



## Estimates of Fundamental Equilibrium Exchange Rates, May 2014

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The latest estimates of fundamental equilibrium exchange rates (FEERs) in this semiannual series<sup>1</sup> find the currencies of the United States, the euro area, China, and Japan are approximately at their FEER levels, which means they are not in need of adjustment to reduce excessive external imbalances. The medium-term current account is at the lower bound of the desired range for the United States and at the upper bound for the euro area and China, however. Concern in early 2014 that the tapering of the bond purchasing program known as

1. This semiannual series of estimates of FEERs began in Cline and Williamson (2008) and was coauthored with John Williamson until his retirement at the end of 2012. The FEERs calculations examine the extent to which exchange rates need to change in order to curb any prospectively excessive current account imbalances back to limits of  $\pm 3$  percent of GDP, consistent with sustainability for deficit countries and global adding-up for surplus countries. The estimates apply the Symmetric Matrix Inversion Method (SMIM) model (Cline 2008). For a summary of the methodology, see Cline and Williamson (2012a, appendix A), available at <http://www.piie.com/publications/pb/pb12-14.pdf>.

quantitative easing (QE) by the US Federal Reserve could cause a second round of emerging-market currency turmoil proved unjustified, and by April such currencies as the Brazilian real had actually strengthened above levels following the 2013 shock from the announcement of prospective tapering.

Perhaps surprisingly, this Policy Brief finds that currency markets have been indifferent to political uncertainty from the Ukraine-Russia standoff (except for a sizable decline in the ruble). Currencies remain overvalued for New Zealand, Turkey, South Africa, and Brazil and undervalued for Singapore, Taiwan, Sweden, and Switzerland. For Japan, even though a large improvement in the current account remains in

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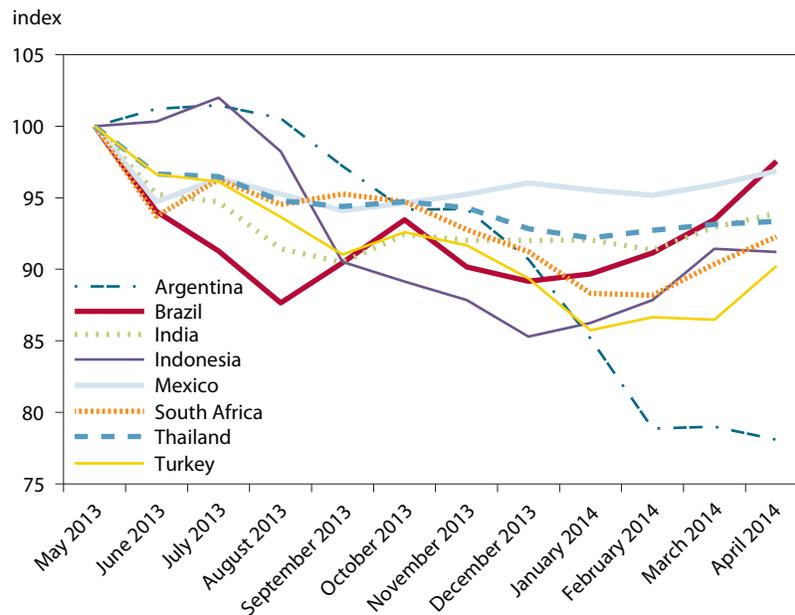
the pipeline from the lagged influence of the sharp depreciation of the yen in late 2012 and early 2013, higher fuel import costs (from the closure of nuclear power plants following the Fukushima disaster) and export weakness (reflecting tensions with China and production-shifting abroad) mean the surplus is unlikely to rise above 3 percent of GDP, so the new FEER estimate for the yen is significantly lower than before.

### CHANGES IN REAL EXCHANGE RATES AND QE TAPERING

Figure 1 shows the path of real effective exchange rates for eight major emerging-market economies from May 2013 through April 2014.<sup>2</sup> As discussed in Cline (2013b), several emerging-market currencies depreciated in the second half of 2013 in response to the US Federal Reserve's May 2013 announcement that it would begin to taper purchases of assets in its program of quantitative easing. Broadly that process was salutary for several

2. Using the SMIM real exchange rate series, which deflates by consumer prices and applies trade weights for the 34 SMIM economies.

**Figure 1 Real effective exchange rates for selected emerging market economies (May 2013 = 100)**



Sources: Thomson Reuters Datastream; International Monetary Fund (2014b); and author's calculations.

economies with overvalued exchange rates, especially South Africa and Turkey but also Brazil and India.

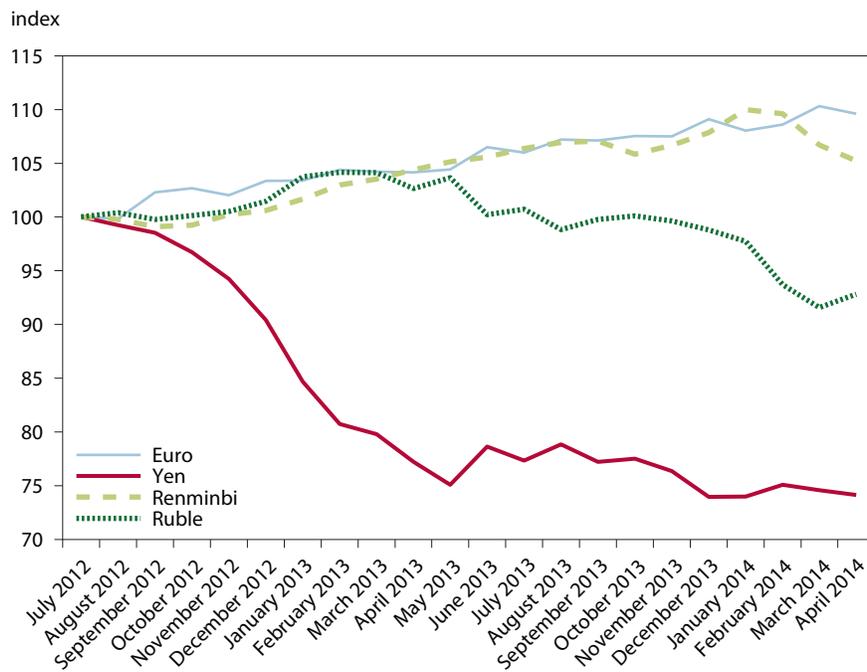
In January 2014 the Fed began to cut back purchases from the previous monthly rate of \$85 billion (split about evenly between long-term US Treasury bonds and mortgage-backed securities) to \$75 billion in January, \$65 billion in February and March, and \$55 billion in April (Federal Reserve 2014). In January a brief second round of “taper turmoil” seemed to appear as a consequence. The Argentine peso fell by 15 percent in two days, and the Turkish lira and South African rand declined significantly as well. By April, however, it was evident that there was no generalized second round of pressure on emerging-market currencies, and indeed the Brazilian real had recovered most of its previous year’s loss. Similarly, as shown in figure 1, by April the real effective exchange rates (REERs) of Turkey and South Africa had rebounded to their December levels. Argentina was the clear exception, as its real effective rate continued to fall. The Argentine case reflected increased government concern about falling reserves and an effort to close the gap between the official rate and the parallel rate.<sup>3</sup>

3. Argentine reserves fell from \$34 billion in August 2013 to \$28 billion by December and \$25 billion by January (IMF 2014b). Capital controls have caused a difference between the official and parallel exchange rates that reached as high as 70 percent before the recent decline in the peso and by mid-May remained as high as 37 percent. “Argentina’s peso: First decline, now fall,” *Economist*, January 23, 2014; and “US dollar ends steady at 8.07 pesos; ‘blue’ higher at 11.05,” *Buenos Aires Herald*, May 5, 2014.

## TRENDS IN THE EURO, YEN, RENMINBI, AND RUBLE

Figure 2 shows the REERs for four other important currencies: the euro, the Japanese yen, the Chinese renminbi, and the Russian ruble. The starting date of July 2012 provides sufficient time to reflect the stabilization of the outlook for the euro area debt crisis, the sharp decline of the yen under Abenomics, and the more recent decline of the renminbi and especially the Russian ruble.

For the *euro*, a relatively steady appreciation from July 2012 to April 2014 has cumulated to about 10 percent. During this period sovereign debt conditions for the euro area periphery economies have steadily improved, with sovereign risk spreads for 10-year bonds showing a persistent decline from around 500 basis points in mid-2012 for Ireland, Italy, and Spain, and 1,000 basis points for Portugal, to a range of 150 to 200 basis points by the first quarter of 2014 for the first three, and about 300 basis points for Portugal. With the specter of at least a Greek exit from the euro having largely disappeared, it is not surprising that the single currency would have recovered. The REER for the euro had depreciated by 13.7 percent from its 2007–09 average to its level in July 2012, the key turning point in the euro area debt crisis marked by the European Central Bank’s (ECB) announcement of its program of Outright Market Transactions (OMT) for purchasing debt of stressed sovereigns subject to adjustment programs.

**Figure 2 Trends in REERs: euro, yen, renminbi, and ruble (July 2012 = 100)**

REER = real effective exchange rate

Sources: Thomson Reuters Datastream; International Monetary Fund (2014b); and author's calculations.

The *yen* has remained at a sharply lower plateau since May of 2013, after having declined by about 25 percent in the fourth quarter of 2012 through the second quarter of 2013. The special case of Japan is examined below (and in appendix A).

For *China*, a significant change in policy seems to have occurred in February 2014, when the exchange rate began to depreciate, and in March, when the central bank widened the band for daily fluctuation of the yuan from  $\pm 1$  percent around the midpoint rate set each day to  $\pm 2$  percent.<sup>4</sup> For several years the yuan has consistently appreciated against the dollar (except in Great Recession year 2009 when it remained flat).<sup>5</sup> But in mid-February the currency began to reverse course, and by end-April the yuan had fallen by 3.28 percent against the dollar from the end-2013 level.

China's new approach apparently represents a desire to increase volatility and thereby reduce the incentive for capital inflows associated with an uninterrupted "one-way bet." Capital inflows have been large. Thus, during 2013 China's external reserves rose by about \$500 billion (from \$3.33 tril-

lion to \$3.84 trillion), even though its current account surplus was only \$190 billion (International Monetary Fund [IMF] 2014b). The difference reflects net capital inflows. Capital inflows continued in the first quarter of 2014, as reserves rose further by well over \$100 billion to reach \$3.95 trillion, an increase far too large to be explained by the current account.<sup>6</sup>

The shift toward depreciation rather than appreciation of the yuan prompted a critique by the US Treasury.<sup>7</sup> It seems likely that this pattern will prove transitory and might have the desired consequence of reducing speculative capital inflows. Nonetheless, if the yuan continues to decline even as China continues to increase reserves by large amounts, the United States and other G-20 partners could increasingly criticize China's exchange rate intervention as a beggar-thy-neighbor policy. The perception in international policy circles would be of a Chinese shift from sins of omission in failing to allow the currency to appreciate as fast as the market would other-

4. Pete Sweeney and Lu Jianxin, "China doubles yuan trading band, seen as sign of confidence," *Reuters*, March 15, 2014.

5. The yuan rose 7.1 percent against the dollar in 2008 (end-December to end-December), 0 percent in 2009, 3.6 percent in 2010, 4.7 percent in 2011, 1 percent in 2012, and 2.9 percent in 2013 (Thomson Reuters Datastream).

6. Josh Noble, "China's foreign exchange reserves near record \$4 tn," *Financial Times*, April 15, 2014. The IMF (2014a) projects China's current account at \$224 billion for 2014, so the quarterly rate would be only about half of the buildup of reserves in the first quarter.

7. Kasia Klimasinska, "U.S. Treasury Warns Against China Reviving Yuan Controls," *Bloomberg*, April 7, 2014.

wise push it to sins of commission in actively depressing the exchange rate below previous levels.

The Russian *ruble*, for its part, has shown stress associated with the Ukraine conflict. The currency fell by 9 percent against the dollar from December 2013 to March before recovering slightly in April. Capital outflows in the first quarter of 2014 amounted to about \$50 billion, or about 10 percent of foreign exchange reserves.<sup>8</sup> By the second week

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of May, however, after Mr. Putin withdrew his objection to Ukrainian elections scheduled for May 25 (and stated that he was removing Russian troops from the border), the currency was about 2 percent higher than the April level. If a full-scale invasion were to occur despite the marked reduction of tension by late May, and resulted in major US and European sanctions, the consequences could be severely disruptive for the Russian and likely also the European economies.<sup>9</sup>

**IMF CURRENT ACCOUNT PROJECTIONS AND ADJUSTMENTS**

Table 1 reports the IMF's most recent projections of current account balances for the 34 economies covered in the SMIM model (IMF 2014a). The medium-term projections for 2019 are adjusted to take account of changes in exchange rates from the base period in the IMF World Economic Outlook (WEO), February 2014, to the base period used in this study, April. In a few cases there were substantial exchange rate changes. Thus, the Brazilian real rose by 7.1 percent, in real effective terms, from February to April. The table then shows the target current

8. Andrew E. Kramer and David Jolly, "Russia Raises Rate to Bolster Economy After S.&P. Cuts Its Debt Rating," *New York Times*, April 25, 2014.

9. The defense, high technology, engineering, and energy sectors could be affected (Anne Gearan, "U.S., Europe ready to impose sanctions on Russian economy," *Washington Post*, May 9, 2014). A European Commission study reportedly estimated that growth of the German economy could be cut 0.9 percent in 2014 and another 0.3 percent in 2015 if tough sanctions were applied, in view of Germany's reliance on Russia for 46 percent of its gas and 37 percent of its oil ("Russia sanctions could hammer German growth—report," *Reuters*, May 9, 2014).

account balance for 2019, which is either the adjusted projection or, if the projection shows an imbalance that exceeds the FEERs benchmark of 3 percent of GDP, a target of  $\pm 3$  percent of GDP.<sup>10</sup>

In past issues of this series, the changes in REERs from the WEO base to the base used in the FEERs issue in question were applied to the SMIM model's impact parameters ( $\gamma$ ) to obtain the corresponding changes that would be expected in the current account balances. However, as discussed in previous issues in this series, the Fund's projections of current accounts show less responsiveness to changes in the REER than would be expected if the full impact parameter were applied. Appendix B reviews past WEO estimates regarding the change in the projected current account, from one WEO issue to the next, in relationship to the corresponding change in the REER. On this basis, in this issue the WEO current account projection is adjusted to only one-half of the amount that would be directly calculated by applying the SMIM impact parameter to the change in the REER from the WEO base month to the FEERs issue base month. The rationale is that since preparing a comprehensive alternative set of current account projections is not feasible, for almost all countries there is little alternative to using the IMF projections as the baseline. The relevant question then becomes: What would the IMF most likely have predicted in its baseline if it had applied real exchange rates in the same base period as in the FEERs series (typically about two months later)? The answer, based on the discussion in appendix B, is a change that amounts to only about one-half of what the SMIM impact parameters would predict. Since the purpose is to replicate as closely as possible what the IMF would have predicted, this approach seems more appropriate than the previous adjustment procedure, which applied the full impact parameter to the observed change in the base for the real exchange rate.

As an example, table 1 shows that for Brazil the 2019 current account projected by the IMF is a deficit of 3.53 percent of GDP. With a 7 percent real appreciation from the February base used in the WEO to the April base used here, and in view of the impact parameter for Brazil ( $-0.12$ ; Cline 2013b, p.15), a full adjustment would boost the projected deficit to 4.37 percent of GDP ( $=3.53 + 7 \times 0.12$ ). Allowing only half of this impact reduces the adjusted current account deficit to 3.95 percent of GDP.

Once again, the adjustment in the current account projection includes a statistical adjustment in the case of Switzerland, amounting to a reduction of 4.1 percent of GDP because the

10. For oil-exporting economies, however, there is no target change in the current account, even if (as in Norway and Saudi Arabia) the surplus is substantially in excess of the normal 3 percent benchmark. The reason is that oil exports convert natural resource wealth into financial wealth, and if the disinvestment represented by oil depletion were taken into account, the excess of saving over investment (the current account) would be much smaller than in the normal statistical accounts.

**Table 1 Target current accounts (CA) for 2019**

<b>Country</b>	<b>IMF Projection of 2014 CA (percent of GDP)</b>	<b>IMF 2019 GDP forecast (billions of US dollars)</b>	<b>IMF 2019 CA forecast (percent of GDP)</b>	<b>Adjusted 2019 CA (percent of GDP)</b>	<b>Target CA (percent of GDP)</b>
<b>Pacific</b>					
Australia	-2.6	1,737	-3.3	-3.3	-3.0
New Zealand	-4.9	241	-6.3	-6.8	-3.0
<b>Asia</b>					
China	2.2	14,839	3.0	3.5	3.0
Hong Kong	3.3	414	5.0	4.8	3.0
India	-2.4	3,096	-2.6	-2.9	-2.9
Indonesia	-3.0	1,252	-2.6	-3.0	-3.0
Japan	1.2	5,718	1.5	1.6 <sup>a</sup>	1.6
Korea	4.4	1,874	3.0	2.5	2.5
Malaysia	4.1	538	3.7	3.4	3.0
Philippines	3.2	522	0.5	0.5	0.5
Singapore	17.7	378	15.0	15.0	3.0
Taiwan	11.7	696	9.6	9.6	3.0
Thailand	0.2	492	0.5	0.4	0.4
<b>Middle East/Africa</b>					
Israel	1.4	399	1.8	1.7	1.7
Saudi Arabia	15.8	932	9.9	10.1	10.1
South Africa	-5.4	467	-4.5	-5.1	-3.0
<b>Europe</b>					
Czech Republic	-0.5	227	-0.9	-0.7	-0.7
Euro area	2.9	16,767	3.0	2.9	2.9
Hungary	2.7	169	-1.5	-1.6	-1.6
Norway	10.2	608	7.8	7.6	7.6
Poland	-2.5	733	-3.4	-3.3	-3.0
Russia	2.1	2,498	1.0	1.1	1.1
Sweden	6.1	788	5.8	6.3	3.0
Switzerland	9.9	816	9.8	5.8 <sup>a</sup>	3.0
Turkey	-6.3	1,052	-5.4	-5.9	-3.0
United Kingdom	-2.7	3,757	-0.6	-0.5	-0.5
<b>Western Hemisphere</b>					
Argentina	-0.5	379	-0.5	-0.4	-0.4
Brazil	-3.6	2,932	-3.5	-4.0	-3.0
Canada	-2.6	2,124	-2.2	-2.2	-2.2
Chile	-3.3	373	-2.5	-2.4	-2.4
Colombia	-3.3	526	-2.8	-3.3	-3.0
Mexico	-1.9	1,678	-1.6	-1.9	-1.9
United States	-2.2	22,090	-2.8	-2.7	-2.7
Venezuela	2.4	374	-2.8	-1.3	-1.3

IMF = International Monetary Fund

a. See discussion in text.

Sources: IMF (2014a); author's calculations.

current account surplus is overstated in the official statistics (see Cline and Williamson 2012a, p. 4).

*Moves toward Previously Adjusted Estimates*—In the previous issue of FEERs estimates (Cline 2013b, appendix A), I made special adjustments to the IMF's projections of current accounts for seven economies: Australia, Brazil, Chile, India, Japan, South Africa, and Turkey. In all cases, the October 2013 WEO had shown seemingly insufficient increase in the projected long-term current account balances to be consistent with the large exchange rate depreciations that had taken place since the previous April 2013 WEO. In the most recent (April 2014) WEO, the Fund has moved the long-term current account balance projections substantially in the "right" direction for almost all of these economies except Japan (discussed below). For this round of FEERs estimates, then, I do not make special adjustments to the WEO forecasts (except to consider the change in the exchange rate from the base period used by the WEO and that used here, just discussed.)<sup>11</sup>

*Japan Paradox*—Japan is the key exception. The paradox is that the new WEO reduces the projected current account surplus even further, despite the sharp real depreciation of the yen.<sup>12</sup> Even though the yen has depreciated in real effective terms by 24.8 percent from its January–July 2012 average to April 2014, Japan's prospective long-term current account surplus in the WEO projections has fallen rather than risen. Thus, whereas the April 2012 WEO had projected Japan's 2017 surplus at 2.0 percent of GDP, the most recent WEO projects the surplus for 2017 at only 1.4 percent of GDP (IMF 2012a, 2014b). Yet given the current account impact parameter in the SMIM model (−0.15; Cline 2013b, p. 15), a real depreciation of 24 percent could have been expected to boost the medium-term surplus by 3.6 percent of GDP. Nor can a change in growth prospects and hence demand for imports explain the paradox. Despite the advent of Abenomics in late 2012, the Fund's average projected growth for 2012–16 has remained unchanged at 1.19 percent in both the April 2012 WEO and the April 2014 WEO. Moreover, the IMF's current account pessimism for Japan is milder than that of some other official and private forecasters. Thus, the OECD (2014) places the 2015 surplus at

only 0.7 percent of GDP, versus 1.18 percent in the April 2014 WEO. Private sector forecasts include 0.65 percent for Blue Chip (2014), about the same as the Organization for Economic Cooperation and Development (OECD), and 1.04 percent for Consensus (2014), about the same as the WEO. The influential

**[L]agged effects of yen depreciation still in the pipeline should be expected to boost the current account by 1.4 percent of GDP ... The estimate of the FEER for the yen has [nonetheless] substantially declined in this set of estimates...**

Japan Center for Economic Research places the surplus even lower at 0.4 percent of GDP in 2015 and ±0.4 percent by 2019, depending on whether the consumption tax continues to be increased (JCER 2014).

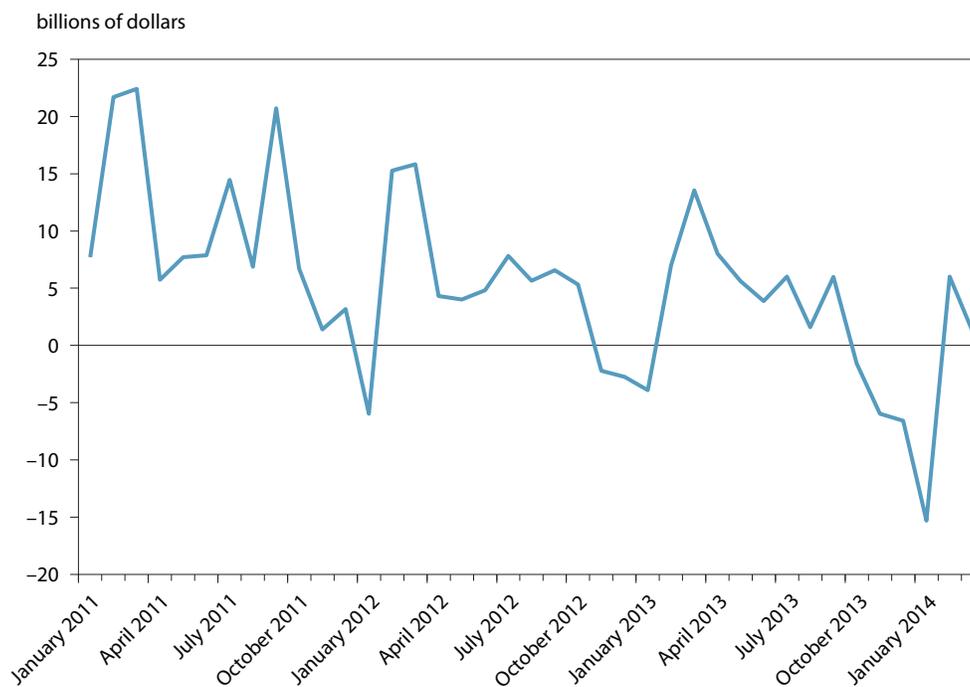
As shown in figure 3, Japan's monthly current account balance has continued downward over the past three years. There are two central questions in explaining the Japan paradox. The first concerns the likely lag from the exchange rate change to the trade impact; the second concerns structural changes. Appendix A shows that the exchange rate lag is centered at six quarters prior to the present. As a consequence the trade outcome in 2013 was responding to the still strong yen of the second half of 2011 and first half of 2012. The analysis in the appendix concludes that, other things being equal, the lagged effects of yen depreciation still in the pipeline should be expected to boost the current account by 1.4 percent of GDP. Added to the actual outcome for 2013, 0.7 percent of GDP, the implication is that the medium-term current account associated with the April 2014 level of the yen would be a surplus of 2.1 percent of GDP, higher than the Fund's projection of 1.5 percent but still well within the FEERs ceiling of 3 percent allowed for imbalances.<sup>13</sup>

The second question is whether structural shifts are occurring for Japan that make its medium-term current account surplus likely to be considerably smaller than might have been expected given the sharp decline of the yen. One reason for the falling surplus is the influence of higher fuel imports after the idling of nuclear power plants in the wake of the 2011 Fukushima disaster. Imports of mineral fuels rose from \$199 billion in 2010 to \$275 billion in 2011, \$302 billion in 2012,

11. For five of the economies, the October 2013 WEO current account balance projected for 2018, my corresponding November 2013 adjusted estimate, and the April 2014 WEO projection for 2018 were as follows, respectively (percent of GDP). Australia: −4.0, −2.7, −3.1; Chile: −3.0, −2.4, −2.5; India: −2.8, −2.4, −2.6; South Africa: −5.7, −4.8, −4.6; Turkey: −8.3, −7.2, −5.6. For Brazil all three concepts were approximately the same (about −3.5 percent of GDP).

12. The October 2013 WEO, November 2013 FEERs, and April 2014 WEO estimates for Japan's 2018 current account surplus were, respectively: 1.7 percent of GDP; 3.8 percent (reflecting my estimate of the influence of the weaker yen), and 1.4 percent (even lower than the Fund's previous estimate).

13. After adjusting for the change in the exchange rate from February to April 2014, the comparison would be against a WEO estimate of 1.6 percent of GDP (table 1).

**Figure 3 Japan: Monthly current account balance, 2011–14**

Source: Ministry of Finance of Japan (2014b).

and \$282 billion in 2013 (World Bank 2014). The increment of fuel imports in 2013 above the 2010 base amounted to 1.69 percent of GDP. However, the higher fuel import costs are already taken into account in the discussion above (which considers the actual 2013 outcome as a base before adding lagged exchange rate effects).

Japan's trade has also experienced surprising weakness on the export side. Total merchandise exports fell from \$823 billion in 2011 to \$799 billion in 2012 and \$701 billion in 2013 (IMF 2014c). The decline in export values from 2011 to 2013 amounted to 2.5 percent of 2013 GDP. Import values also fell but by considerably less (from \$855 billion in 2011 to \$815 billion in 2013). Exports to China fell sharply, declining by 24 percent from 2011 to 2013, or twice the percentage decline for exports to all other markets. The disproportionate reduction in exports to China likely reflects the escalating tensions over the disputed Diaoyu/Senkaku islands.<sup>14</sup> Overall, the dollar value of Japan's exports fell by 14.8 percent from 2011 to 2013, but it would have risen by 5.1 percent if Japan had simply kept its 2011 share in trading partners' total imports.<sup>15</sup> Nor does the lagged exchange rate explain much of the decline in exports.<sup>16</sup>

14. Allison Jackson, "Island Dispute Disrupts Sino-Japanese Trade," the *Financialist*, January 30, 2013.

15. Based on IMF (2014b, c) for 20 economies (with the euro area as one economy), accounting for 85 percent of Japan's exports in 2011.

16. The lagged real exchange rate relevant for trade in 2011 (i.e., primarily

The shortfall of some 15 to 20 percent in Japan's exports in 2013 from what might have been expected even after considering exchange rate lags constitutes an important puzzle. Some accounts suggest that this trend reflects an increasing tendency of Japanese firms to shift production offshore. A Cabinet Office of Japan (2014, p. 41) survey finds that manufacturing firms have increased the share of their total production carried out abroad from 17.2 percent in 2011 to 21.6 percent in 2013.

Overall, these considerations suggest that the Fund's medium-term surplus of 1.5 percent of GDP for Japan may be understated, given the large response to the lagged exchange rate still in the pipeline. Nonetheless, the estimate in appendix A adjusting for this lag (2.1 percent of GDP) is only moderately higher than the adjusted WEO estimate (1.6 percent after taking account of the change in the yen from February to April; see table 1), and persistence of adverse structural trends could push the outcome further toward the WEO estimate. In any event, even the estimate in appendix A is comfortably within the  $\pm 3$  percent band allowed in the FEERs method, so no change in the exchange rate would be called for even if this adjustment were made.

the second half of 2009 and first half of 2010) was 5.6 percent lower than the lagged rate relevant for 2013 (second half of 2011 and first half of 2012). Even with a high price elasticity of unity, after considering global inflation, the consequence should have been to reduce export earnings by less than 5 percent, in contrast to an actual drop of about 15 percent.

## FEER ESTIMATES

Table 2 reports the results of applying the SMIM model to arrive at FEERs for the 34 economies. The first column reports the target change in the current account as a percent of GDP. The third column reports the corresponding target change in the REER (equal to the first column divided by the economy's impact parameter  $\gamma$ ). Because the SMIM can only arrive at a close approximation rather than the full set of exact targets (because the number of equations for country current accounts exceeds the number of currencies excluding the dollar), the simulation results are slightly different and are shown in the second column for the current account change and in the fourth column for the REER change. Because the aggregate magnitude of desired reductions in current account surpluses somewhat exceeds the corresponding aggregate magnitude for desired reductions in current account deficits, the simulation results impose a slight depreciation even on economies in which there is a zero target change in the current account (such as the United States and the euro area), and yield a slightly smaller currency appreciation than would otherwise be called for in currencies with needed appreciations.

The final three columns in table 2 report information for bilateral exchange rates against the dollar: the actual level of the currency in April 2014, the percent change in the bilateral rate needed to reach the FEER in the model simulation, and the implied FEER-consistent bilateral rate. Because of movements of other currencies, the bilateral move against the dollar can differ from the movement of the REER. Thus, for China, the simulation indicates an appreciation of 1.1 percent for the REER. This is accomplished, however, in a fashion that boosts the currency slightly more against the US dollar (by 2.8 percent).

The results indicate large overvaluations of currencies in New Zealand (by about 15 percent) and Turkey (by about 13 percent). Brazil has also become significantly overvalued once again, and South Africa has remained overvalued, both by about 9 percent. Conversely, there are large undervaluations for the currencies of Singapore (23 percent) and Taiwan (14 percent). Sweden and Switzerland also have sizable undervaluations (8 percent and about 6 percent, respectively).

The cases with relatively large exchange rate misalignments are a familiar set. Table 3 shows the corresponding misalignment estimates in the three previous issues of this series, for the economies with the largest overvaluations (first panel) or undervaluations (second panel), as well as five other major economies (third panel). New Zealand once again has a large overvaluation, reflecting a large current account deficit. Turkey's overvaluation has narrowed substantially from the levels in late 2012 and early 2013 but remains relatively high. Brazil's over-

valuation has increased somewhat, reflecting the recent rise in the exchange rate shown in figure 1. South Africa's overvaluation has remained at about its previous average levels.

Among the economies with undervalued exchange rates, Singapore remains the most extreme case, reflecting its high current account surplus (projected at 15 percent of GDP in 2019). Taiwan's substantial undervaluation also persists. Sweden's undervaluation at 8 percent is smaller than in October 2012 and April 2013 but larger than the October 2013 misalignment. Switzerland's undervaluation at about 6 percent continues the approximate average of the previous three estimates.

The final panel in the table shows that there has been a sharp reduction in the undervaluation of the Australian dollar, from about 12 percent in October 2012–April 2013 to only about 2 percent in October 2013–April 2014.<sup>17</sup> The US overvaluation has remained relatively small in all four estimates, and the size of China's undervaluation is down from about 3 percent to only about 1 percent. The driving force in the estimate for China is the smaller long-term current account surplus. In the first issue of this series of reports in mid-2008, the Chinese yuan was found to be 18.4 percent undervalued in real effective terms, reflecting a baseline projection of a current account surplus of 10 percent of GDP (Cline and Williamson 2008a, pp. 13, 15). In contrast, the IMF's medium-term projection now places China's current account surplus at 2.2 percent of GDP in 2014, rising gradually to 2.99 percent by 2019. (The adjusted projection of 3.5 percent estimated in table 1 takes account of the depreciation of the yuan from the IMF's February 2014 base to the April base of this study.) For its part, the euro has been found to be at an equilibrium level in this set of estimates as well as the previous three, so that the small overvaluations shown in table 3 reflect strictly the global adding-up properties of the SMIM model (similar to the small depreciation estimated in this issue for the United States).

Of the major economies, Japan shows the largest change in recent FEERs estimates, from an undervaluation of 9 percent in April 2013 to a 1 percent overvaluation in the present issue (again reflecting only global adding-up, given a target of zero current account change). The change reflects the sharp downscaling in my assessment of needed adjustments to the IMF baseline projections, in light of the increasing evidence

17. The change for Australia reflects a sharp reduction in the WEO projection of the medium-term current account deficit, from 5.6 percent of GDP in April 2013 to 4 percent in October 2013 and 3.3 percent in April 2014 (IMF 2013a, c; 2014a). The decline largely reflects the 6.6 percent depreciation in Australia's REER from February–March 2013 to February 2014 (and a modest downscaling of projected domestic growth).

**Table 2 Results of the simulation: FEERs estimates**

Country	Changes in current account as percentage of GDP		Change in REER (percent)		Dollar Exchange Rate		FEER- consistent dollar rate
	Target change	Change in simulation	Target change	Change in simulation	Actual April 2014	Percentage change	
Pacific							
Australia*	0.3	0.4	-1.3	-2.4	0.91	-0.1	0.91
New Zealand*	3.8	4.0	-14.6	-15.4	0.85	-13.6	0.74
Asia							
China	-0.5	-0.3	2.0	1.1	6.17	2.8	6.00
Hong Kong	-1.8	-1.5	3.5	3.0	7.76	6.5	7.29
India	0.0	0.2	0.0	-0.8	60.9	0.8	60.5
Indonesia	0.0	0.2	0.0	-1.0	11,417	3.4	11,038
Japan	0.0	0.1	0.0	-0.9	102	1.4	101
Korea	0.0	0.3	0.0	-0.8	1,071	1.3	1,057
Malaysia	-0.4	0.0	0.9	-0.1	3.28	4.8	3.13
Philippines	0.0	0.2	0.0	-0.9	44.8	3.4	43.3
Singapore	-12.0	-11.5	24.1	23.1	1.27	25.5	1.01
Taiwan	-6.6	-6.3	14.8	14.1	30.4	17.0	26.0
Thailand	0.0	0.4	0.0	-0.9	32.4	1.8	31.8
Middle East/Africa							
Israel	0.0	0.2	0.0	-0.6	3.48	0.0	3.48
Saudi Arabia	0.0	0.3	0.0	-0.7	3.75	1.3	3.70
South Africa	2.1	2.2	-8.2	-8.8	10.75	-7.8	11.66
Europe							
Czech Republic	0.0	0.3	0.0	-0.5	19.8	-0.6	19.9
Euro area*	0.0	0.3	0.0	-1.3	1.38	-0.6	1.37
Hungary	0.0	0.3	0.0	-0.5	225	-0.6	227
Norway	0.0	0.2	0.0	-0.6	6.00	0.0	5.99
Poland	0.3	0.5	-0.8	-1.4	3.04	-1.6	3.09
Russia	0.0	0.1	0.0	-0.6	36.1	-0.5	36.3
Sweden	-3.3	-3.0	8.7	8.0	6.41	7.8	5.95
Switzerland	-2.8	-2.6	6.2	5.8	0.88	5.9	0.83
Turkey	2.9	3.1	-12.3	-12.9	2.21	-12.6	2.53
United Kingdom*	0.0	0.2	0.0	-0.7	1.66	-0.4	1.65
Western Hemisphere							
Argentina	0.0	0.2	0.0	-1.0	7.93	-2.9	8.17
Brazil	1.0	1.1	-7.9	-9.0	2.33	-8.3	2.54
Canada	0.0	0.1	0.0	-0.4	1.11	0.0	1.11
Chile	0.0	0.2	0.0	-0.8	563	-0.6	567
Colombia	0.3	0.4	-1.6	-2.3	2,017	-2.2	2,063
Mexico	0.0	0.1	0.0	-0.4	13.2	0.1	13.2
United States	0.0	0.2	0.0	-1.1	1.00	0.0	1.00
Venezuela	0.0	0.1	0.0	-0.5	6.29	0.0	6.29

FEER = fundamental equilibrium exchange rate; REER = real effective exchange rate

\*The currencies of these countries are expressed as dollars per currency. All other currencies are expressed as currency per dollar.

Source: Author's calculations.

**Table 3 Successive estimates of changes in REER needed to reach FEERs: October 2012–April 2014 (percent)**

	October 2012	April 2013	October 2013	April 2014
Substantially overvalued in 2014				
New Zealand	-15.2	-18.2	-17.7	-15.4
Turkey	-23.2	-29.9	-18.5	-12.9
Brazil	-2.3	-4.3	-4.6	-9.0
South Africa	-5.9	-13.0	-8.2	-8.8
Substantially undervalued in 2014				
Singapore	24.5	21.4	21.4	23.1
Taiwan	9.4	13.2	9.0	14.1
Sweden	14.4	12.1	4.7	8.0
Switzerland	4.8	9.0	3.9	5.8
Other major economies				
Australia	-10.6	-13.1	-1.6	-2.4
China	3.1	2.2	3.6	1.1
Euro area	-0.9	-0.8	-2.0	-1.3
Japan	-1.1	9.4	3.7	-0.9
United States	-2.2	-3.1	-1.7	-1.1

Sources: Table 2; Cline (2013a, b); Cline and Williamson (2012).

of a persistent decline in Japan's current account surplus for a given level of the REER.<sup>18</sup>

Figure 4 shows the results of the FEERs estimates using April 2014 as the base and ordering the economies from most undervalued to most overvalued. The figure shows both the percent change in the REER needed to reach the FEER and the corresponding bilateral change against the dollar to reach the FEER-consistent bilateral rate.

## COMPARISON TO OTHER ESTIMATES

*IMF*—For the past two years, the IMF has provided an alternative set of estimates of REER adjustments needed to reach fundamental equilibrium, or what the Fund calls “Current Accounts Consistent with Fundamentals and Desirable Policies” (IMF 2012b, 2013b). Those estimates constitute part of the IMF's External Balance Assessment (EBA). Following the introduction of the EBA, Cline and Williamson (2012b) examined the Fund's new approach and welcomed the new initiative

but were skeptical of some key features of its implementation. The EBA's cross-country statistical underpinning appears to give undue weight to average past actual current account performances of countries, as opposed to policy ideals; excessive weight to existing net foreign asset positions (such that a high net international investment position [NIIP] becomes grounds for justifying a high current account surplus to maintain the already high ratio of the NIIP to GDP); and especially, an excessive shift factor for financial centers.<sup>19</sup>

Table 4 reports the IMF's most recent estimates of current account “norms” for major economies.<sup>20</sup> The norms for Singapore and Switzerland are remarkably high at surpluses of 15 and 13 percent of GDP, respectively, reflecting the financial center shift factor. Sweden's norm at 5 percent of GDP is also high. Otherwise the norms lie within the  $\pm 3$  percent of GDP band allowed in the methodology of the present study.<sup>21</sup> Nevertheless, the presence of point-estimates of desired norms

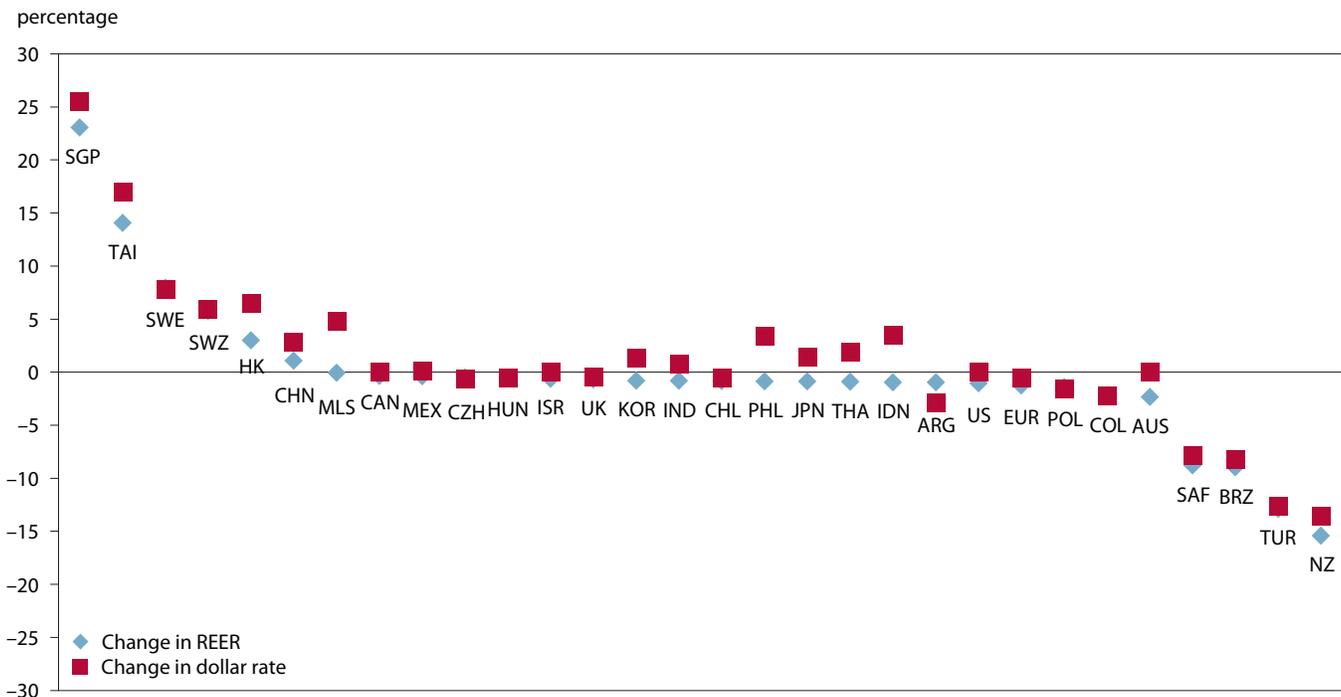
18. In my spring 2013 estimates, I had placed Japan's 2018 current account at 4.6 percent of GDP, rejecting the IMF's estimate of 1.7 percent in light of the deep depreciation of the yen. My fall 2013 estimates reduced the baseline current account to 3.8 percent, again rejecting the fall WEO estimate of 1.7 percent. In appendix A, the corresponding adjusted estimate in light of lagged exchange rate effects is a medium-term surplus of 2.1 percent of GDP (versus the IMF's corresponding 1.6 percent), a surplus comfortably within the 3 percent level that would trigger needed correction.

19. The statistical approach also considered such other factors as demographic structure, level of development, and strength of the domestic safety net (as an indication of the need for domestic private saving).

20. These data are extracted from IMF (2013b, p. 24). The estimate for Singapore is inferred from figure 22 of that report and Singapore's actual current account outcome in 2012.

21. Except for a  $-3.8$  percent norm for India. The 3.8 percent for Russia is for an oil country, and like the present study, the EBA approach simply treats existing surpluses of oil economies as norms rather than calling for exchange rate changes.

**Figure 4 Changes needed to reach FEERs (percent)**



SGP = Singapore, TAI = Taiwan, SWE = Sweden, SWZ = Switzerland, HK = Hong Kong, CHN = China, MLS = Malaysia, CAN = Canada, MEX = Mexico, CZH = Czech Republic, HUN = Hungary, ISR = Israel, UK = United Kingdom, KOR = Korea, IND = India, CHL = Chile, PHL = Philippines, JPN = Japan, THA = Thailand, IDN = Indonesia, ARG = Argentina, US = United States, EUR = Euro area, POL = Poland, COL = Colombia, AUS = Australia, SAF = South Africa, BRZ = Brazil, TUR = Turkey, NZ = New Zealand  
 FEER = fundamental equilibrium exchange rates; REER = real effective exchange rate  
 Source: Author's calculations.

for the current accounts yields a needed adjustment in almost all cases, whereas there is often no adjustment needed in the estimates of the FEERs approach given the sizable latitude allowed. It is also noteworthy that the Fund's norms seem to have shifted in the direction of observed outcomes in some key cases.<sup>22</sup>

Figure 5 compares the changes in the REERs needed to reach the FEERs in the estimates of the present study to the corresponding REER changes needed to reach the EBA "norm." Because of the timing of the IMF report, the comparison applies the average of the needed changes identified in the present set of estimates (based on exchange rates in April 2014) and the previous round of estimates (based on exchange rates in October 2013 [Cline 2013b]). For the EBA, the figure

22. Thus, the norm for Malaysia shifted from 6 percent of GDP in the mid-2012 report to 2.5 percent in the mid-2013 report, following a shift in the actual current account from 11.6 percent of GDP in 2011 to 6.1 percent in 2012. The norm for Japan shifted from 2.9 percent of GDP in the first report to 0.5 percent in the second, following a corresponding shift in the actual current account from 2.0 percent of GDP in 2011 to 1.0 percent in 2012. Turkey's norm shifted from -4 percent of GDP to -2.5 percent, following a shift in the actual current account from -9.6 percent of GDP in 2011 to -6.2 percent in 2012. India's norm shifted from -1.6 percent of GDP to -3.75 percent, as the balance shifted from -4.2 percent in 2011 to -4.6 percent in 2012.

takes the simple average of the high case and low case estimates in the IMF estimates.<sup>23</sup>

In principle, the two sets of needed adjustments are equal to the divergence of the current account (for this study, the 2019 projection; for the IMF, the 2012 "cyclically adjusted" level) from the  $\pm 3$  percent of GDP band (this study) or the EBA "norm" (IMF), multiplied by the respective impact parameters ( $\gamma$  in this study and its implicit counterpart in the EBA; see Cline 2013b, appendix B).

The most extreme divergences are for Singapore and Switzerland, as expected. The EBA sees the Singapore dollar as needing only 5 percent appreciation versus 22 percent in the present study, and judges that the REER for the Swiss franc should actually depreciate by about 7 percent instead of appreciating by 5 percent as in this study. The exceptionally high normative surplus for these financial centers explains the difference. The EBA approach carries over into the Fund's Article IV advice, in which it recently judged that the franc "remains moderately overvalued" and even recommended

23. The difference between the two was typically 10 percentage points, but the range was especially large for Hong Kong (about 20 percent) and Japan (about 30 percent).

**Table 4 The IMF's EBA current account norms (percent GDP, 2013)**

Australia	-2.0
Brazil	0.5
Canada	-1.5
China	0.5
Euro area	1.5
India	-3.8
Indonesia	-1.3
Japan	0.5
Korea	2.0
Malaysia	2.5
Mexico	-0.3
Poland	-2.5
Russia	3.8
Singapore <sup>a</sup>	15.5
South Africa	-3.0
Sweden	5.0
Switzerland	13.0
Thailand	1.0
Turkey	-2.5
United Kingdom	-2.5
United States	-3.0

EBA = External Balance Assessment  
IMF = International Monetary Fund

a. Inferred; see text.

Source: IMF (2013b, p. 24).

negative interest rates on banks' excess reserves if upward pressure on the currency materialized.<sup>24</sup> Yet the Fund's predicted current account surplus for Switzerland in 2014 stands at \$69 billion (IMF 2014a)—almost one-third as large as the surplus projected for China, for a country with a population only 0.6 percent as large. To the extent that excessive current account surpluses have a negative externality when there is substantial underemployment in the international economy, and even adjusting for statistical overstatement of the Swiss current account because of misattribution of multinational earnings, one does wonder why Switzerland seems to enjoy what seems to be an exceptional "pass" on exchange rate behavior.

Other divergences can mostly be explained by the fact that the EBA applies a backward-looking cyclically adjusted current account as the "actual" that may need to be adjusted,

24. Catherine Bosley, "IMF Suggests SNB Use Negative Rates if Franc Faces More Pressure," *Bloomberg*, March 24, 2014.

whereas this study applies the five-year-forward current account. The latter is also cyclically adjusted in the sense that within five years the general assumption would be that cyclical output gaps will have been eliminated, but the use of a forward-looking rather than backward-looking base would seem more appropriate. For example, the EBA shows Malaysia needs a large appreciation, which is understandable considering that its 2012 cyclically adjusted current account of 5 percent of GDP was 2.5 percentage points in excess of the EBA norm of a 2.5 percent surplus. In contrast, the estimate in this study is that Malaysia no longer needs an appreciation, because its five-year-out projected current account surplus is slightly less than 3 percent of GDP (the average for the present study and the fall 2013 estimate). Similar differences are present for several of the other countries showing sizable differences between the two studies.<sup>25</sup> Considering these differences, the two sets of estimates of needed exchange rate changes are perhaps closer than might be expected given the differing methodologies, as the broad adherence of the two paths in figure 5 suggests.

A potentially important exception is the case of China. The IMF's EBA sets a small surplus of 0.5 percent of GDP as all that should be expected as the norm for China. This level is substantially smaller than the 3 percent of GDP surplus permitted in the FEERs approach of this study. The larger appreciation for the yuan called for by the EBA than here, by 7.5 percent in comparison to 2.3 percent (average, Cline 2013b and this study), reflects this divergence. The divergence from the EBA is also attributable mainly to the different benchmark rather than baseline in the case of Australia.<sup>26</sup>

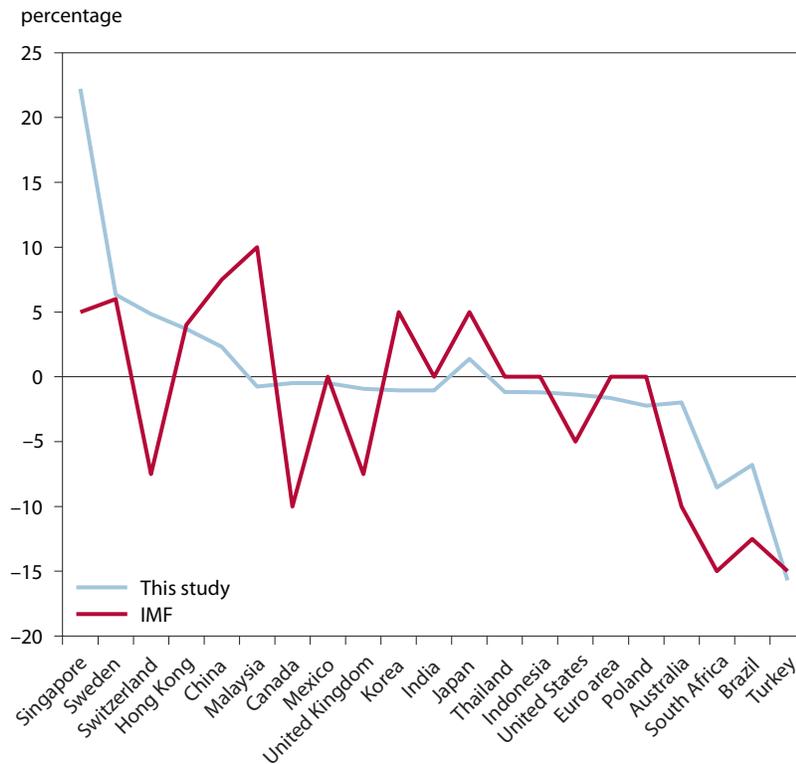
*PIIE Colleagues*—Within Washington, there are alternative views on equilibrium exchange rates even closer to home. My colleagues Martin Kessler and Arvind Subramanian, on the one hand, and C. Fred Bergsten and Joseph E. Gagnon, on the other, have divergent views.<sup>27</sup> Bergsten and Gagnon (2012) have emphasized the presence of exchange rate intervention, as best revealed by the building up of reserves, as the litmus test of

25. Thus, comparisons of the cyclically adjusted current account in 2012 (the EBA basis) versus the five-year-forward current account (this study, present estimate and fall 2013 estimate average) show the following: for Canada, -3.5 versus -2.4; United Kingdom, -4 versus -0.5; Korea, 4.5 versus 2.5; United States, -3.75 versus -2.7; South Africa, -6 versus -5.1.

26. The EBA sets Australia's norm at a deficit of 2 percent of GDP; the FEERs method here allows a deficit of 3 percent of GDP, resulting in a lower estimate of the needed depreciation even though the medium-term current account projection (3.3 percent of GDP deficit) is close to the 2012 cyclically adjusted level (-3.5 percent of GDP).

27. For a recent airing, see Bob Davis, "Undervalue/Overvalue: The Great Yuan Debate Continues," *Wall Street Journal*, May 13, 2014.

**Figure 5 Comparison of percent changes in REER needed to reach FEER (this study)<sup>a</sup> and IMF level “Consistent with fundamentals and desirable policies”**



IMF = International Monetary Fund; REER = real effective exchange rate; FEER = fundamental equilibrium exchange rate

a. Average, table 2 and Cline (2013b).

Sources: Author's calculations and IMF (2013b).

whether a currency is undervalued. They do not seek to identify a FEER, nor do they define acceptable ranges for current account imbalances. Instead, they argue that it is unacceptable to intervene to prevent appreciation of the currency (“currency manipulation”) if the current account is already in surplus (i.e., a ceiling of zero instead of +3 percent of GDP) and the level of reserves is already adequate by international standards. On this basis, they judge that China remains seriously undervalued.<sup>28</sup> In contrast, Kessler and Subramanian (2014) have argued that the most recent set of international price comparisons in the World Bank purchasing power parity (PPP) estimates show

that China’s exchange rate is if anything slightly overvalued against the expected benchmark for an economy at its stage of development. As reported above, my own current estimate is that China is not undervalued for purposes of the permissible current account band, and the small appreciation called for in the results stems solely from the simulation adding-up properties.

It is useful in this debate to recall the one time when moving more concretely to an international agreement on permissible external imbalances was considered. At the Gyeongju, Korea meeting of the G-20 finance ministers in October 2010, one of the member countries suggested ±4 percent of GDP as a range within which countries should keep current account imbalances. A number of countries, including the United States and initially even China, were reported to consider this range favorably. By the time of the G-20 summit meeting in early November of that same year, however, opposition to such a target from China, Germany, and Japan helped

28. China accumulated about \$500 billion in additional reserves in 2013, or about 5 percent of GDP. Its current account was about 2 percent of GDP, so net capital inflows were about 3 percent of GDP. The Bergsten-Gagnon rule would require nonintervention in the exchange market until the current account fell to zero, implying permissible buildup of reserves of about 1 percent of GDP if net capital inflows were to persist at recent levels (although in some contexts the authors suggest that China should ideally shift to a current account deficit).

block the idea, and US Treasury Secretary Timothy Geithner distanced himself from the 4 percent target as unduly rigid to account for commodity exporting economies, for example.<sup>29</sup> So there is currently no internationally acknowledged obligation to adhere to even a wider band of imbalances than the  $\pm 3$  percent of GDP used for the FEERs estimates here, let alone a ceiling of zero for the current account as the precondition for permissible intervention.

A central problem with the Bergsten-Gagnon approach emphasizing intervention is that the emerging market economies in particular have not signed on to an international obligation to pursue what amounts to a floating exchange rate regime. Indeed, “fear of floating” remains characteristic of many of these economies. Nor have they undertaken an explicit limit to their current account surpluses. (Neither have some advanced countries, in particular Switzerland, on both counts.) However, on the part of the large high-income economies, in February 2013, in the wake of the sharp decline of the yen, the G7 finance ministers reaffirmed their “longstanding commitment to market determined exchange rates and to consult closely in regard to actions in foreign exchange markets” (G7 Finance Ministers 2013). In principle the major economies (including China and the other BRICs—Brazil, Russia, and India) could pursue an initiative to commit to avoiding excessive current account imbalances (this time adopting instead of eschewing the Seoul 4 percent target, or even 3 percent). The initiative could include a commitment to refrain from intervening to build up reserves when the current account is in surplus and the level of reserves is already at a level considered comfortable by international standards, the key criteria for currency manipulation in Bergsten and Gagnon (2012). But some would no doubt argue that the emerging market economies should be given more “development space” than such an accord would permit, especially considering that some view undervaluation as a successful growth model.<sup>30</sup>

With respect to the purchasing power parity (PPP) approach, I consider it largely unreliable (Cline and Williamson 2008b). It can be extremely misleading, as in the 1980s when high domestic prices placed Japan’s currency as highly overvalued on a PPP basis, even as its massive trade surpluses bespoke major undervalua-

tion instead. The PPP approach is susceptible to the vagaries of changing measurement (e.g., whether rural areas get surveyed).<sup>31</sup> Although the underlying Balassa-Samuelson premise—that the ratio of the market exchange rate to the PPP exchange rate appreciates as the economy develops (because productivity growth is higher in tradables than in nontradables)—is plausible, if one accepts this framework, one presumably ought to accept similarly a framework that shows a systematic shift in the current account commensurate with the stage of development (from structural deficit from inflow of scarce capital to structural surplus from outflow of abundant capital). Yet that pattern is not what we observe (with large surpluses in recent years in China, for example). It is difficult to give much weight to the new result cited by Kessler and Subramanian (that China was only slightly undervalued in 2011) when the same PPP equations yield the judgment that Turkey was substantially undervalued despite its large current account deficit.<sup>32</sup>

## CONCLUSION

The principal results found in this issue of FEERs estimates are as follows.

First, the four largest economies (United States, euro area, China, and Japan) are all approximately at their FEERs. Three of these economies, however, are also approximately at the limits of their current account bands permitted in the FEERs methodology, with medium-term current accounts projected at approximately  $-3$  percent of GDP for the United States and approximately  $+3$  percent for the euro area and China. By implication, the three largest economies will warrant monitoring for signs of moves into excessive imbalances.

Second, for emerging markets, the actual “tapering” of quantitative easing by the Federal Reserve beginning in January 2014 provoked only temporary concerns of renewed turmoil like that experienced after the May 2013 announce-

29. The G-20 summit agreed only to avoid excessive current account surpluses or deficits “assessed against indicative guidelines to be agreed.” Shamim Adam and Aki Ito, “G-20 Spat Risk Eases as U.S. Eschews Pushing Targets,” *Bloomberg*, November 8, 2010; and David Lawder, “US won’t seek 4 pct trade imbalance target—Geithner,” *Reuters*, November 6, 2010.

30. Dani Rodrik (2011) argues for development policy space to allow greater departures from free trade (and by implication, from market exchange rates) in developing countries (for a comment, see Cline 2011). Bhalla (2012) seeks to demonstrate that undervaluation has been a source of growth in development experience.

31. In his comment on our 2008 paper, Jeffrey Frankel (2008, 157) stated: “Most important, Cline and Williamson question the reliability of the Chinese price data in the Penn World Tables ... Several weeks after the Peterson Institute conference ... the authors were proven spectacularly right when the Asian Development Bank ... and the IBRD ... released the preliminary results of a new study of absolute PPP [showing] far less of an undervaluation [of the yuan] against the dollar.”

32. The Kessler-Subramanian equation places Turkey at an undervaluation of 11.3 percent in 2011 (average for two models and two sample definitions), even though Turkey’s current account in 2011 showed a large deficit (9.7 percent of GDP; IMF 2014a). Note further that the 1.7 percent average undervaluation they find for China in 2011 is substantially smaller than the undervaluation identified in the fall 2011 issue of this study: 10.6 percent (Cline and Williamson 2011). Their estimate also involves wide variation, from undervaluation of 10 percent in two of their four model-sample combinations to 10 percent overvaluation in another combination.

ment of tapering. By April only the Argentine peso showed a persistent decline from the beginning of the year, reflecting earlier distortions from exchange market controls, whereas the other principal emerging market currencies rebounded. Indeed, the Brazilian real recovered to a level representing significant overvaluation, reversing the salutary correction in 2013 associated with the first round of “taper” turmoil.

Third, the climate of political stress from the Ukraine-Russia conflict has had surprisingly little impact on financial markets (with the exception of a high single digit decline in the ruble itself). But a shift to much broader economic sanctions would have the potential for greater impact, presumably for the euro in particular.

Fourth, a special analysis for Japan finds that sizable current account strengthening remains in the pipeline from lagged effects of the real effective depreciation of the currency by approximately 25 percent from mid-2012 to early 2013. This prospective increase in the current account is on the order of 1.5 percent of GDP. Nonetheless, the impact of higher fuel imports post-Fukushima is approximately on the same scale but in the opposite direction. Moreover, exports have been surprisingly weak, especially to China (perhaps because of the Diaoyu/Senkaku islands dispute). In addition, the shifting of production abroad, perhaps reflecting longer-term corporate strategies in view of Japan’s declining population, may also have contributed to weaker exports, albeit with the future compensation of stronger profit remittances. Overall, the consequence is that Japan’s medium-term surplus now seems likely to remain well below 3 percent of GDP despite the major decline of the yen. The estimate of the FEER for the yen has thus substantially declined in this set of estimates, to

a FEER-consistent bilateral rate of 101 yen per dollar (versus 92 in the November 2013 estimates and 86 in the May 2013 estimates; Cline 2013a,b).

Fifth, a familiar set of currencies persists in misalignment. The currencies of New Zealand, Turkey, and South Africa remain substantially overvalued; those of especially Singapore and Taiwan but also Switzerland and Sweden remain undervalued. Brazil has become significantly overvalued.

Sixth, although PPP-based estimates for China by some of my Institute colleagues show minor undervaluation similar to the estimate here, the PPP approach has not proven robust in the past (as illustrated by the doubtful results for Turkey in the new PPP estimates). Similarly, the diagnosis by others of my colleagues of extreme undervaluation of the Chinese yuan based on large exchange market intervention implies a commitment to floating exchange rates that China and most other emerging market economies have not made. Intervention is best seen as supplementary information within a framework that primarily emphasizes the size of external current account imbalances (as in the FEERs methodology).

Finally, the IMF’s EBA is now providing annual estimates of “norms” for current account balances and corresponding ranges for currency misalignments. The Fund’s method appears to give undue allowance for financial centers to pursue enormous current account surpluses, however. Its norms are point estimates that seem unlikely to generate international agreement (such as a norm of –3 percent of GDP for the US current account despite its status as a rich capital-abundant economy). The EBA could benefit from calculating exchange rate misalignments against its own medium-term projections as a more forward-looking approach to supplement its present backward-looking calculations.

## REFERENCES

- Bergsten, C. Fred, and Joseph E. Gagnon. 2012. *Currency Manipulation, the US Economy, and the Global Economic Order*. Policy Briefs in International Economics 12-25 (December). Washington: Peterson Institute for International Economics.
- Bhalla, Surjit S. 2012. *Devaluing to Prosperity: Misaligned Currencies and their Growth Consequences*. Washington: Peterson Institute for International Economics.
- Blue Chip. 2014. *Blue Chip Financial Forecasts* (monthly). New York: Aspen Publishers.
- Cabinet Office of Japan. 2014. *FY2013 Annual Survey of Corporate Behavior*. Tokyo, February 14. Available at [http://www.esri.cao.go.jp/en/stat/ank/h25ank/h25ank\\_summary.pdf](http://www.esri.cao.go.jp/en/stat/ank/h25ank/h25ank_summary.pdf).
- Cline, William R. 2008. *Estimating Consistent Fundamental Equilibrium Exchange Rates*. Working Paper 08-6. Washington: Peterson Institute for International Economics.
- Cline, William R. 2011. Comment on Dank Rodrik’s *The Globalization Paradox*. Prepared remarks presented at the event “The Globalization Paradox: Democracy and the Future of the World Economy,” held at the Peterson Institute for International Economics, Washington, May 4.
- Cline, William R. 2013a. *Estimates of Fundamental Equilibrium Exchange Rates, May 2013*. Policy Briefs in International Economics 13-15 (May). Washington: Peterson Institute for International Economics.
- Cline, William R. 2013b. *Estimates of Fundamental Equilibrium Exchange Rates, November 2013*. Policy Briefs in International Economics 13-29 (November). Washington: Peterson Institute for International Economics.
- Cline, William R., and John Williamson. 2008a. *New Estimates of Fundamental Equilibrium Exchange Rates*. Policy Briefs in International Economics 08-7 (July). Washington: Peterson Institute for International Economics.

- Cline, William R., and John Williamson. 2008b. Estimates of the Equilibrium Exchange Rate of the Renminbi: Is There a Consensus and if Not, Why Not? In *Debating China's Exchange Rate Policy*, eds. Goldstein and Lardy. Washington: Peterson Institute for International Economics.
- Cline, William R., and John Williamson. 2011. *The Current Currency Situation*. Policy Briefs in International Economics 11-18 (November). Washington: Peterson Institute for International Economics.
- Cline, William R., and John Williamson. 2012a. *Estimates of Fundamental Equilibrium Exchange Rates, May 2012*. Policy Briefs in International Economics 12-14 (May). Washington: Peterson Institute for International Economics.
- Cline, William R., and John Williamson. 2012b. *Updated Estimates of Fundamental Equilibrium Exchange Rates*. Policy Briefs in International Economics 12-23 (November). Washington: Peterson Institute for International Economics.
- Consensus. 2014. Consensus Economics, *Consensus Forecasts* (monthly). London: Consensus Economics.
- Federal Reserve. 2014. *Economic Research & Data*. Washington: Federal Reserve Board. Available at <http://www.federalreserve.gov/econresdata/default.htm>.
- Frankel, Jeffrey A. 2008. Equilibrium Exchange Rate of the Renminbi" In *Debating China's Exchange Rate Policy*, eds. Goldstein and Lardy Washington: Peterson Institute for International Economics.
- G7 Finance Ministers. 2013. *Statement by G7 Finance Ministers and Central Bank Governors*. Available at <http://www.library.utoronto.ca/g7/finance/fm130212.htm>.
- IMF (International Monetary Fund). 2010a. *World Economic Outlook*. April. Washington: IMF.
- IMF (International Monetary Fund). 2010b. *World Economic Outlook*. October. Washington: IMF.
- IMF (International Monetary Fund). 2011a. *World Economic Outlook*. April. Washington: IMF.
- IMF (International Monetary Fund). 2011b. *World Economic Outlook*. September. Washington: IMF.
- IMF (International Monetary Fund). 2012a. *World Economic Outlook*. April. Washington: IMF.
- IMF (International Monetary Fund). 2012b. *Pilot External Sector Report*. July. Washington: IMF.
- IMF (International Monetary Fund). 2012c. *World Economic Outlook*. October. Washington: IMF.
- IMF (International Monetary Fund). 2013a. *World Economic Outlook*. April. Washington: IMF.
- IMF (International Monetary Fund). 2013b. *Pilot External Sector Report*. August. Washington: IMF.
- IMF (International Monetary Fund). 2013c. *World Economic Outlook*. October. Washington: IMF.
- IMF (International Monetary Fund). 2014a. *World Economic Outlook*. April. Washington: IMF.
- IMF (International Monetary Fund). 2014b. *International Financial Statistics* (monthly). Washington: IMF.
- IMF (International Monetary Fund). 2014c. *Direction of Trade Statistics* (monthly). Washington: IMF.
- JCER (Japan Center for Economic Research). 2014. *The 40th Medium-Term Economic Forecast (2013FY-2025FY)*. Tokyo (March). Available at [http://www.jcer.or.jp/eng/pdf/m40\\_full.pdf](http://www.jcer.or.jp/eng/pdf/m40_full.pdf).
- Kessler, Martin, and Arvind Subramanian. 2014. *Is the Renminbi Still Undervalued? Not According to New PPP Estimates*. RealTime Economics Issues Watch. Washington: Peterson Institute for International Economics (May). Available at <http://blogs.piie.com/realtime/?p=4300>.
- Ministry of Finance of Japan. 2014a. *Trade Statistics of Japan*. Available at: [http://www.customs.go.jp/toukei/info/index\\_e.htm](http://www.customs.go.jp/toukei/info/index_e.htm).
- Ministry of Finance of Japan. 2014b. *Balance of Payments (Historical Data)*. Available at [http://www.mof.go.jp/english/international\\_policy/reference/balance\\_of\\_payments/ebpnet.htm](http://www.mof.go.jp/english/international_policy/reference/balance_of_payments/ebpnet.htm)
- OECD (Organization for Economic Cooperation and Development). 2014. *OECD Economic Outlook 95 database*. Paris.
- Rodrik, Dani. 2011. *The Globalization Paradox: Democracy and the Future of the World Economy*. New York: W. W. Norton.
- Williamson, John. 1983. *The Exchange Rate System*. Policy Analyses in International Economics 5. Washington: Institute for International Economics.
- World Bank. 2014. *World Integrated Trade Solution database*. Washington: World Bank. Available at <https://wits.worldbank.org/>.

## APPENDIX A

## Response of Trade to the Exchange Rate in Japan

A major paradox for exchange rate realignments over the past 18 months is that even though the Japanese yen has fallen by about 25 percent in real effective terms, Japan's current account surplus has fallen further, and the medium-term forecast in the WEO shows a smaller rather than larger surplus than before the decline.<sup>33</sup> Although higher fuel import costs (following the Fukushima nuclear plant disaster) and, possibly, repercussions of the political dispute with China over the Senkaku Islands, have played a role, it is also possible that the trade gains from a more competitive exchange rate have not materialized yet but are still in the pipeline because of usual lags from the exchange rate signal to trade outcomes. This appendix investigates how large this lag effect might be.

The influence of the exchange rate on the trade balance can be gauged by the ratio of nonfuel imports to nonfuel exports. In principle, when the real effective exchange rate depreciates, this ratio should decline by a proportion that reflects the price elasticity of demand for imports, the price elasticity of foreign demand for exports, and the pass-through ratio indicating the portion of the potential reduction in foreign-currency price that export firms allow to take place when the yen depreciates. It turns out, specifically, that the elasticity of the import/export value ratio with respect to the exchange rate should be:  $\psi = -(\eta + \theta + \theta\varepsilon)$ , where  $\eta$  is the price elasticity of import demand,  $\varepsilon$  is the price elasticity of foreign demand for exports, and  $\theta$  is the export pass-through ratio.

For the following equations, let  $P$  refer to price; subscripts  $x$  and  $m$ , to exports and imports; subscripts  $0$  and  $1$ , to base period and subsequent period; subscripts  $q$  and  $v$ , to quantity and value; superscripts  $\$$  and  $\yen$ , to dollar (international) and yen (domestic);  $R$  to the exchange rate (with a higher value indicating more units of foreign currency per unit of domestic currency); the overdot, to proportionate change; and define  $z$  as the ratio of imports (nonfuels) in dollar values to exports in dollar values. Then a simple elasticities-based structure of trade will behave as follows.

$$P_{m1}^{\$} = P_{m0}^{\$} \tag{A.1}$$

$$P_{m1}^{\yen} = P_{m0}^{\yen} (1 - \dot{R}) \tag{A.2}$$

$$P_{x1}^{\$} = P_{x0}^{\$} (1 + \theta \dot{R}) \tag{A.3}$$

International prices (in dollars) for Japan's imports are given and unchanged by the exchange rate (first equation). Import prices expressed in yen, however, fall proportionately by the amount of the increase in the exchange rate (equation A.2). For exports, dollar prices facing international customers will rise when the yen appreciates, but less than proportionately to the extent that the export pass-through ratio ( $\theta$ ) is lower than unity (equation A.3).

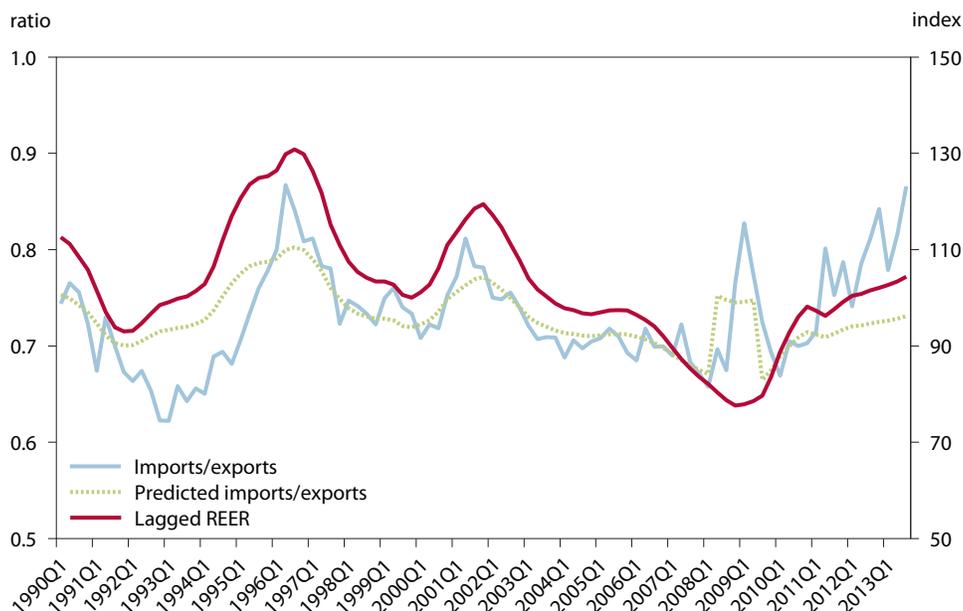
$$M_{q1} = M_{q0} (1 + \eta \dot{P}_m^{\yen}) = M_{q0} (1 + \eta [-\dot{R}]) \tag{A.4}$$

$$X_{q1} = X_{q0} (1 + \varepsilon \dot{P}_x^{\$}) = X_{q0} (1 + \varepsilon \theta \dot{R}) \tag{A.5}$$

The real volume of imports changes by a proportion equal to the import price elasticity multiplied by the proportionate change in the yen price of imports, which in turn is the negative of the proportionate increase in the strength of the yen (fourth equation). The real volume of exports changes by the export price elasticity multiplied by the proportionate rise in the foreign (dollar) price of Japanese exports, which in turn is the pass-through fraction multiplied by the proportionate rise in the exchange rate (fifth equation).

33. Thus, the October 2012 WEO placed the 2017 current account surplus at 1.93 percent of GDP; the most recent (April 2014) WEO projects the surplus for that year at 1.37 percent (IMF 2012c, 2014a).

**Figure A.1 Japan: Ratio of nonfuel imports to exports (left) and lagged REER (right) (2010 = 100)**



REER = real effective exchange rate

Sources: Ministry of Finance of Japan (2014a); Bank for International Settlements Effective Exchange Rate Indices (2014), available at <http://www.bis.org/statistics/eer/index.htm>; and author's calculations.

Import and export values in dollar terms are then:

$$M_{v1} = M_{q1} P_{m1}^{\$} = M_{q0} (1 + \eta[-\dot{R}]) P_{m0}^{\$} = M_{v0} (1 - \eta \dot{R}) \tag{A.6}$$

$$X_{v1} = X_{q1} P_{x1}^{\$} = X_{q0} (1 + \varepsilon \theta \dot{R}) P_{x0}^{\$} (1 + \theta \dot{R}) = X_{v0} (1 + [1 + \varepsilon] \theta \dot{R}) \tag{A.7}$$

Equations A.6 and A.7 show that the proportionate changes of the dollar values of trade are:  $-\eta \dot{R}$ , for imports; and  $[1 + \varepsilon] \theta \dot{R}$ , for exports.<sup>34</sup> The proportionate change in the ratio of import value to export value (both in dollars) will then be the proportionate change of the numerator minus the proportionate change of the denominator, divided by unity plus the proportionate change in the denominator, or:<sup>35</sup>

$$\dot{z} = \{-\eta \dot{R} - [1 + \varepsilon] \theta \dot{R}\} / \{1 + [1 + \varepsilon] \theta \dot{R}\}, = -\dot{R}(\eta + \theta + \varepsilon \theta) / \{1 + [1 + \varepsilon] \theta \dot{R}\} \tag{A.8}$$

In the case in which both the import and export price elasticities equal (negative) unity and there is complete pass-through ( $\theta = 1$ ), this result translates to  $\dot{z} = \dot{R} / (1 + \dot{R})$ . That is, a 1 percent rise in the exchange rate will induce nearly a 1 percent rise in the import/export ratio, and the elasticity of  $z$  with respect to the exchange rate is almost unity.

Figure A.1 shows the path of the ratio of quarterly nonfuel imports to nonfuel exports (goods and services, dollar values) from 1990 through 2013.<sup>36</sup> On the left-hand vertical scale, the blue line indicates that this ratio reached a trough of about 0.62 in the second quarter of 1992, rose to a peak of 0.87 in the second quarter of 1996, pursued a gradually falling path to a trough of

34. Note that the derivation of the final right-hand side of equation A.7 omits as vanishingly small an interaction term,  $\varepsilon[\theta \dot{R}]^2$ .

35. If  $z$  is a ratio, and if the numerator rises by proportion  $a$  and the denominator by proportion  $b$ , then  $z_t = z_0(1+a)/(1+b)$ ;  $\Delta z = z_t - z_0$ ; and expansion shows that  $\Delta z/z_0 = (a-b)/(1+b)$ .

36. Data on fuel imports and exports are from the Ministry of Finance of Japan (2014a). Data on exports of goods and services are from the IMF (2014b).

0.67 in the first quarter of 2008, then began a rising path to reach 0.87 in the third quarter of 2013. There was also a temporary surge to 0.83 in the first quarter of 2009 as the global Great Recession caused a slump in exports.

On the right-hand vertical scale, a composite lagged real effective exchange rate is shown in red. The REER is the Bank for International Settlements index (CPI deflated), with a base of 2010 = 100. The lag structure is centered on six quarters prior to the present and encompasses five quarters, from the eighth-lagged quarter to the fourth-lagged quarter.<sup>37</sup> The figure shows a broad correlation between the lagged REER and the ratio of nonfuel import to export values.

A statistical regression of the ratio of nonfuel imports to exports ( $z$ ) on the lagged real effective exchange rate ( $R_L$ ) and a dummy variable for the second quarter of 2008 through the second quarter of 2009 for the Great Recession yields the following results (with  $t$ -statistics in parentheses):

$$z_t = 0.45 + 0.002695 R_{L,t} + 0.086 D; \text{ adj. } R^2 = 0.31 \quad (\text{A.9})$$

(10.5)      (6.6)      (3.8)

Although the degree of explanation is relatively low, the regression coefficients are highly significant. The elasticity of the import/export ratio (percent change in the ratio for a 1 percent change in the lagged exchange rate) is thus substantially below unity, indicating that the trade elasticities are below unity.<sup>38</sup>

When the estimated equation is applied, the resulting path of the predicted ratio of nonfuel imports to exports is shown in green in figure A.1. Although the predicted path lies close to the actual path for most of the past 24 years, it falls noticeably short of the actual by 2013. For the first three quarters of 2013, the average actual trade ratio is 0.82, whereas the average predicted ratio is only 0.73. Underprediction of the ratio is consistent with the view that structural changes are occurring, such as production moving offshore, causing export erosion.

The results nonetheless suggest that considerable external adjustment is in the pipeline that has not yet taken place because of the relatively long lag from the exchange rate signal to the trade outcome. The average level of the lagged real exchange rate variable in the first three quarters of 2013 was 103.48. However, in April 2014, with the same base (2010 = 100), the REER stood at 76.1. If the REER were to stay at its present level, then, after a lapse of eight quarters, the lagged real exchange rate would be 26 percent lower than the lagged REER was on average in the first three quarters of 2013. Applying the difference, the implication is that after the lags are completed, the ratio of imports to exports would be expected to be 0.0738 lower than it was in the first three quarters of 2013.<sup>39</sup> This reduction would amount to a 9 percent decline in the ratio from its level of 0.81 in the year ending in the third quarter of 2013 (with nonfuel imports at \$686 billion and exports at \$845 billion).

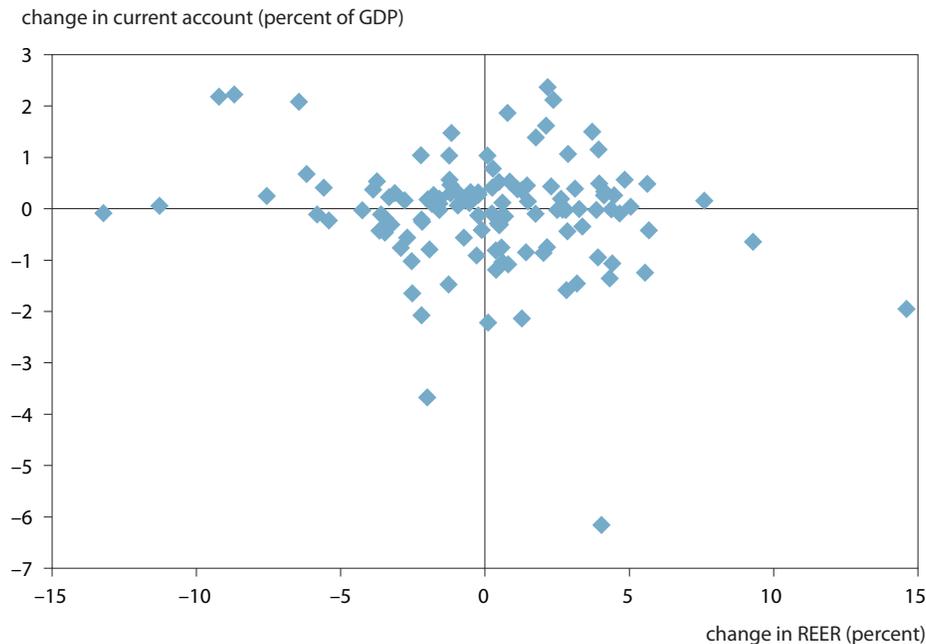
Dividing the expected pipeline effect of the lagged exchange rate into one-half on the import side and one-half on the export side, the resulting 0.045 proportionate decline in nonfuel imports and 0.045 proportionate rise in nonfuel exports would be expected to generate an increase in the trade surplus amounting to \$69 billion, or 1.42 percent of 2014 GDP. Against the actual outcome in 2013 (0.7 percent of GDP), the influence to be expected from lagged exchange rate effects still in the pipeline would boost the medium-term current account estimate to a surplus of 2.1 percent of GDP.

37. The weights, based on relative size of coefficients in an unconstrained regression but then forced to be symmetrical around the sixth quarter, are: 0.167, 0.208, 0.25, 0.208, and 0.167 for the fourth through eighth lagged quarters, respectively.

38. Applying the coefficient on the lagged REER, a 10-point appreciation in the lagged real exchange rate index (such as from 90 to 100) will cause a rise in the import/export ratio by 0.2695. The averages for the full period are 102.36 for the lagged REER and 0.73 for the import/export ratio. So a 1 percent rise in  $R_L$  amounts to 1.0236, and a 1 percent rise in  $z$  is 0.0073. Applying the regression coefficient, an increase in the lagged real exchange rate by 1 percent boosts the import/export ratio by  $1.0236 \times 0.002695 = 0.00276$ , which amounts to 0.378 percent of the average  $z$ . This elasticity of 0.378 could result, for example, from a combination of  $\eta = -0.5$ ,  $\theta = 0.5$ , and  $\varepsilon = -0.75$ , which generates an elasticity of 0.375 for  $z$  with respect to  $R$  (equation A.8).

39. That is:  $(76.1 - 103.48) \times 0.002695 = -0.0738$ .

**Figure B.1 Change in IMF's third-year-out current account projection (percent of GDP) and corresponding percent change of REER in base month<sup>a</sup>**



IMF = International Monetary Fund; REER = real effective exchange rate

a. Change in third-year current account balance from the IMF's spring *World Economic Outlook* (WEO) to fall WEO of the same year.

Sources: IMF (2010a, b; 2011a, b; 2012a, c; 2013a, c); and author's calculations.

## APPENDIX B

### Adjusting for Changes in the Exchange Rate from the WEO Base Period

The semiannual series of FEERs estimates beginning with Cline and Williamson (2008a) uses the most recent available semiannual *World Economic Outlook* (WEO) prepared by the IMF as the source of projected current account balances (except for specially excepted cases). Typically the base month used by the IMF for its WEO projections is about two months earlier than the base month for exchange rates in the FEERs estimates. Movements in real effective exchange rates can be nontrivial even in two months, so the question arises as to whether and how to adjust the IMF forecasts for changes in the exchange rate base. In the past, this study has simply applied each country's current account impact parameter ( $\gamma$ ) to the change in the REER from the WEO base to the FEERs study base to arrive at an adjusted medium-term current account forecast.

As discussed in Cline (2013b), however, WEO current account forecasts have tended to show considerable inertia, in the sense that medium-term current account forecasts tend to remain little changed from one issue of the WEO to the subsequent one even in cases where there have been large exchange rate changes. As a consequence, considering that the updating for the base month is meant primarily to replicate what the IMF would have obtained if it had worked with a slightly later month for the exchange rate base, an implication is that simple application of the SMIM impact parameter to the change in the exchange rate may overstate swings that would have occurred in the IMF forecasts for given changes in exchange rates. This appendix examines this question of inertia and arrives at a simple conclusion for the updating procedure: The change from the WEO baseline is set at only one-half the change implied by application of the full SMIM parameter.

Consider first further evidence on the question of inertia in the IMF WEO forecasts of current account balances. Figure B.1 reports changes in the three-year-forward current account as a percent of GDP in the fall WEO versus the spring WEO in the same year, on the vertical axis, against percent changes in the real effective exchange rate from the base used in the spring WEO

to the base used in the fall WEO. The data are for the 30 non-oil economies in the FEERs set (see e.g. table 1 in the main text), and refer to the fall WEOs of 2010 through 2013. Focus on the third-year-out current account projection (e.g., the forecast for 2015, if the WEO in question is the fall 2012 issue) is meant to capture the influence of lags from the exchange rate to the trade outcome.

As an example, the observation furthest to the northwest in the figure refers to Turkey in the September 2011 WEO. In that issue, the IMF changed its forecast of the current account balance for 2014 (three years out) from the  $-8.34$  percent of GDP estimated in the April 2011 WEO to  $-6.16$  percent of GDP, an increase of 2.2 percent of GDP. Turkey's real effective exchange rate had depreciated by 9.2 percent from the base period used in the spring WEO (February 8–March 8, 2011) to the base period used in the fall WEO (July 18–August 5, 2011). In this case, the implicit current account impact parameter was  $\gamma = -0.24$  ( $= +2.2/-9.2$ ).

As the figure shows, however, in a large number of cases the outcome is not what might have been expected. Indeed, with 120 possible cases (30 countries, four years), 53 have the wrong sign: The current account projection moved to a higher forecast despite a stronger currency (northeast quadrant) or to a lower forecast despite a weaker currency (southwest quadrant). A statistical regression does find a significant coefficient with the expected sign, but the size of the coefficient is small and the degree of explanation is extremely low.<sup>40</sup>

Because many other things can change over the half-year between the two WEO forecasts other than the exchange rate, it is not surprising that there is a low degree of explanation. For purposes of inferring the influence of the exchange rate, it is useful to screen out all cases where the change in the current account moves in the wrong direction (northeast and southwest quadrants). Because the resulting set of “correct sign” observations may be biased by a few extreme cases that had far larger changes than could reasonably be attributed to the exchange rate (albeit in the “right” direction), a second screen is to omit all observations in which the implied impact coefficient ( $\gamma$ ) is implausibly strong. This screen is set at  $-1$  (1 percent appreciation causes 1 percent of GDP current account decline). Of the 120 observations, 53 are screened out by the incorrect sign and another 11 are screened out due to excessive movement. For the remaining 56 observations, the median ratio of the change in current account to change in REER is  $-0.15$ , which is three times as large as the regression coefficient for the full set of observations. The doubly-screened median implicit impact parameter of  $-0.15$  turns out to be exactly one-half of the median SMIM impact parameter ( $\gamma$ ) for the same set of country-years.

In light of this evidence, for purposes of updating the WEO estimates to account for the later base period, this issue of FEERs estimates applies only one-half of the current account adjustment that would be obtained by direct application of SMIM model impact parameter to the change in the REER between the base periods. This procedure can be thought of as the best approximation of what the IMF researchers would have arrived at based on past WEO issues after screening out non-germane cases. It can also be thought of as giving one-half weight to the WEO estimates with no changes whatsoever (by implication, assuming complete IMF inertia) but also one-half weight to the potential SMIM adjustment (as the “true” estimate).

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40. The regression yields:  $dCA = -0.055 dR^*$ , with a t-statistic of  $-2.2$  and adjusted  $R^2 = 0.029$ , where  $dCA$  is the change in the projected current account as percent of GDP and  $dR^*$  is the percent change in the real effective exchange rate.

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