



Estimates of Fundamental Equilibrium Exchange Rates, November 2013

William R. Cline

William R. Cline, senior fellow, has been associated with the Peterson Institute for International Economics since its inception in 1981. His numerous publications include *Resolving the European Debt Crisis* (coeditor, 2012), *Financial Globalization, Economic Growth, and the Crisis of 2007–09* (2010), and *The United States as a Debtor Nation* (2005).

Author's Note: I thank Jared Nolan for research assistance. For comments on an earlier draft, I thank without implicating Joseph E. Gagnon, Olivier Jeanne, Arvind Subramanian, Edwin M. Truman, and John Williamson.

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Since the previous estimates of fundamental equilibrium exchange rates (FEERs) in this series in May (Cline 2013), numerous exchange rates have moved substantially in response to the announcement in late May that the US Federal Reserve would likely begin to “taper” its quantitative easing program of large-scale asset purchases.¹ The new estimates here again take as their point of departure the medium-term current account projections of the most recent *World Economic Outlook* (WEO) of the International Monetary Fund (IMF 2013b). However, because of a seeming inertia in the Fund’s

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 consistent with sustainability. 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>.

projections despite large exchange rate moves, this round of calculations pays special attention to compiling alternative estimates for economies with large changes in exchange rates (appendix A).

The new estimates here suggest that the “taper shock” has had a salutary effect in moving several misaligned exchange rates in a corrective direction. Nonetheless, the main patterns highlighted in the previous estimates remain broadly unchanged. The overvaluation of the dollar and undervaluation of the Chinese renminbi remain modest and no longer constitute the severe imbalances of 2006–07; overvaluations remain large in New Zealand, Turkey, and to a lesser extent South Africa, and undervaluations remain large in Singapore and Taiwan. The Japanese yen is now modestly less undervalued than in the previous set of estimates. Despite a real effective appreciation of the euro by about 3 percent from April to October, the medium-term surplus of the euro area remains within the FEERs band of ± 3 percent of GDP, and no change is targeted for the currency.

THE TAPER SHOCK

On May 22, 2013, US Federal Reserve Chairman Ben Bernanke stated before Congress that the Fed might reduce the rate of asset purchases in the coming months if US economic conditions improved sufficiently.² The interest rate on the 10-year US Treasury bond had fallen as low as 1.64 percent at the beginning of May but then rose steadily to 2.98 percent in early September before easing to about 2.5 percent by late October. International capital markets reacted strongly, even though the Federal Reserve had not yet carried out any reductions in its monthly asset purchases.³ The risk-on phase in international capital markets, dominated by yield-seeking,

2. Susanne Walker and Cordell Eddings, “U.S. 10-Year Yield Tops 2% as Bernanke Says Fed May Taper Buys,” *Bloomberg*, May 22, 2013.

3. In September 2012 the Federal Reserve began its third program of large-scale asset purchases (QE3), amounting to \$45 billion of long-term US Treasury bonds and \$40 billion in agency mortgage-backed assets monthly. Purchases have continued at this rate during the past year. Federal Reserve Press Releases, September 13, 2012, and September 13, 2013.

shifted to a risk-off mode as investors anticipated a new period of higher US interest rates.

Table 1 reports the changes in real effective exchange rates (REERs) and nominal rates against the dollar from the base period of the previous round of FEERs estimates, April 2013, to the new base, October.⁴ Relatively large real depreciations have occurred in the “BIITS” emerging market economies—Brazil, India, Indonesia, Turkey, and South Africa. Large declines have also occurred in Mexico, Australia, Thailand, and Argentina.⁵

These declines were even larger before some recovery in October. From their mid-April levels to their low points in late August or early September (depending on the currency), declines against the dollar had reached 20 percent for the Brazilian real, 22 percent for the Indian rupee, 17 percent for the Indonesian rupiah, 13 percent for the Turkish lira, and 13 percent for the South African rand. By the end of October those declines had moderated to 12 percent, 12 percent, 14 percent, 10 percent, and 11 percent, respectively (*Bloomberg*, accessed October 31, 2013). The moderation of the declines reflected the partial reversal in the taper-induced rise in the long-term US Treasury rate.⁶

As shown in figure 1, how much a currency has declined relates significantly to the size of the country’s current account balance. The figure shows the 2013 current account balance as a percent of GDP as projected in the most recent WEO (IMF 2013b) on the horizontal axis and the percent change in the real effective exchange rate from April to the October base in table 1 on the vertical axis. The five economies in the lower left-hand corner are the BIITS countries, all of which have sizable deficits. Australia, not included in the figure, also experienced a large depreciation in the face of a large current account deficit.⁷ In contrast, in the northeast quadrant of the figure, countries with sizable current account surpluses experienced real effective appreciation.

Figure 2 shows the real effective exchange rate change for these same countries over this period, once again on the

4. The real indexes used here deflate by consumer prices and apply the SMIM trade weights. They track the Bank for International Settlements (BIS) real effective exchange rate indices closely.

5. The large change in the opposite direction for Venezuela reflects a continuing pattern of infrequent adjustments of a fixed exchange rate despite high inflation.

6. By the end of October the 10-year US Treasury rate had eased to 2.57 percent (Federal Reserve 2013).

7. The decline in the REER was about 7 percent, and the 2013 current account deficit is running at 3.4 percent of GDP. The decline of the Australian dollar was however also likely affected by changing prospects for growth in China. See for example James Glynn, “Australian Dollar Plunges on Fed Tapering, China Weakness,” *Wall Street Journal*, June 20, 2013.

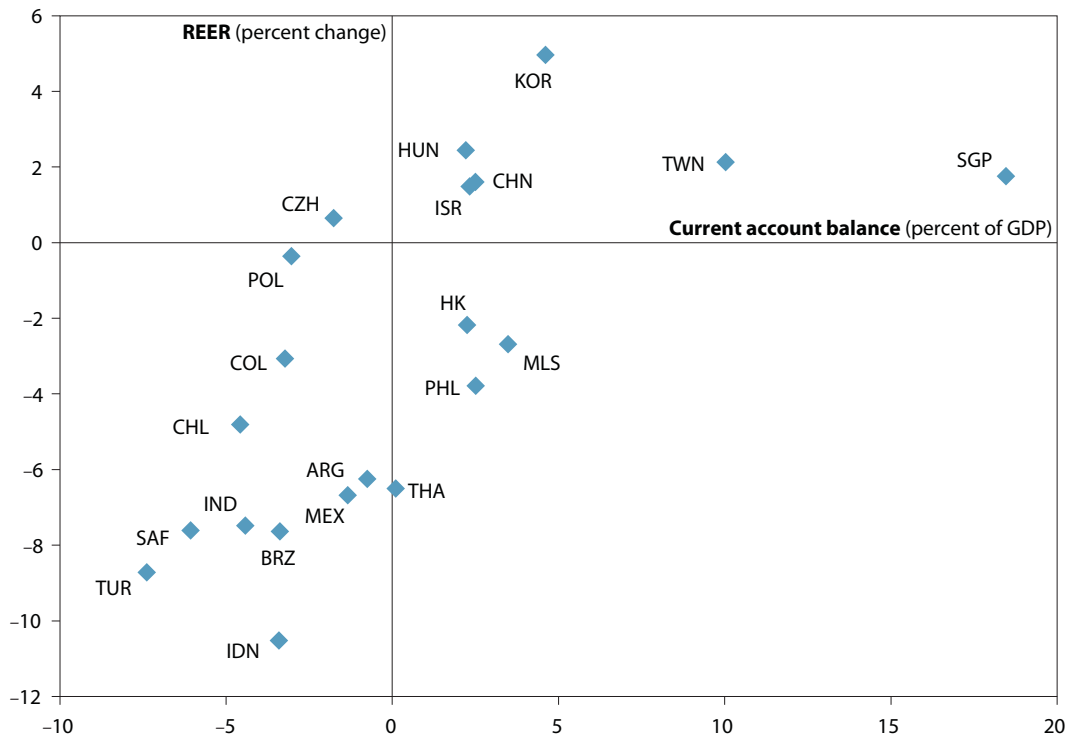
Table 1 Changes in exchange rates, April 2013 to October 2013

Country	Percent change in REER	Percent change in nominal dollar rate
Pacific		
Australia	-6.8	-9.1
New Zealand	-0.1	-1.6
Asia		
China	1.6	1.3
Hong Kong	-2.2	0.1
India	-7.5	-13.4
Indonesia	-10.5	-16.7
Japan	0.4	-0.0
Korea	5.0	4.9
Malaysia	-2.7	-4.2
Philippines	-3.8	-4.8
Singapore	1.8	-0.4
Taiwan	2.1	1.4
Thailand	-6.5	-7.3
Middle East/Africa		
Israel	1.5	2.4
Saudi Arabia	0.0	-0.0
South Africa	-7.6	-8.8
Europe		
Czech Republic	0.6	5.1
Euro area	3.1	4.5
Hungary	2.4	5.9
Norway	-4.9	-2.7
Poland	-0.4	3.4
Russia	-2.5	-2.4
Sweden	-1.6	1.1
Switzerland	0.2	3.6
Turkey	-8.7	-10.4
United Kingdom	3.4	4.9
Western Hemisphere		
Argentina	-6.2	-13.5
Brazil	-7.6	-9.3
Canada	-2.1	-1.7
Chile	-4.8	-6.2
Colombia	-3.1	-3.0
Mexico	-6.7	-6.5
United States	0.8	
Venezuela	25.8	0.0

REER = real effective exchange rate

Sources: Datastream; author’s calculations.

Figure 1 Percent change in REER, April–October 2013, and 2013 current account balance (percent of GDP)



REER = real effective exchange rate

SGP = Singapore, HK = Hong Kong, MLS = Malaysia, TWN = Taiwan, CHN = China, CZH = Czech Republic, HUN = Hungary, MEX = Mexico, ISR = Israel, COL = Colombia, KOR = Korea, PHL = Philippines, IDN = Indonesia, THA = Thailand, CHL = Chile, ARG = Argentina, IND = India, POL = Poland, BRZ = Brazil, SAF = South Africa, TUR = Turkey

Source: IMF (2013b); author's calculations.

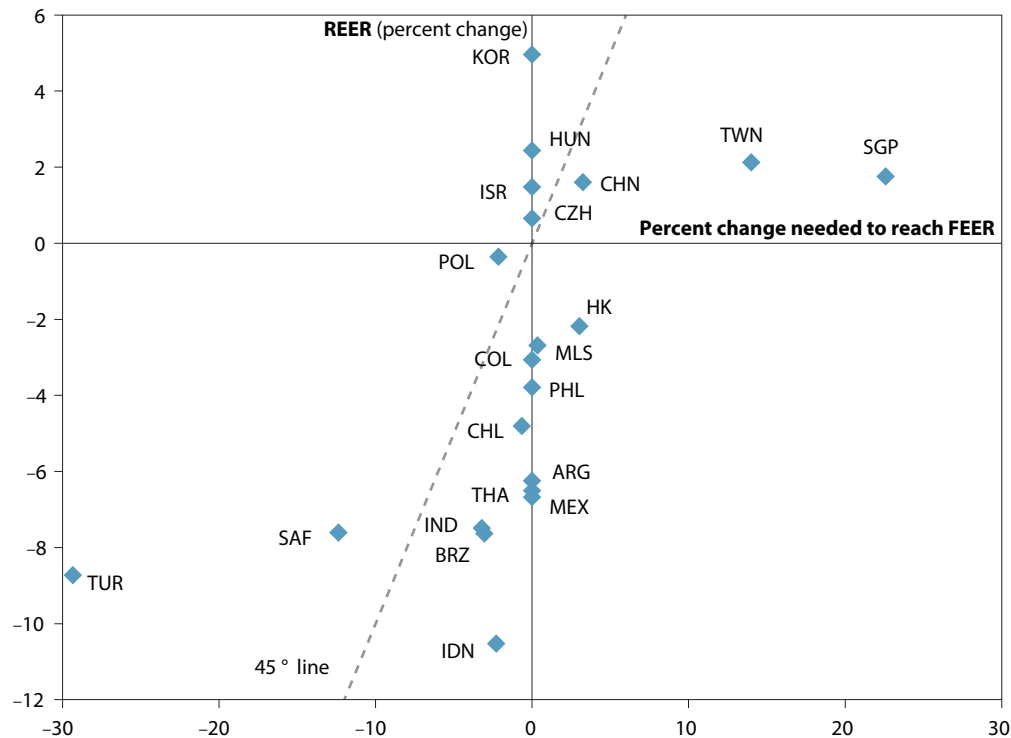
vertical axis, against the targeted change in the REER needed to reach the FEER as measured in the May 2013 round of estimates using an April base (Cline 2013). The figure suggests that the exchange rate movements were salutary in the sense of being in the right direction to move toward FEERs for most of the economies, including especially depreciations for Turkey, South Africa, India, Brazil, and Indonesia, and appreciations for China, Taiwan, and Singapore. If the actual moves had been exactly as called for, the observations would lie along the upward sloping line showing equal values on the two axes. As indicated by the distance from this line, the corrective moves for Singapore and Taiwan were small relative to the adjustments needed to reach FEERs; conversely India, Brazil, and Indonesia overshot. (The presence of several observations strung along the vertical axis reflects the fact that in the FEERs estimates countries are judged to need no change if their current accounts lie within a band of ± 3 percent of GDP, meaning a value of zero on the horizontal axis.) Only two

economies' REERs moved in the "wrong" direction (northwest or southeast quadrants: Hong Kong, which has a fixed exchange rate against the dollar, and Malaysia).

The new estimates here suggest that the "taper shock" has had a salutary effect in moving several misaligned exchange rates in a corrective direction.

Countries under exchange rate pressure tended to draw down reserves to curb their currency declines. For ten emerging market economies with significant exchange rate declines from April to September, table 2 indicates the initial level of reserves (end of April) and the percent change in reserves by the end of September, as well as the decline in the REER from the April average to the September average.

Figure 2 Percent change in REER, April–October 2013, and May 2013 estimate of percent change needed to reach FEER



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

SGP = Singapore, HK = Hong Kong, MLS = Malaysia, TWN = Taiwan, CHN = China, CZH = Czech Republic, HUN = Hungary, MEX = Mexico, ISR = Israel, COL = Colombia, KOR = Korea, PHL = Philippines, IDN = Indonesia, THA = Thailand, CHL = Chile, ARG = Argentina, IND = India, POL = Poland, BRZ = Brazil, SAF = South Africa, TUR = Turkey

Sources: Cline (2013) and IMF (2013b).

The surprise in table 2 is that these economies did not draw down reserves more aggressively to curb the depreciation of their exchange rates. Indonesia and Argentina used reserves the most (based on percent change in reserves). Reserves actually increased in Chile and Mexico, barely changed in the Philippines and South Africa, and declined only 2.6 percent in Brazil and Malaysia. Nor was the limited use of reserves forced by an initial position of low reserves; most of the economies had accumulated reserve levels exceeding 50 percent of imports of goods and services, and reserves in Brazil and the Philippines substantially exceeded 100 percent. The combination of limited intervention response to exchange rate pressure despite large reserves suggests that in at least some cases the authorities may have welcomed some correction in exchange rates. Indeed, previously some of them (especially Brazil) had complained about upward pressure on their currencies from US quantitative easing (“currency wars”). The taper shock episode stands in sharp contrast to the sudden stop in the East Asian crisis of 1997–98, when reserves were relatively

much lower and nonetheless fell much further—by about 40 percent in Korea, 35 percent in Thailand, and 24 percent in Indonesia—but over a longer period.⁸

Even so, the minimal drawdowns in table 2 may also reflect another phenomenon: the use of swaps linked to foreign exchange that do not show up as a use of reserves, especially in Brazil. In August Brazil announced a \$60 billion intervention program through the end of the year; if implemented through traditional sales of foreign exchange, this intervention would cut reserves by one-sixth, but instead, by using swaps that settle in Brazilian reais, this action will not affect reserves.⁹

8. These declines were from January to August 1997 in Thailand, June to December 1997 in Korea, and June 1997 to February 1998 in Indonesia (IMF 2013d).

9. “Brazil central bank launches \$60 billion currency intervention,” *Reuters*, August 22, 2013. The program involves weekly intervention of \$500 million in currency swap derivatives and \$1 billion in the spot market through repurchase agreements. The swaps settle in Brazilian reais and therefore do not affect reserves but incur risk to the central bank of losses associated with a weaker than expected exchange rate at maturity. The repurchases involve a temporary

Table 2 Changes in REERs and reserves in selected emerging market economies, April to September 2013

Country	REER	Reserves		
	Percent change ^a	Level, end of April 2013 (billions of US dollars)	Percent of 2012 imports (goods and services)	Percent change by end of September 2013
Argentina	-3.1	39.5	47.0	-12.1
Brazil	-10.6	378.7	124.5	-2.6
Chile	-4.3	41.2	45.9	2.6
India	-10.2	296.4	54.8	-6.8
Indonesia	-8.9	107.3	50.3	-10.8
Malaysia	-3.9	140.3	61.2	-2.6
Mexico	-7.1	167.1	41.6	2.9
Philippines	-4.1	83.2	109.2	0.4
South Africa	-7.3	50.3	41.8	-0.6
Thailand	-6.8	177.8	65.7	-3.0
Turkey	-10.2	134.0	53.7	-3.5

REER = real effective exchange rate

a. April to September, average.

Sources: IMF (2013c, d); author's calculations.

The ability to carry out what might be thought of as financial alchemy reflects hard-earned credibility but may also prove costly.

MEDIUM-TERM CURRENT ACCOUNT ESTIMATES

Table 3 reports the IMF's October WEO estimates of medium-term (2018) current account balances for the 34 economies covered in the FEERs estimates. The corresponding "adjusted" estimates shown in the table make adjustments that take account of changes in real exchange rates from the base period of the WEO (July 29–August 26) to the base used in this study (October). As in past issues, the adjusted estimates apply the current account impact parameters (discussed in appendix B). By far the most important adjustment caused by the base date was that of Indonesia. The REER of the Indonesian rupiah fell by 10.2 percent from the IMF's August base to the October base. Another important adjustment for the base period was that for Brazil. Brazil's REER appreciated by 6 percent from the IMF's August base to the October base, curbing the

cash drawdown in reserves that is reversed when the counterparty returns the dollars; the international liquidity definition does not register the temporary decline.

prospective improvement from the steeper depreciation that had occurred from April to August.

As discussed in appendix A, the adjusted medium-term current account estimates of some countries make a further special adjustment to address what appears to be undue inertia in the WEO estimates in the face of large exchange rate changes. That is, for several economies the October WEO projections of medium-term current accounts show little change from the April projections, even though there have been large movements in these countries' REERs. This pattern is not new to the WEO projections, and it is unclear whether it primarily reflects trade elasticity pessimism, some form of recognition lag, or a real tendency for offsetting developments predominantly to neutralize the impact of the exchange rate change.¹⁰ For six economies with exchange rate depreciations exceeding 5 percent between the February–March base of the April WEO and the August base of the October WEO—namely Australia, Brazil, Chile, India, Indonesia, and Turkey—a synthetic estimate for the August base is calculated using a 50 percent weight for the IMF's estimate and a 50 percent weight for an alternative estimate. The alternative takes the April WEO estimate for the medium-term current account and adds an increment predicted by applying the change in the REER to the impact parameter (γ) for the country in question.¹¹ By implication, the presumption is that WEO projections prepared following large exchange rate movements are less likely to have fully incorporated the new outlook than projections prepared in a period of relative calm.

As in the previous round of FEERs calculations in May, special estimates are used for the medium-term current account balances of Japan and Switzerland. For Switzerland the adjustment subtracts 4.1 percent of GDP for a statistical adjustment reflecting treatment of multinational corporate earnings.¹² For Japan, the WEO continues to project a low medium-term surplus despite the sharp real effective depreciation that occurred from September 2012 to April 2013.¹³ The adjusted estimate in table 3 is based instead on the most recent IMF Article IV review for Japan (IMF 2013e, 40). That review, in August 2013,

10. For the response of one IMF expert when queried about this phenomenon, see this transcript: <http://www.piie.com/publications/papers/transcript-20130927.pdf>, p. 28–29. Note, however, that in principle, elasticity pessimism should not be the main influence, because the trade elasticities implied by the IMF's External Balance Assessment are only modestly lower than those used in the SMIM. See appendix B.

11. For Brazil, this procedure has the effect of leaving the adjusted current account estimate in table 2 unchanged from the October WEO estimate; otherwise the update of the exchange rate would have caused the projection to show a larger current account deficit as the consequence of the partial recovery of the real.

12. See the discussion in Cline and Williamson (2012a, 4).

13. The REER for the yen fell by 22 percent during this period before stabilizing (author's calculations, deflating by consumer prices).

Table 3 Target current accounts (CA) for 2018

Country	IMF projection of 2013 CA (percent of GDP)	IMF 2018 GDP forecast (billions of US dollars)	IMF 2018 CA forecast (percent of GDP)	Adjusted 2018 CA (percent of GDP)	Target CA (percent of GDP)
Pacific					
Australia	-3.4	1,702	-4.0	-2.7	-2.7
New Zealand	-4.2	220	-6.1	-7.2	-3.0
Asia					
China	2.5	13,760	4.1	4.2	3.0
Hong Kong	2.3	419	5.1	5.6	3.0
India	-4.4	2,481	-2.8	-2.4	-2.4
Indonesia	-3.4	1,212	-2.5	-0.2	-0.2
Japan	1.2	5,943	1.7	3.8	3.0
Korea	4.6	1,702	2.6	1.2	1.2
Malaysia	3.5	443	3.1	2.0	2.0
Philippines	2.5	421	0.9	0.8	0.8
Singapore	18.5	349	15.2	14.5	3.0
Taiwan	10.0	697	8.1	7.6	3.0
Thailand	0.1	558	0.2	0.4	0.4
Middle East/Africa					
Israel	2.3	357	2.1	2.4	2.4
Saudi Arabia	19.3	871	12.4	13.0	13.0
South Africa	-6.1	464	-5.7	-4.8	-3.0
Europe					
Czech Republic	-1.8	230	-1.4	-1.4	-1.4
Euro area	2.3	15,508	2.7	2.6	2.6
Hungary	2.2	170	-1.4	-2.3	-2.3
Norway	11.8	610	8.7	9.7	9.7
Poland	-3.0	687	-3.5	-3.8	-3.0
Russia	2.9	3,010	0.2	-0.1	-0.1
Sweden	5.7	725	5.1	5.2	3.0
Switzerland	10.5	757	9.3	5.1	3.0
Turkey	-7.4	1,280	-8.3	-7.2	-3.0
United Kingdom	-2.8	3,245	-0.6	-1.2	-1.2
Western Hemisphere					
Argentina	-0.8	589	-0.8	0.5	0.5
Brazil	-3.4	2,730	-3.4	-3.4	-3.0
Canada	-3.1	2,274	-2.5	-2.4	-2.4
Chile	-4.6	407	-3.0	-2.4	-2.4
Colombia	-3.2	496	-2.7	-2.6	-2.6
Mexico	-1.3	1,730	-1.7	-1.2	-1.2
United States	-2.7	21,556	-3.0	-2.7	-2.7
Venezuela	2.8	428	-2.4	-3.9	-3.9

IMF = International Monetary Fund

Sources: IMF (2013b); author's calculations.

judged that there was great uncertainty about the future current account balance because of the sharp decline in the yen, the temporary impact of energy shortages, and possible effects of the new macroeconomic framework. The review placed the underlying current account in mid-2013 at 3 percent of GDP (almost 2 percent of GDP higher than the prospective 2013 outcome of 1.2 percent in table 3). The IMF staff judged that higher growth and higher inflation could reduce the medium-term current account to 1.5 percent of GDP, or 1 percent below its norm of 2.5 percent for Japan, but there was even greater uncertainty on the upside: 2 percent of GDP above that norm (that is, an upside level of 4.5 percent of GDP). Considering that the concept in the present study as well as the WEO is the current account that would result from continuation of the present real effective exchange rate, the lower range can be ignored (because it explicitly would require real appreciation). The estimate used here, a medium-term surplus of 3.8 percent of GDP, is obtained by taking the average of the IMF staff's estimate of the present underlying balance (3 percent) and the upper bound of its uncertainty range (4.5 percent).¹⁴

Finally, the medium-term current account projections for China warrant comment. The October WEO reduces China's average growth rate in 2014–18 from 8.4 percent in the April WEO to 7.0 percent, implying that by 2018 real output will be 6.5 percent lower than previously expected. Usually a larger trade surplus would be associated with slower growth if the main influence is slower expansion of domestic demand, yet the 2018 current account projection is almost unchanged (at 4.1 percent of GDP versus 4.3 percent in the April WEO). No attempt is made here to make a special adjustment for any possible resulting understatement of the medium-term surplus.

FEERS ESTIMATES

With the adjusted medium-term current account estimates in hand, the next step in arriving at FEERS is to calculate the corresponding target change in the current account. The standard criterion of this series is once again applied: Current account imbalances should be no wider than ± 3 percent of GDP. The final column in table 3 sets a ceiling of +3 percent and a floor of -3 percent of GDP for the target current account; otherwise the target merely repeats the adjusted 2018 estimate. Exceptions are made for oil-exporting countries (Norway, Russia, Saudi Arabia, Venezuela), for which no limits are set

14. Note further that the Article IV review finds that “adjusting the EBA [External Balance Assessment] REER results for the sharp depreciation since 2012 staff assesses that the REER is moderately undervalued with a mid-point of -5 percent, but an unusually wide range of -20 percent undervaluation to 10 percent overvaluation reflecting significant uncertainty and market volatility.” (IMF 2013e, 41).

(so that the “target” current account remains the same as the baseline adjusted estimate).¹⁵

Table 4 then shows the elements of the FEERS calculation. The first column indicates the target change in the current account (percent of GDP). The second column shows the change achieved in the SMIM model calculation, which by definition cannot yield exactly the set of changes desired.¹⁶ The simulation results turn out to yield somewhat larger than targeted current account increases for both excessive-deficit countries and countries with zero targeted current account

The size of the targeted correction for China is again moderate, at about a one percent of GDP reduction in the surplus, in sharp contrast to estimates four or five years ago when China's prospective surplus was far higher.

change (by about 0.3 to 0.4 percent of GDP), and somewhat smaller than targeted current account decreases for excessive-surplus countries (0.4 to 0.5 percent of GDP). Otherwise the aggregate of the reductions in surpluses of excess-surplus economies (China, Hong Kong, Japan, Singapore, Sweden, Switzerland, Taiwan) would significantly exceed the aggregate of the reductions in deficits of excess-deficit countries (Brazil, New Zealand, Poland, South Africa, Turkey).

Several patterns that have become familiar in recent FEERS estimates are present once again. The size of the targeted correction for China is again moderate, at about a one percent of GDP reduction in the surplus, in sharp contrast to estimates four or five years ago when China's prospective surplus was far higher. A large surplus reduction is once again targeted for Singapore at about 11 percent of GDP, almost unchanged from the May 2013 estimate. Japan's targeted correction is a reduction of around half of one percent of GDP, down from somewhat more than one percent in the previous estimate.¹⁷ Targeted surplus reductions are also somewhat smaller than

15. The rationale is that an oil-exporting country is converting natural resource wealth into financial assets, and therefore could reasonably be expected to run larger current account surpluses than would otherwise be warranted. Note, however, that in the current round of estimates, two oil-exporting countries—Russia and Venezuela—are expected to run deficits rather than surpluses.

16. This is because the system is overdetermined, with more equations than endogenous variables. See Cline 2008.

17. The change reflects the lower estimate of the medium-term surplus, at 3.8 percent of GDP instead of 4.6 percent in the April-base round. As discussed above, special estimates are used for the Japan baseline in both the present calculations and the April-base estimates.

Table 4 Results of the simulation: Principal 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 October 2013	Percentage change	
Pacific							
Australia*	0.0	0.3	0.0	-1.6	0.95	1.9	0.97
New Zealand*	4.2	4.6	-16.4	-17.7	0.83	-14.9	0.71
Asia							
China	-1.2	-0.9	5.0	3.6	6.10	5.9	5.77
Hong Kong	-2.6	-2.2	5.3	4.4	7.75	9.4	7.09
India	0.0	0.3	0.0	-1.3	61.6	0.6	61.3
Indonesia	0.0	0.3	0.0	-1.4	11,346	3.9	10,918
Japan	-0.8	-0.5	5.1	3.7	98	6.6	92
Korea	0.0	0.5	0.0	-1.3	1,066	1.9	1,046
Malaysia	0.0	0.7	0.0	-1.5	3.18	4.3	3.05
Philippines	0.0	0.3	0.0	-1.4	43.1	3.8	41.6
Singapore	-11.5	-10.7	23.1	21.4	1.24	24.5	1.00
Taiwan	-4.6	-4.0	10.2	9.0	29.4	13.5	25.9
Thailand	0.0	0.7	0.0	-1.4	31.2	2.4	30.5
Middle East/Africa							
Israel	0.0	0.3	0.0	-1.0	3.54	-0.4	3.55
Saudi Arabia	0.0	0.5	0.0	-1.1	3.75	1.7	3.69
South Africa	1.8	2.1	-7.2	-8.2	9.91	-6.8	10.63
Europe							
Czech Republic	0.0	0.4	0.0	-0.8	18.8	-1.7	19.1
Euro area*	0.0	0.5	0.0	-2.0	1.36	-1.5	1.34
Hungary	0.0	0.4	0.0	-0.8	216	-1.5	219
Norway	0.0	0.3	0.0	-1.0	5.95	-1.1	6.01
Poland	0.8	1.1	-2.1	-3.1	3.07	-4.0	3.19
Russia	0.0	0.2	0.0	-0.9	32.1	-1.0	32.4
Sweden	-2.2	-1.8	5.9	4.7	6.41	4.0	6.16
Switzerland	-2.1	-1.8	4.7	3.9	0.90	3.8	0.87
Turkey	4.2	4.4	-17.5	-18.5	1.98	-18.4	2.43
United Kingdom*	0.0	0.3	0.0	-1.1	1.61	-1.2	1.59
Western Hemisphere							
Argentina	0.0	0.3	0.0	-1.5	5.85	-1.9	5.96
Brazil	0.4	0.6	-2.9	-4.6	2.19	-3.4	2.27
Canada	0.0	0.2	0.0	-0.6	1.04	0.1	1.04
Chile	0.0	0.4	0.0	-1.3	501	0.2	501
Colombia	0.0	0.2	0.0	-1.1	1,885	-0.7	1,897
Mexico	0.0	0.2	0.0	-0.6	13.0	0.2	13.0
United States	0.0	0.4	0.0	-1.7	1.00	0.0	1.00
Venezuela	0.0	0.2	0.0	-0.9	6.29	0.2	6.28

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

FEER = fundamental equilibrium exchange rates

REER = real effective exchange rate

Source: Author's calculations.

in the May calculations for Sweden and Switzerland (both at about 2 percent of GDP rather than 4 to 5 percent). Significant targeted surplus reductions are also once again identified for Taiwan (albeit by somewhat less than before) and Hong Kong.

The cases with targeted increases in current account outcomes are also familiar and somewhat more moderate than before. Needed improvements are about 4 percent of GDP in Turkey (down from about 6 percent in the May estimates) and 2 percent of GDP in South Africa (down from 3 percent); the needed improvement of 4.6 percent of GDP in New Zealand remains almost unchanged from the previous estimate.

The next two columns in table 4 show the corresponding targeted changes in REERs, first the direct target estimate and second the achieved change in the SMIM simulation. For the four largest economies, the estimated changes in the REERs are relatively small. Both China and Japan show needed REER appreciations of about 5 percent, calculated directly (column 3), or about 4 percent after taking account of international consistency in the SMIM model (column 4). Both the euro area and the United States have zero change in the REER called for in the direct individual calculations and REER depreciations of about 2 percent after taking account of international consistency (as discussed above).¹⁸ Large effective depreciations of about 18 percent are called for in the cases of New Zealand and Turkey, and a still sizable depreciation of 8 percent is indicated for South Africa. The needed corrections are smaller than before for Turkey and South Africa, however (the May estimates identified needed REER depreciations of 30 percent and 13 percent, respectively).

Needed REER appreciations are again extremely high for Singapore (21 percent in the simulation results), high for Taiwan (about 9 percent), and at a moderate benchmark of about 4 percent for Japan, China, Hong Kong, Sweden, and Switzerland. The needed corrections are smaller than before for Sweden, Japan, and Switzerland (compared to 12 percent, 10 percent, and 9 percent appreciations indicated in the May estimates). The needed appreciation for China is slightly larger than before, primarily reflecting the lower current account impact parameter obtained in the updated estimates of appendix B.¹⁹

The remaining columns of table 4 translate the results into corresponding nominal bilateral rates against the dollar. The fifth column indicates the actual average rate against the dollar in October. Next, the penultimate column shows the

percent change needed in the nominal rate against the dollar to be consistent with the simulation results for changes in real effective exchange rates. The final column indicates the nominal rate against the dollar when this percent change is applied to the actual October exchange rate. Figure 3 shows the simulation results for the changes needed in the REER as well as in the nominal bilateral rate against the dollar.

The FEER-consistent bilateral rates against the dollar are practically unchanged from the May estimates for numerous economies, including the euro area, China, Hong Kong, Australia, and New Zealand.²⁰ However, the new FEER-consistent rate against the dollar is 9 to 14 percent weaker than before for Argentina, Brazil, India, Indonesia, and Thailand. In all of these cases the actual rate fell by broadly comparable amounts from April to October (table 1). The tendency for the FEER-consistent bilateral rate against the dollar to move with the actual rate reflects “path dependency,” as discussed in Cline and Williamson (2012b, 13). This phenomenon occurs because the wide range allowed for the current account (± 3 percent of GDP) means there can be a large change in the prospective current account without triggering a new estimate of the required percent change (if any) in the REER to reach the FEER. If there is no change in the prescribed percent change in the FEER, but the actual bilateral rate against the dollar is substantially lower in the new base period than before, then a correspondingly lower FEER-consistent bilateral rate will be calculated than in the previous estimate.

This paradox is compounded when the IMF medium-term projections used show elasticity pessimism, such that the needed correction is not much changed, even if there has been a substantial exchange rate change. Thailand illustrates this case (zero target for REER change in both April and October but a FEER-consistent bilateral rate against the dollar that is 9 percent lower in the new estimate, paralleling the 7.3 percent actual reduction in the bilateral rate in the interim). Correlation of the change in the FEER-consistent bilateral rate with the actual bilateral rate is relatively frequent.²¹ However, Turkey illustrates the opposite case when there is an absence of path dependency because the imbalance is large and well outside the 3 percent of GDP limit. In such a case the FEER-consistent bilateral rate against the dollar will tend to remain unchanged as the currency falls but the size of the remaining needed adjustment from the new exchange rate level declines. As it turns out, for Turkey the FEER-consistent bilateral rate is slightly *stronger* in the new estimates than in the April-base estimates, despite a 10 percent

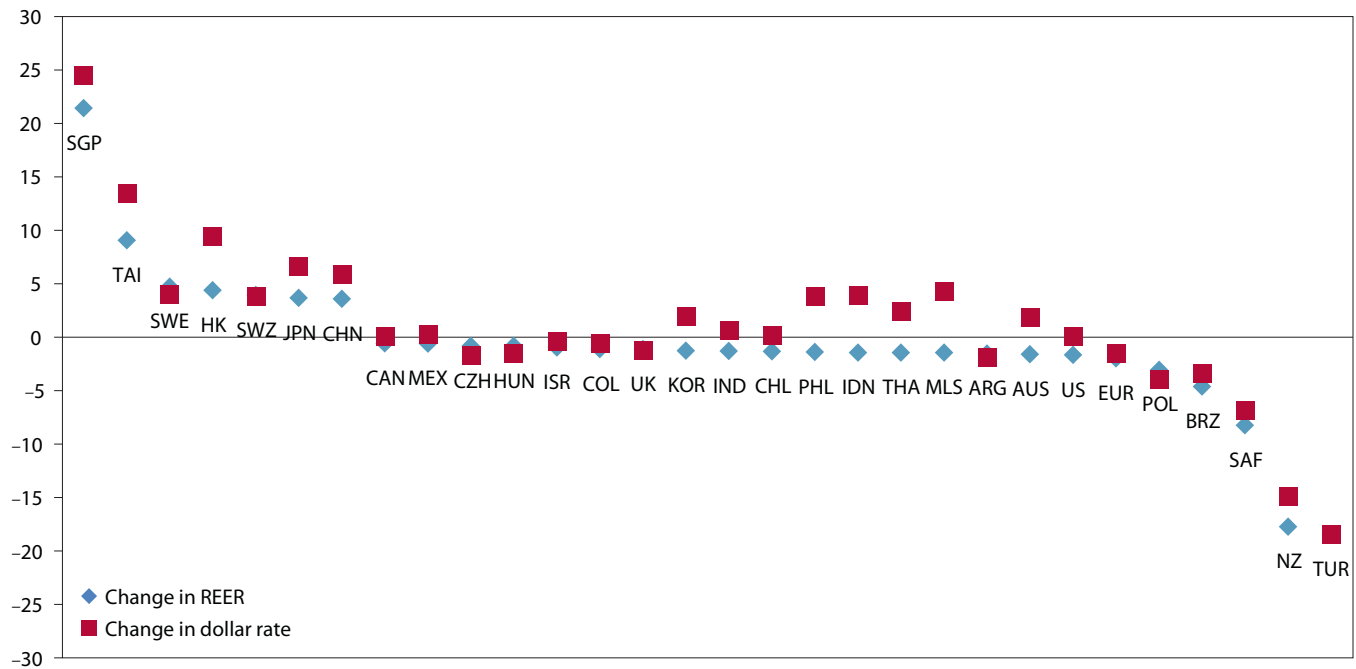
18. However, if an aggressive target of a zero current account balance is set as a floor for rich countries and a ceiling for emerging market economies, as considered in a variant examined in Cline (2013a), the changes would be much larger for China (a REER appreciation of 18.0 percent) and the United States (a REER depreciation of 12.4 percent).

19. With exports falling as a percent of GDP, China's impact parameter has fallen from -0.30 to -0.24 percent of GDP for a 1 percent REER appreciation.

20. Changes against the dollar are less than 1.5 percent.

21. A simple regression of the percent change in the FEER-consistent bilateral rate against the percent change in the actual bilateral rate from April to October 2013 shows a significant coefficient of 0.58 and adjusted R-squared of about 0.5.

Figure 3 Changes needed to reach FEERs (percent)



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

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

Source: Author's calculations.

depreciation against the dollar from April to October, reflecting an absence of path dependency outside the allowed current account band combined with appreciation of the euro and thus of trading partners important to Turkey.

THE EURO AND GERMANY'S SURPLUS

In its semiannual report to Congress on exchange rate policies, in late October the US Treasury (2013, 3) concluded:

“Within the euro area, countries with large and persistent surpluses need to take action to boost domestic demand and shrink their surpluses. Germany has maintained a large current account surplus throughout the euro area financial crisis, and in 2012 Germany’s nominal current account surplus was larger than that of China. Germany’s anemic pace of domestic demand growth and dependence on exports have hampered rebalancing at a time when many other euro-area countries have been under severe pressure to curb

demand and compress imports in order to promote adjustment. The net result has been a deflationary bias for the euro area, as well as for the world economy.”

It is certainly the case that Germany’s current account surplus has been large and persistent. It averaged 6.5 percent of GDP in 2007–12.²² The IMF (2013b) projects that it will be 6 percent for 2013 but also that it will decline to 4.6 percent of GDP by 2018. In the framework of the FEERs analysis, if Germany had its own currency, it would be a candidate for corrective appreciation to reduce the surplus to no more than 3 percent of GDP. Because of the single currency, however, it is necessary to treat the euro area as a single economy for the purposes of this analysis, and the relevant current account becomes that of the euro area as a whole. As shown in table 3, the estimated adjusted current account surplus of the euro

22. Germany’s absolute surplus reached \$238 billion in 2012, larger than the \$194 billion for China. China is projected to return to the largest absolute surplus in 2013, at \$224 billion compared to \$215 billion for Germany (IMF 2013b).

area in 2018 is 2.6 percent of GDP, within the allowed band of 3 percent of GDP.

Model simulations by the IMF (2013g, 23) indicate that fiscal expansion in Germany would do little to boost real GDP in the troubled euro area periphery. A fiscal stimulus of 1 percent of GDP sustained for two years would boost real GDP of euro area partners by a maximum of 0.2 percent of GDP, and even this effect would be concentrated in the Czech Republic, Austria, the Netherlands, and Belgium rather than the debt-stressed periphery.²³ Germany's own output gap is close to zero, so fiscal stimulus alone would not be appropriate solely from Germany's standpoint.²⁴ With output at poten-

... [A]lthough there may be some room for Germany to move in the direction called for by the US Treasury, it may be unrealistic to expect a large move with large results. ... The spillovers to the debt-stressed economies of the euro area periphery from its action would be relatively limited.

tial, the multiplier in real terms would be expected to be low or zero. Yet Germany does not control monetary policy and thus cannot pursue fiscal expansion accompanied by monetary tightening—the usual means of shifting the composition of demand from net exports to domestic demand by bidding up the exchange rate.

Germany's fiscal balance is projected at a deficit of 0.4 percent of GDP in 2013. Its gross public debt is projected at 80 percent of GDP (IMF 2013b). To meet the euro area rule of reducing the excess of debt above 60 percent of GDP in steps of one-twentieth annually, and with medium-term growth at 1.3 percent and inflation at 1.7 percent, the medium-term deficit could be allowed to average as high as 2 percent of GDP.²⁵ In principle, then, a fiscal stimulus that raised the deficit by about 1.5 percent of GDP would remain consistent

with the long-term debt objective. With the German economy already at potential output, there could be some inflationary consequences, although a modest increase in inflation would still leave it close to the euro area ceiling target of 2 percent. A fiscal stimulus could in principle be complemented with an "internal revaluation," switching demand from exports to domestic demand rather than boosting total demand. For this purpose, a "fiscal revaluation" could reduce taxes on consumption (VAT) and increase those on labor and capital; alternatively, Germany could pursue "wage inflation."²⁶ Internal revaluation is an even more untried strategy than internal devaluation, however.

These considerations suggest that although there may be some room for Germany to move in the direction called for by the US Treasury, it may be unrealistic to expect a large move with large results. Germany does not control its own currency and is already at a near-zero output gap. The spillovers to the debt-stressed economies of the euro area periphery from its action would be relatively limited.

CONCLUSION

Despite widespread concern that prospective tapering in US quantitative easing has wreaked havoc in international capital and currency markets, exchange rate misalignments have tended to narrow in the past six months. Spurred by the taper shock, overvalued currencies have corrected downward in Turkey, South Africa, India, Indonesia, and even Australia. At the same time, medium-term surplus estimates have moderated in Taiwan, Sweden, Switzerland, and Japan, narrowing the extent of their undervaluations.²⁷ Cases of large misalignments persist, however, with Singapore once again undervalued by 21 percent, New Zealand again overvalued by nearly 18 percent, and Turkey still overvalued by 18 percent despite some correction.

23. "Countries in the euro area periphery would receive relatively small spillovers, reflecting weak trade links for the smaller economies (Greece, Portugal) and the large size of countries with stronger trade ties to Germany (such as Italy and Spain)." (IMF 2013g, 23).

24. The output gap was +0.3 percent of GDP in 2012 and is projected at -0.4 percent in 2013 and -0.2 percent in 2014.

25. With a deficit of zero, the debt ratio would decline annually by the rate of nominal GDP growth, or 3 percent. The need to cut the debt ratio by 1 percent of GDP annually would reduce the fiscal space to a deficit of 2 percent of GDP.

26. See the discussion on the obverse cases of internal devaluation and fiscal devaluation in Cline and Williamson (2011b, 10–11).

27. Note, however, that the somewhat lower estimate for Japan (3.8 percent of GDP surplus in 2018 instead of 4.6 percent in the May estimates) reflects my different treatment in arriving at the "adjusted" estimate, rather than a change in the WEO projection.

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APPENDIX A

ALTERNATE CURRENT ACCOUNT PROJECTIONS

The medium-term projections of the most recent *World Economic Outlook* (WEO) of the International Monetary Fund (typically available in April and again in October) serve as the baseline for calculating fundamental equilibrium exchange rates (FEERs) in the semiannually updated series begun in Cline and Williamson (2008). The Fund's current account projections tend to be insensitive to the real exchange rate, however, which can occasionally make it important to determine an alternative baseline for a country with a large exchange rate change. For example, although the real effective exchange rate (REER) for Japan fell by 18.8 percent from the base period of the October 2012 WEO to that of the April 2013 WEO, the projected medium-term current account surplus declined slightly.²⁸ Instead, with the current account impact parameter used in the SMIM parameter set, Japan's medium-term current account surplus could have been expected to rise by 2.9 percent of GDP.²⁹

The announcement in May 2013 of “tapering” of US quantitative easing provoked a widespread reversal of previous capital flows to emerging markets, spurring significant declines in a

number of exchange rates. Once again the subsequent WEO showed only limited current account changes despite large exchange rate changes. Especially when there are numerous large movements in real exchange rates, it seems necessary to base the FEERs analysis on current account projections that go beyond the WEO estimates and in particular allow for greater responsiveness of current account changes to real exchange rate changes.

For a subset of economies with large exchange rate changes, set at a threshold of a move by 5 percent or more in the REER, alternative estimates of the medium-term current account can be calculated as follows. The expected change from the previous WEO can be calculated as the percent change in the REER between the two base periods multiplied by the current account impact parameter for a 1 percent change in the REER. (Updated estimates for this parameter are presented in appendix B). If this expected change is larger than the change reported in the WEO between the previous and current issue by more than 1 percent of GDP, incorporation of some weight to an alternative estimate is deemed warranted.

Table A.1 reports the results of this calculation for the set of countries that meet these criteria. For these economies, a weight of 50 percent is applied to this alternative estimate of the change in the projected current account, with 50 percent weight applied to the most recent WEO estimate. This synthetic estimate for the exchange rate of the most recent WEO period is then applied as the estimate that is then further adjusted for the change in exchange rate to the period of the present study to obtain the “adjusted” current account estimate of the main text (table 3).

28. The exchange rate base periods were July 30–August 27, 2012 and February 11–March 11, 2013, respectively. The medium-term surplus was 1.9 percent of GDP in 2017 in the earlier projection and 1.7 percent of GDP in 2018 in the later one (IMF 2012, 2013a).

29. The impact parameter for Japan is: $\gamma = -0.148$. See appendix B.

Table A.1 Predicted versus WEO-estimated changes in current account for countries with REER changes exceeding 5 percent^a

Country	April WEO 2018 current account (percent of GDP)	October WEO 2018 current account (percent of GDP)	Change (percent of GDP)	Change in REER between WEO bases* (percent change)	Predicted change in current account (percent of GDP)	Predicted change–WEO change (percent of GDP)	Weighted alternative 2018 current account (percent of GDP)
Australia	-5.6	-4.0	1.6	-8.7	1.7	0.1	-3.9
Brazil	-3.4	-3.4	0.1	-13.2	1.6	1.5	-2.6
Chile	-2.8	-3.0	-0.2	-5.4	1.6	1.8	-2.1
India	-3.4	-2.8	0.5	-6.2	1.4	0.8	-2.4
South Africa	-6.0	-5.7	0.3	-7.6	1.9	1.6	-4.9
Turkey	-8.4	-8.3	0.1	-5.9	1.4	1.3	-7.7

IMF = International Monetary Fund
WEO = World Economic Outlook

* April: February 11–March 11; October: July 29–August 26

a. Excluding oil exporters.

Sources: IMF (2013a, b); author's calculations.

APPENDIX B

UPDATED IMPACT PARAMETERS AND
COMPARISON TO IMF ESTIMATES

A key parameter in arriving at the fundamental equilibrium exchange rate (FEER) is the change in the current account, as a percent of GDP, for a 1 percent change in the real effective exchange rate (REER). As developed in Cline (2005, 252), this parameter “ γ ” depends on the price elasticity of exports and the share of exports in GDP.³⁰ Table B.1 updates this parameter using data for 2012. As in the past, the parameter for the United States is estimated from a current account simulation model rather than the summary equation based on export share and incorporates the influence of interest on cumulative debt positions (Cline and Williamson 2011a, 17).

Table B.1 also reports the implied corresponding parameter estimated by the International Monetary Fund (IMF) in the External Balance Assessment (EBA) of its Pilot External Sector Report (IMF 2013f). That report provides country estimates of the extent to which the cyclically-adjusted current account exceeds the level “consistent with fundamentals and desirable policies” and a corresponding estimate of the extent

30. The parameter is calculated as: $\gamma = -1.056x + 0.56x^2$, where x is the ratio of exports of goods and services to GDP, subject to a maximum of 0.5 for the absolute value of γ .

to which the real effective exchange rate differs from the level “consistent with fundamentals and desirable policies.” The current account divergence is expressed as a percent of GDP and the REER divergence as a percent, so the ratio of the former to the latter is equivalent in concept to the parameter “gamma” in this study.³¹

As indicated in the table, for most countries the IMF’s implied value for the impact parameter is relatively close to that in the method applied in this study, although the γ estimates of this study are moderately larger than those implied in the IMF EBA estimates.³² There is one major exception: Switzerland. The IMF’s curious finding that Switzerland, despite having an excessive surplus, should nonetheless depreciate to be consistent with fundamentals and desirable policies (IMF 2013f, 28) gives the implied impact parameter for Switzerland the wrong sign, an exceptional estimate that should be ignored.

31. Because the IMF gives a range for both the current account divergence and the real exchange rate divergence, the calculation here takes the ratio at the midpoints of the two respective ranges. For those cases in which the midpoint of the exchange rate divergence is zero, the average is taken of the ratio of the high current account divergence divided by the high (in absolute terms) REER divergence, and the corresponding ratio for the two low-divergence cases.

32. The ratio of this study’s γ to the IMF counterpart (next to last and final columns in table B.1) has a median value of 1.28, with the 25th percentile at 0.92 and the 75th percentile at 1.48.

Table B.1 Export/GDP ratio, current account impact parameter, and comparison to implied IMF EBA impact parameter

Country	Exports of goods and services/GDP		Current account impact parameter γ		EBA-implied γ
	2010	2012	Previous	Updated	
Pacific					
Australia	0.22	0.20	-0.21	-0.19	-0.16
New Zealand	0.31	0.29	-0.27	-0.26	
Asia					
China	0.35	0.26	-0.30	-0.24	-0.26
Hong Kong	2.12	2.14	-0.50	-0.50	-0.21
India	0.24	0.23	-0.22	-0.22	-0.20
Indonesia	0.25	0.24	-0.23	-0.22	-0.20
Japan	0.16	0.15	-0.15	-0.15	-0.10
Korea	0.54	0.59	-0.41	-0.43	-0.48
Malaysia	1.04	0.87	-0.50	-0.49	-0.36
Philippines	0.35	0.26	-0.30	-0.24	
Singapore	2.34	2.01	-0.50	-0.50	-0.80
Taiwan	0.64	0.64	-0.45	-0.44	
Thailand	0.71	0.75	-0.47	-0.48	-0.20
Middle East/Africa					
Israel	0.38	0.36	-0.32	-0.31	
Saudi Arabia	0.68	0.56	-0.46	-0.42	
South Africa	0.28	0.28	-0.25	-0.25	-0.20
Europe					
Czech Republic	0.78	0.76	-0.48	-0.48	
Euro area	0.22	0.27	-0.21	-0.24	-0.18
Hungary	0.81	0.90	-0.49	-0.50	
Norway	0.42	0.41	-0.34	-0.34	
Poland	0.42	0.46	-0.34	-0.37	-0.20
Russia	0.30	0.29	-0.27	-0.26	-0.20
Sweden	0.49	0.48	-0.38	-0.38	-0.51
Switzerland	0.65	0.64	-0.45	-0.45	0.42
Turkey	0.21	0.26	-0.20	-0.24	-0.16
United Kingdom	0.29	0.31	-0.26	-0.27	-0.20
Western Hemisphere					
Argentina	0.22	0.20	-0.21	-0.19	
Brazil	0.14	0.13	-0.14	-0.12	-0.19
Canada	0.29	0.30	-0.26	-0.27	-0.21
Chile	0.40	0.34	-0.33	-0.29	
Colombia	0.16	0.18	-0.15	-0.17	
Mexico	0.30	0.33	-0.27	-0.29	-0.20
United States	0.13	0.14	-0.21	-0.21	-0.23
Venezuela	0.23	0.26	-0.22	-0.24	

Sources: IMF (2013d, f); author's calculations.