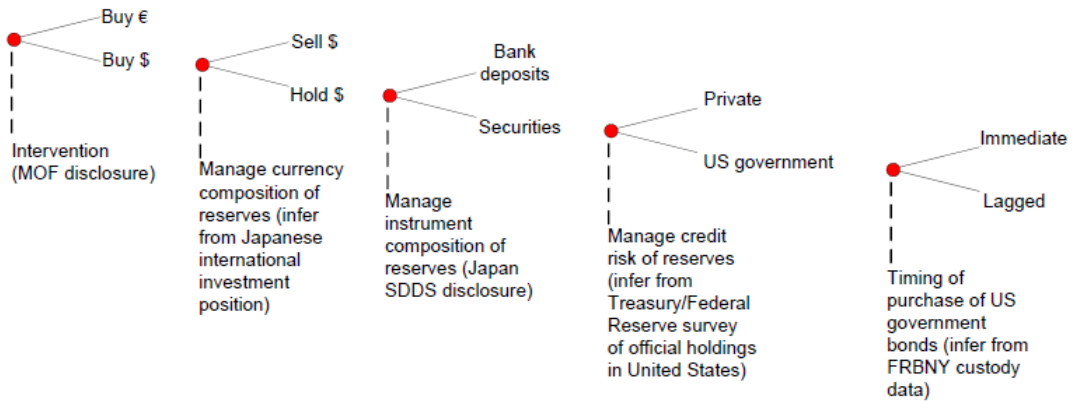
3.1 Quantity effects of the interventions

When the MoF buys US dollars against yen, it is generally thought to invest the dollar proceeds in US Treasuries. Ceteris paribus, sizeable purchases of Treasury bonds can drive down yields. Bernanke et al (2004) simply regress the yields on the intervention.

On further consideration, at least five decisions stand between the intervention to hold down the yen and the purchase of US Treasury bonds. The following Figure considers each in turn.

First is the choice of the currency¹ in which to intervene. Unlike most currencies, the yen trades actively against both the US dollar and the euro. In fact, according to the MoF disclosure, in the 2003-04 period, only ¥83 billion out of ¥35 trillion in intervention was executed by selling yen against euro—that is, less than 1%.

From MOF intervention to purchase of US government bonds: a stylised decision tree



Source: authors

Second is the management of the MoF’s reserves by currency. While the MoF was buying dollars in the market almost exclusively, standard diversification would suggest that the MoF would subsequently sell some proportion of these dollars for other currencies. Here we draw on the Bank of Japan’s article on Japan’s international investment position, which indicates the exchange rate valuation effects for Japan’s foreign exchange reserves for calendar years 2003 and 2004. On the hypothesis that Japan’s reserves are invested in dollars or euro, the valuation effect, combined with the movements of the yen versus the dollar and the euro, can be used to infer the weights on the dollar and the euro (Table 1). Under this hypothesis, the Japanese reserves were invested 90-95% in dollars.

Table 1

The dollar share of Japanese official foreign exchange reserves, 2003-04

Inferred on the hypothesis that reserves are held in US dollars and euro only

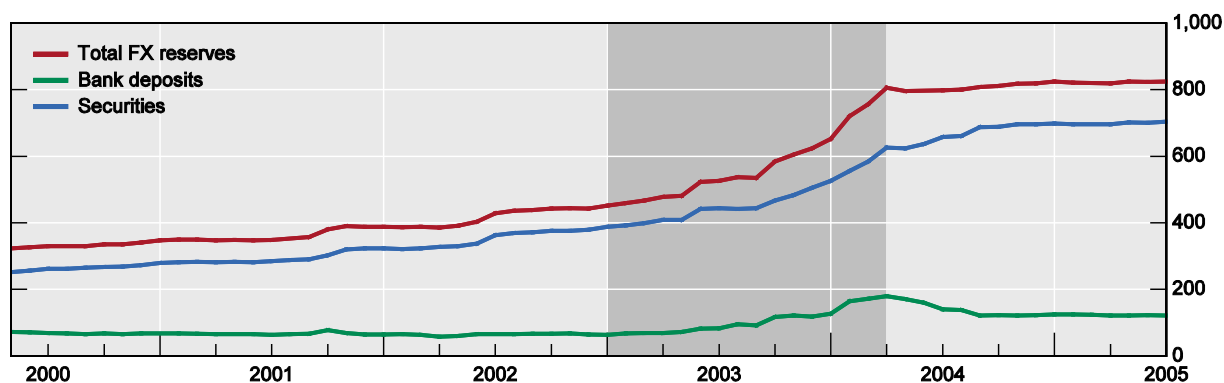
Year	Foreign exchange reserves			Exchange rates				Implied \$ weight
	Level, end-year (¥ trillion)	Valuation change (¥ trillion)	Valuation change as % of average reserves ¹	¥/\$, end-year	¥/€, end-year	¥/\$, % change	¥/€, %change	
2002	56.063			119.37	125.72			
2003	72.083	-6.119	-9.6	106.97	134.91	-10.39%	7.31%	95.3%
2004	87.720	-1.717	-2.1	103.78	140.96	-2.98%	4.48%	88.8%

¹ Average reserve taken to be the sum of current and previous end-year reserves divided by two.

Sources: Bank of Japan (2004, 2005), authors’ calculations.

Third is the choice of investing in securities or bank deposits. Drawing on the Japanese data reported according to the IMF's special data dissemination standards (SDDS), McCauley (2005) shows that the bulk, over 80%, of Japan's 2003-04 intervention proceeds were invested in securities, with some temporary build-up of bank deposits in the wake of heavy intervention (Graph 2).⁶

Graph 2
Japanese foreign exchange reserves by instrument
In billions of US dollars



Source: Japanese Ministry of Finance.

Fourth is the choice of which securities to buy. In 2003-04, the most conservative reserve managers might invest dollars only in US Treasury or agency securities; somewhat less conservative ones might in addition buy supranational and other countries' agency dollar bonds, and those with most risk appetite might buy US corporate bonds. According to McCauley (2005), US Treasury data showed that official holdings of securities in the United States in June 2004 included \$1,172 billion in Treasury securities, \$216 billion of agency securities and only \$47 billion of corporate bonds. In other words, US Treasury data suggest that close to 97% of reserves invested in fixed-income securities in the United States were invested in public securities, ie Treasury or agency securities.

If the overwhelming majority of Japanese purchases of dollars remained invested in the dollar, and the bulk was invested in US government bonds, the fifth and final choice, a crucial one for our analysis, is how fast these investments were made. If they were practically instantaneous, we would expect to find an immediate impact on US yields as well. If they were very protracted, or if market participants were not aware of the MoF's investment strategy, we would expect the response of yields to the investment to be spread over time.

Graph 3 shows the amounts of Treasury and federal agency securities that the Federal Reserve holds in custody for foreign official and international accounts. We presume that MoF investments in such securities would be held in custody at the Federal Reserve Bank of New York and would thus be recorded in this statistic.⁷ It is striking how the custody holdings

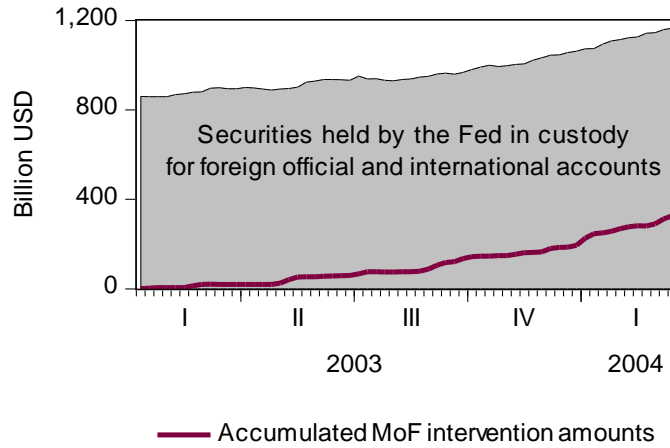
⁶ The SDDS data do not provide a currency decomposition, so they do not reveal the instrument composition of dollar reserves in particular.

⁷ The fact that measured Chinese holdings of Treasury securities tend to be increased with the annual surveys from the levels implied by the monthly Treasury International Capital flow data (Setser and Pandey (2009))

increase over the time of the intervention period almost exactly by the accumulated intervention amount. It is thus possible that the investment took place rather fast.

Graph 3

MoF's cumulative interventions and Federal Reserve custody holdings



Sources: Federal Reserve, MoF.

Regression analysis confirms that overall custody holdings rose with cumulative Japanese intervention in this period. In estimating this relationship, keeping track of the timing is important. The Federal Reserve publishes weekly official holdings in custody data as of Wednesday close of business. Given the two-day settlement lag of FX transactions, these data cannot contain any MoF Treasury purchases funded with any interventions on Wednesday or indeed on Tuesday. At the latest, MoF intervention through Monday could be invested by Wednesday, and could show up in this week's holdings release. Interventions that took place in the four previous business days, ie Tuesday the previous week through Friday the previous week, also could fund increases in this week's official securities holdings.

To allow for the lagged investment of MoF dollars in US securities, we estimate the relationship using an error-correction setup. This allows the data to speak on how much of the cumulated intervention ends up in the custody holdings, and how fast. We regress this week's change in the custody holdings on the cumulated interventions that took place during the seven to two business days before the custody release, on the lagged level of custody holdings and on the level of cumulated interventions seven business days before the release.⁸ Thus, using weekly data, we fit

$$\Delta holdings_t = c_0 + c_{\Delta acc} \Delta acc_interventions_t^{previousweek} + c_{EC} (holdings_{t-1} - c_{acc} acc_interventions_{t-1}^{previousweek}) + e_t \quad (1)$$

suggests that US government securities held in Chinese reserves, which were also increasing in this period, are not generally held in custody at the Federal Reserve.

⁸ If we include lagged changes in custody holdings or lagged intervention increases, these variables are insignificant.

The sample is 15 January 2003 to 16 March 2004. Given the weekly release of the custody data, we estimate at that frequency. Custody holdings and interventions are measured in billions of US dollars.

Table 2 reports the results in the first column. About a third of intervention between last Tuesday and this Monday ends up in this Wednesday's close of business custody holdings. Moreover, the results, if taken literally, suggest that all of the accumulated intervention eventually ended up in the custody holdings. That is, we find that the level of custody holdings and the accumulated reserves seem to increase one-for-one in the longer term. If we impose $C_{acc} = 1$, this restriction is not rejected in a Wald test (p-value of 0.412) and we obtain the estimates reported in the second column. Here, the estimated coefficient on this week's intervention of 0.334 and the estimated adjustment coefficient of -0.168 imply together that about 45% of Tuesday through Monday intervention will be invested by the Wednesday of the following week.

Table 2
Impact of MoF interventions on Federal Reserve custody holdings¹

	Unrestricted	Restricted
C_0	174.643*** (65.750)	148.584*** (54.888)
$C_{\Delta acc}$	0.351*** (0.116)	0.334*** (0.113)
C_{EC}	-0.198** (0.075)	-0.168** (0.063)
C_{acc}	0.967*** (0.041)	
Adjusted R ²	0.189	0.195

¹ OLS regressions of equation (1), using weekly data spanning 15 January 2003 to 16 March 2004. Stars */**/** indicate significance at the ten/five/one percent level.

Sources: Federal Reserve and MoF.

Taken together, the estimation suggests that the MoF invested about a third of the intervention proceeds almost immediately in US Treasuries and agency bonds that the Federal Reserve Bank of New York holds in custody for its official counterparts. Within weeks, most of the proceeds seem to have been invested in US bonds.

3.2 Price effects of the interventions

Having established the size and speed of the quantity effects, we now turn to prices. Like Bernanke et al (2004), we expect to find a direct effect of the Japanese interventions on US bond yields. If investors rebalanced their portfolios, or if market makers anticipated their doing so, we would also expect bond yields in other currencies, including the Japanese yen, to decline. However, this effect should only be found for economies whose bonds serve as close substitutes for US bonds.

We follow Bernanke et al (2004) and regress the daily change in the ten-year US government bond yield on the intervention amount of the MoF. To account for the time that passes between the striking of the foreign exchange deal and its actual settlement and possible investment, we consider the change in yield from the day before the deal until two days after.⁹ We thus fit

$$i_{t+2} - i_{t-1} = c + a * intervention_t + b * (vix_{t+2} - vix_{t-1}) + e_t \quad (2)$$

where we measure the foreign exchange interventions in trillion yen. These equations allow for changes in global risk aversion, as measured by the Chicago Board Options Exchange market volatility indicator VIX, to affect bond yields.¹⁰

To test for a global portfolio balance effect, we also consider potential substitute bonds from other advanced economies. As such, we use ten-year government bonds from France, Germany, Greece, Ireland, Italy, Portugal, Spain, the United Kingdom, Switzerland and Japan.

Moreover, we estimate all equations using as well ten-year interest rate swap rates, which are yields from generic private-sector derivative contracts that are close substitutes for government bonds. With them, we can assess whether the rebalancing of portfolios is limited to government bonds or instead exerts broader effects on private yields.

Finally, we consider the effect on emerging market government bond yields. We start out from the prior view that these vary in their integration with global bond markets and thus in the degree to which they serve as substitutes for US Treasuries. We therefore expect to find varied effects. To account for the fact that emerging market bond markets are not as developed as those in advanced economies, we concentrate on the most commonly traded segment. We use 10-year yields for Brazil, China, India, Malaysia, Mexico, Singapore, Chinese Taipei and Thailand, the 7-year yield for Indonesia, the 5-year yield for Hong Kong SAR and the 3-year yield for Korea and the Philippines.

Table 3 shows the estimation results. Concentrating first on the advanced economies bond yields in the top panel, we find the strongest response in the United States. We estimate that one trillion yen of intervention lowered the US bond yield by 8.9 basis points. This translates to an impact of roughly one basis point for a USD 1 billion intervention.¹¹

⁹ We also ran regressions using $i_{t+1} - i_{t-1}$. The impact of the intervention is significant in this setup, too.

¹⁰ The results are also robust to using only the change in the VIX between $t-1$ and t . Standard unit roots tests reject non-stationarity of the data.

¹¹ Bernanke et al report an effect of 0.73 basis points. If we focus on the impact of interventions on bond yields the next day, we find a smaller effect that is only border-line significant. Thus, the intervention in itself, as distinct from the subsequent investment of the proceeds, does not seem to be the whole story. Compare Gagnon et al (2010), who find a 38-82 basis-point effect from \$1.7 trillion of bond purchases under the LSAP programme.

Table 3
Impact of interventions on government bond yields and swap rates (in %)¹

Advanced economies: Ten-year bond yields											
	United States	France	Germany	Greece	Ireland	Italy	Portugal	Spain	United Kingdom	Switzerland	Japan
Intervention amount (trillion JPY)	-0.089*** (0.030)	-0.046** (0.023)	-0.046** (0.023)	-0.028 (0.020)	-0.045* (0.024)	-0.046* (0.024)	-0.049** (0.024)	-0.050*** (0.018)	-0.059** (0.024)	-0.053*** (0.018)	-0.044*** (0.013)
VIX	-0.008 (0.005)	-0.008* (0.004)	-0.009* (0.005)	-0.011** (0.004)	-0.008* (0.004)	-0.009* (0.004)	-0.007 (0.005)	-0.011*** (0.004)	-0.010** (0.005)	-0.009*** (0.003)	-0.003 (0.003)
Adjusted R ²	0.045	0.038	0.041	0.042	0.040	0.040	0.031	0.069	0.070	0.050	0.015

Advanced economies: Ten-year swap rates					
	USD	EUR	GPB	CHF	JPY
Intervention amount (trillion JPY)	-0.096*** (0.030)	-0.041** (0.018)	-0.045** (0.019)	-0.045*** (0.015)	-0.054*** (0.012)
VIX	-0.004 (0.005)	-0.008** (0.003)	-0.009*** (0.003)	-0.004 (0.003)	-0.003 (0.002)
Adjusted R ²	0.027	0.031	0.038	0.021	0.027

Emerging markets: Bond yields												
	Brazil	China	India	Malaysia	Mexico	Singapore	Chinese Taipei	Thailand	Indonesia	Hong Kong SAR	Korea	Philippines
Maturity	10 years	10 years	10 years	10 years	10 years	10 years	10 years	10 years	7 years	5 years	3 years	3 years
Intervention amount (trillion JPY)	-0.151 (0.132)	-0.143*** (0.027)	0.007 (0.020)	-0.031* (0.016)	-0.021 (0.049)	-0.084* (0.047)	-0.057** (0.024)	0.021 (0.043)	0.005 (0.041)	-0.137*** (0.037)	-0.051 (0.034)	-0.116** (0.057)
VIX	0.010 (0.041)	-0.007 (0.006)	0.009 (0.006)	0.001 (0.004)	0.012* (0.007)	-0.014** (0.006)	0.005 (0.008)	-0.001 (0.007)	-0.011 (0.012)	-0.005 (0.006)	0.000 (0.005)	0.019* (0.019)
Adjusted R ²	-0.072	0.074	0.012	0.005	0.011	0.048	0.004	-0.006	0.001	0.071	0.003	0.015

¹ OLS regressions of equation (2), sample 15 January 2003 to 16 March 2004. Constant included but not reported. Stars */**/** indicate significance at the ten/five/one percent level. White heteroskedasticity consistent standard errors in parentheses.

Sources: BIS and MoF.

But we also find reactions in the yields of bonds that may be considered close substitutes for US bonds. The second strongest impact is detected for UK government bonds, the yields on which decrease by an estimated 7.2 basis points. Government bond yields in the euro area countries respond similarly, with drops between 4.5 and 5.0 basis points. The notable exception is Greece, where we do not find a significant reaction. Thus, already in 2003/04, it appears that bond investors viewed Greek government bonds as different – presumably more risky. MoF interventions seem to have lowered yields in Switzerland as well, with a drop of 5.3 basis points per trillion yen, and in Japan itself, where the ten-year government bond yield is estimated to drop by about 4.4 basis points.¹²

The second panel in Table 2 reports results for interest rate swap rates. Here, we estimate response coefficients between 4.1 and 9.6 basis points. Again, the effect is largest in the US, where the MoF funds were largely invested. These estimates lie in the range obtained for government bond yields and thus suggest a wide portfolio balance effect that reaches private sector yields and thereby affects the cost of debt for firms and households.

For the Asian economies, priors regarding the integration of bond markets are largely borne out by the estimates shown in the third panel of Table 2. We take the information on bond market integration from McCauley and Jiang (2004), who estimate the pass-through of changes in the US Treasury yield to local bond yields in the period January 2001 through March 2004. They find that, Hong Kong SAR, with its currency peg to the dollar, showed greatest bond market integration, with Singapore and Chinese Taipei at moderate levels of integration. If we use a threshold of 0.3 pass-through of US Treasury yield changes to local bond yield changes, Korea, Malaysia and the Philippines also had somewhat integrated local bond markets, while China, India, Indonesia and Thailand did not. These priors sort the Asian emerging bond markets well in relation to the estimations results in Table 3 (Table 4). Exceptions are the Chinese and Korean bond markets.

Table 4
Effect of MoF intervention and Asian local bond market integration

Pass-through of US Treasury yield changes	Effect of MoF intervention		Total
	Significant	Not significant	
More than 0.3	HK, MY, PH, TW, SG	KR	6
Less than 0.3	CN	ID, IN, TH	3
Total	6	3	9

Note: Bond markets classified according to estimated effect of MoF intervention (columns) and estimated pass-through of 1% change in US Treasury yield in the period January 2001-March 2004. X^2 test of the independence of pass-through and significance of measured effect is 3.403, which is significant at the 0.065 level. Fisher's exact test for independence is significant only at the 0.191 level.

Sources: Table 3 and McCauley and Jiang (2004, p 54).

¹² Given that the cumulated intervention reached ¥35 trillion, this estimated impact suggests that the Japanese intervention lowered Japanese bond yields by some 1.5 percentage points, which would imply a negative 10-year bond yield. Of course, the yield stayed positive. One explanation for this is that the intervention effect wore off over time.

Turning to the size of the intervention effect on local bond yields, the significant drops in Asian government bond yields after MoF interventions turn out to be larger where shorter-term bonds are taken as benchmarks. In China, Malaysia, Singapore and Chinese Taipei, we use ten-year yields, and the estimated impact of a trillion yen intervention ranges between 3.1 basis points for Malaysian bonds to 14.3 basis points for Chinese bonds. Other than the somewhat anomalous size of the Chinese bond reaction, these estimates lie in the range identified for the advanced economies. For the shorter-term bonds used for Hong Kong SAR and the Philippines, the estimated response is even larger than for the US.¹³

Outside of Asia, we do not find significant responses for Brazil or Mexico. This is consistent with evidence that local currency bond markets in Latin America in this period were less integrated with the US Treasuries market than Asian local bond markets (Jeanneau and Tovar (2006, p 50)).

In sum, we find broad evidence for a global portfolio balance effect. Bond yields in countries equally advanced as the United States and in countries whose bond market was more integrated dropped after MoF interventions. If interventions take place at a time when monetary loosening is called for in these economies as well as in Japan, this effect should be welcome. In other instances, monetary policy might have to be tightened to undo the effect of the global portfolio rebalancing.

4. Conclusions

This paper shows that the Japanese foreign exchange interventions in 2003-04 seem to have increased MoF holdings of US Treasuries and lowered long-term interest rates in the US. We find that simultaneously, government bond yields and interest rate swap rates decreased in a range of industrial countries, including Japan, as well as in emerging market economies whose bond markets are well integrated into global bond markets. This points to a global portfolio balance effect that reflects the global integration of many bond markets.

These findings afford a new perspective on what has been called the currency wars. If the proceeds of large-scale currency interventions are invested in major bond markets, these incidental large-scale bond purchases can ease monetary conditions abroad in economies with internationally integrated bond markets. Given the state of the US economy in 2003, the US authorities might well have welcomed lower bond yields that were a side-effect of Japanese intervention then, even if they did not welcome the intervention itself. Chinese intervention and its investment in US bonds in 2005-2006 would have been less welcome since it may have contributed to the so-called conundrum of rising policy rates and broadly stable bond yields. In general, when cycles are not in synchronicity, as in early 2011 when emerging market economies were tightening monetary policy as leading economies sought to ease monetary conditions, large bond purchases, whether as unconventional monetary policy or as an incidental consequence of currency intervention, would be welcome in some places and problematic in others. Thus, the broad global monetary effect of currency

¹³ This may reflect the fact that MoF investment in Treasuries favoured Treasuries of 1-5 year maturities, as do reserve managers in general (McCauley and Rigaudy (2011, p 36)), so that the impact was larger at such medium-term maturities.

intervention, arising from the investment habitats of central bank reserve managers, amounts to a global policy externality that deserves to be systematically taken into account by policymakers (Caruana (2012)).

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