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Estimates of Fundamental Equilibrium Exchange Rates, November 2020

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November 24, 2020

This study updates estimates of Fundamental Equilibrium Exchange Rates (FEERs) using October 2020 as the base month. These new estimates take as their point of departure the most recent issue of the World Economic Outlook (WEO) of the International Monetary Fund (IMF, 2020a,c). I apply the real effective exchange rate series of the Bank of International Settlements to take account of changes in real exchange rates subsequent to the base period used in the WEO.

The Coronavirus Shock and Exchange Rates

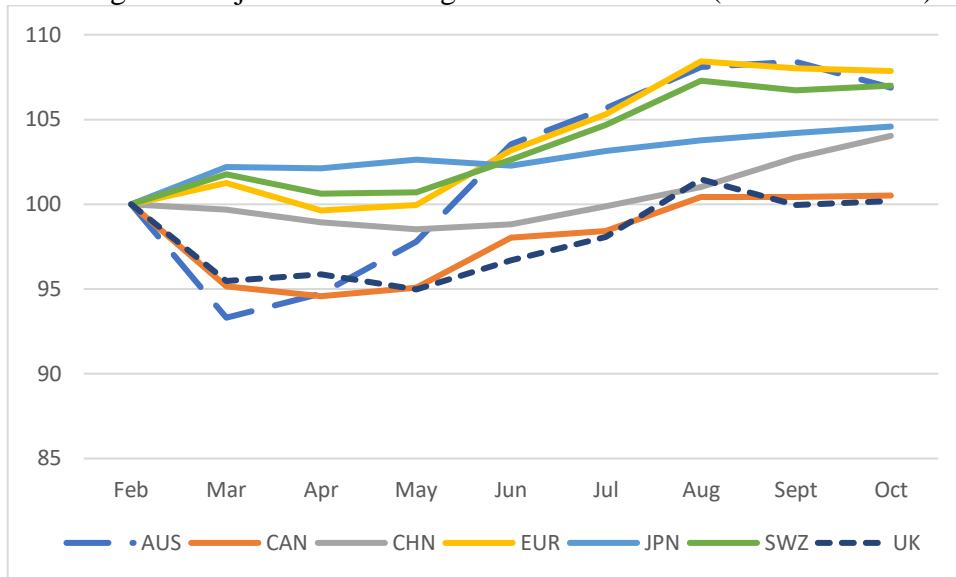
Three forces have driven major exchange rate moves over the past nine months: the risk-off, safe-haven effect in the initial phase of the pandemic (March-April), the Zero Interest Rate Policy (ZIRP) of the Federal Reserve in response to the crisis, and Pandemic Response Performance (PRP) by June and thereafter. The initial surge of the US dollar against other currencies from the safe-haven effect has subsequently been reversed by ZIRP and PRP.

As shown in Figure 1, in March and April there were sharp declines in the currencies of Brazil, Mexico, and South Africa, against the US dollar, as well as significant declines in the Australian dollar, Canadian dollar, and pound sterling. In contrast, the Euro, Japanese yen, and Swiss franc rose modestly against the dollar, as they were alternative safe-haven currencies and also as a consequence of the sharp reduction in the US interest rates. From March 2 to March 16 the Federal Reserve cut the effective Federal Funds rate from 1.59 percent to 0.25 percent (Federal Reserve Board of St Louis, FRED). By August the US dollar was well below its February level against the euro and Australian dollar and had also eased against the yen. It is difficult to escape the conclusion that far superior Pandemic Response Performance in Australia, Japan, and the euro area through July compared to that of the US contributed to this outcome. Figure 2 shows a sharp decline of the Brazilian Real and the Mexican peso against the dollar, in part reflecting Brazil's poor response to the pandemic, and a significant rise in the Korean won, reflecting Korea's outstanding response to it.²

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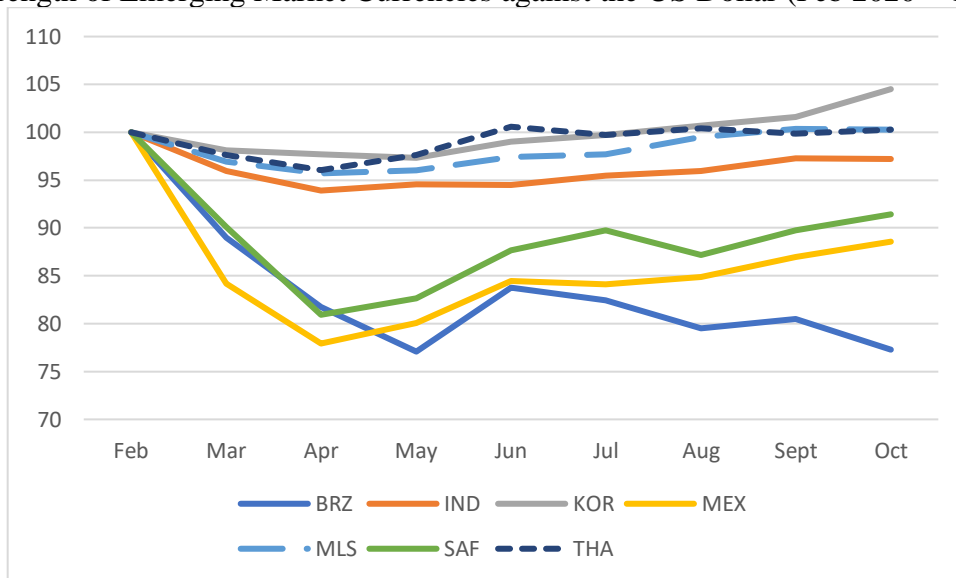
² Exchange rate data for figures 1 and 2 are from the Federal Reserve (2020a).

Figure 1
Strength of Major Currencies against the US Dollar (Feb 2020 = 100)



Source: Calculated from Federal Reserve (2020)

Figure 2
Strength of Emerging Market Currencies against the US Dollar (Feb 2020 = 100)



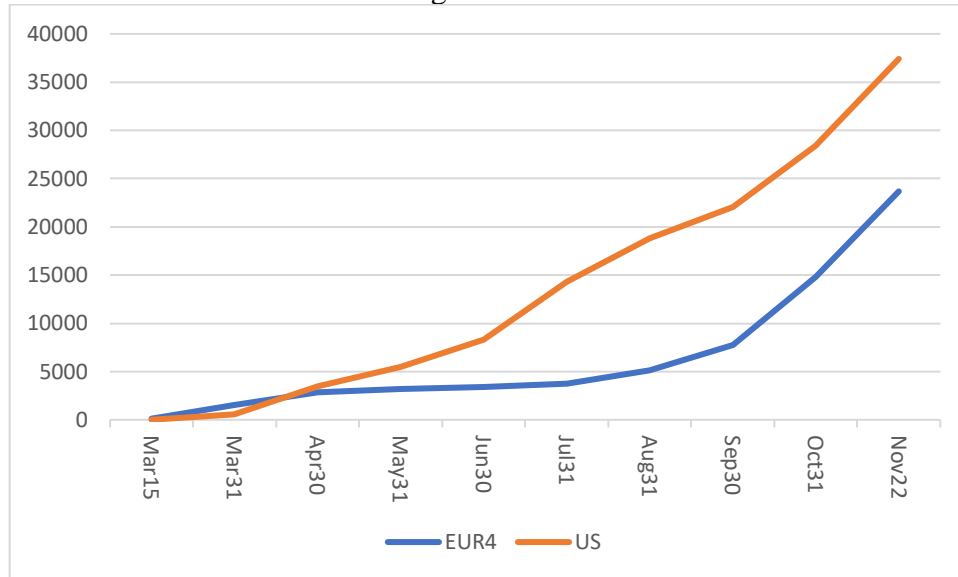
Source: Calculated from Federal Reserve (2020a)

The influence of relative performance on the pandemic at first favored the dollar relative to the euro. The euro rose only from an average of \$1.09 in February to \$1.10 in March, and eased back to \$1.09 in April-May, despite the sharp drop in US interest rates. As US cases escalated in the summer in the face of stabilization in Europe, the euro strengthened to an average of \$1.13 in June, \$1.15 in July, and \$1.18 in August, where it remained through late November. The halt to the euro's rise coincided with the reversal, beginning in August, toward

faster escalation in covid-19 cases in the four large euro economies than in the United States, as shown in figure.³

Figure 3

Cumulative Covid-19 Cases per Million Population:
US and Four Largest Euro Area Countries^a



a. France, Germany, Italy, Spain
Source: Worldometer (2020).

Table 1 reports changes in real bilateral exchange rates against the US dollar for 32 major economies, from the average in the fourth quarter of 2019 to the average in the third quarter of 2020. The table orders the estimates from highest to lowest.

Table 1 underscores the major real declines of the bilateral exchange rates of Mexico, South Africa, and Brazil even after taking account of their cumulative domestic inflation over the three-quarter period relative to that of the United States. It adds countries not covered in the Federal Reserve data shown in figures 1 and 2, and shows the sharp declines in the real exchange rates of Russia and Turkey. The European currencies tend to show real bilateral appreciations against the dollar in the range of 5 percent from the fourth quarter of 2019 to the third quarter of 2020. Ironically, Argentina also shows a real appreciation of 5 percent, but as the consequence off high domestic inflation that exceeds a large nominal depreciation.⁴

³ From the end of April to the end of July, cumulative cases rose only 30 percent in the four euro-area economies, but soared 316 percent in the United States. Then from the end of July to November 22, the additional increase in cases amounted to 160 percent in the US but reached 534 percent for the four European countries.

⁴ Argentina's inflation is not projected by the IMF. The rate shown in the table is an estimate for the year ending June (see: <https://tradingeconomics.com/argentina/inflation-cpi>).

Table 1
Real Bilateral Exchange Rate Change against the US Dollar
from 2019:Q4 to 2020:Q3 (percent)

Country	nominal change	annual inflation	real change
Sweden	8.5	0.8	7.9
Switzerland	7.6	-0.8	5.8
Philippines	4.3	2.4	5.0
Argentina	-19.0	43.0	4.8
Euro area	5.6	0.3	4.6
Australia	4.6	0.7	4.0
Czech Republic	1.9	3.3	3.3
Poland	1.9	3.3	3.2
New Zealand	2.9	1.7	3.0
China	1.9	2.9	2.9
Taiwan	3.9	-0.1	2.7
Saudi Arabia	0.0	3.6	1.5
Japan	2.4	-0.1	1.2
Hungary	-0.9	3.7	0.6
Israel	2.2	-0.5	0.6
Hong Kong SAR	1.0	0.4	0.1
United States	0.0	1.5	0.0
United Kingdom	0.4	0.8	-0.2
Norway	-0.2	1.4	-0.3
Canada	-0.9	0.6	-1.6
Korea	-1.0	0.5	-1.7
India	-4.2	4.9	-1.8
Singapore	-0.8	-0.4	-2.2
Chile	-3.3	2.9	-2.4
Malaysia	-0.9	-1.1	-2.8
Indonesia	-4.2	2.1	-3.8
Thailand	-3.4	-0.4	-4.8
Colombia	-8.7	2.4	-8.1
Mexico	-12.8	3.4	-11.6
South Africa	-12.9	3.3	-11.7
Russia	-13.6	3.2	-12.5
Turkey	-19.9	11.9	-13.8
Brazil	-23.4	2.7	-22.7

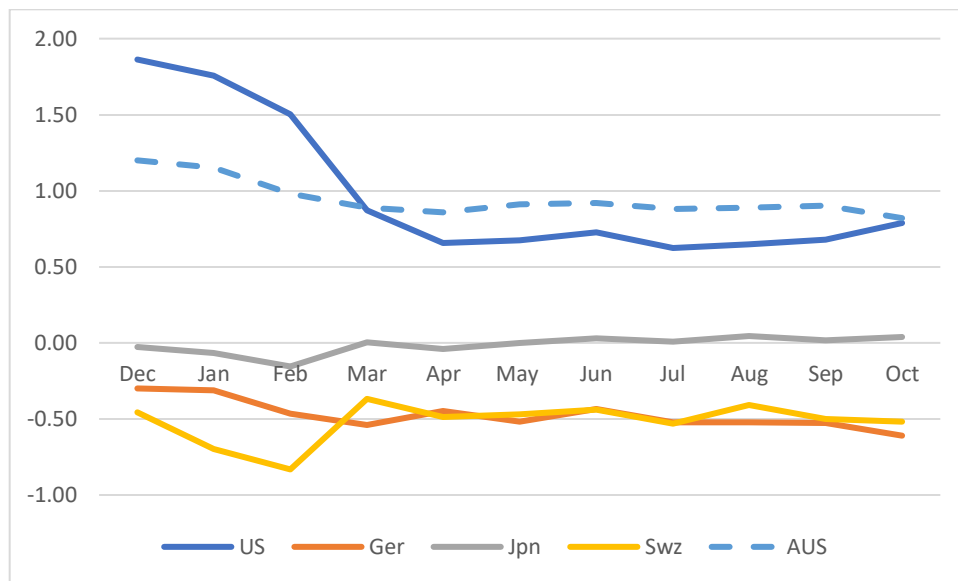
Source: Calculated from BIS (2020a) and IMF (2020)

The sharp declines in the currencies of Brazil, South Africa, and Mexico reflected large capital outflows provoked by the pandemic. From end-February to end-June, reductions in holdings of local currency government debt, primarily by non-residents, amounted to 2.1 percent of GDP in South Africa, 1.4 percent in Brazil, and 1.1 percent in Mexico (IMF, 2020b, p. 40).⁵ As central banks and domestic banks purchased more than compensating amounts, local currency government debt rose by almost 4 percent of GDP in South Africa and 0.8 percent in Brazil (but remained unchanged in Mexico). The net effect was to provide monetary ease to confront recession but in a fashion that placed downward pressure on currencies.

As noted, the rise of European and several other major currencies against the dollar reflects a decline in differential between US interest rates and those in other key advanced economies, in addition to differential success in containing the pandemic. Figure 4 show the yield on the 10-year government bond for the United States, Germany, Japan, Switzerland, and Australia from December 2019 through October 2020. Against these four economies, the simple average interest differential for the US fell from 175 basis points in December 2019 and 162 basis points in February to a low of 65 basis points in August before widening modestly to 86 basis points in October.

Figure 4

Yield on the 10-year Government Bond
(percent)



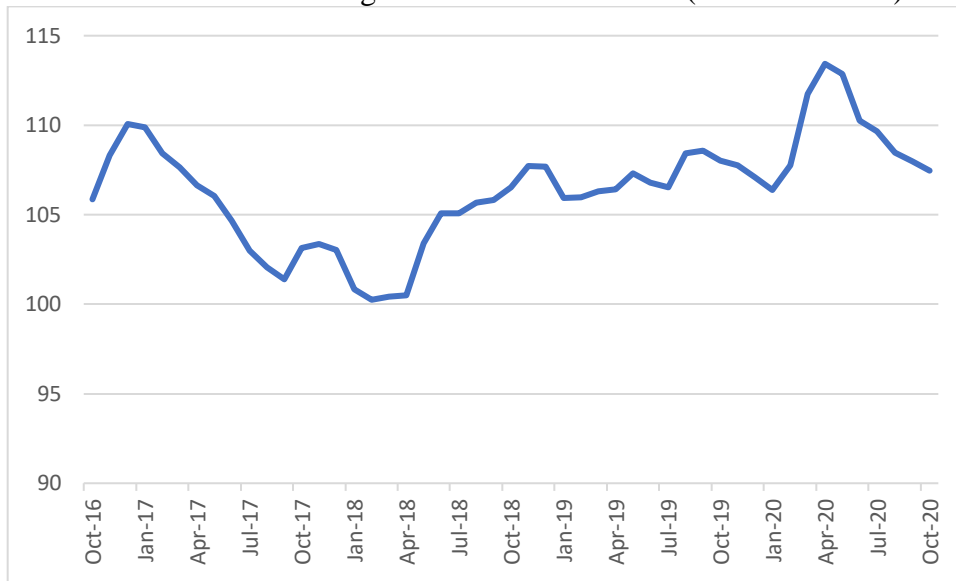
Source: FRED (2020)

The broad real effective exchange rate of the US dollar as calculated by the Federal Reserve rose 5.3 percent from February to April in the initial pandemic shock, as shown in Figure 5. Thereafter it eased back to the February level by October, which was also the same

⁵ Non-residents accounted for almost all of the reduction in holdings in South Africa, but non-bank domestic holdings were almost one-fourth of the reductions in Brazil and one-sixth in Mexico.

level as in December 2019. Even so, the real effective exchange rate (REER) of the US dollar still remains toward the higher end of the range it has traversed in the Trump administration.⁶ The present strength of the dollar in part reflects the high weight of Canada and Mexico in US trade, as the currencies of both (especially the peso) remain weaker relative to the US dollar than before the pandemic shock.

Figure 5
Real Effective Exchange Rate of the US Dollar (Jan 2006 = 100)



Source: Federal Reserve (2020b)

Results of the Main Calculations

Table 2 reports the current account projections of the IMF for the 34 countries (with the euro treated as one economy) covered in the FEERs series dating back to 2008.⁷ The first column reports the IMF’s projections of current account balances in 2020 in the October 2020 WEO. The second column reports the Fund’s projection of the current dollar value of GDP for each economy in 2025.

⁶ Figure 5 uses the Federal Reserve’s Broad Real Exchange Rate Index (Federal Reserve, 2020b).

⁷ See the final section of the “Publications” page at econintl.com for links to all issues in this series.

Table 2: Target Current Accounts (CA) for 2025

Country	IMF Projection of 2020 CA (percent of GDP)	IMF 2025 GDP forecast (billions of US dollars)	IMF 2025 CA forecast (percent of GDP)	Adjusted 2025 CA (percent of GDP)	Target CA (percent of GDP)
Pacific					
Australia	1.8	1,755	-2.0	-1.9	-1.9
New Zealand	-2.0	261	-2.9	-2.9	-2.9
Asia					
China	1.3	23,089	0.5	0.2	0.2
Hong Kong	4.4	453	4.0	4.6	3.0
India	0.3	3,959	-2.5	-2.8	-2.8
Indonesia	-1.3	1,533	-1.8	-1.7	-1.7
Japan	2.9	6,014	3.1	3.1	3.0
Korea	3.3	2,030	4.3	3.8	3.0
Malaysia	0.9	518	0.7	0.7	0.7
Philippines	1.6	565	-2.2	-2.1	-2.1
Singapore	15.0	432	14.0	14.0	3.0
Taiwan	9.6	836	9.2	8.9	3.0
Thailand	4.2	666	4.0	4.3	3.0
Middle East/Africa					
Israel	3.5	498	2.8	2.7	2.7
Saudi Arabia	-2.5	895	-0.6	-0.5	-0.5
South Africa	-1.6	407	-2.4	-3.0	-3.0
Europe					
Czech Republic	-0.7	348	1.0	2.1	2.1
Euro area	1.9	17,093	2.5	2.5	2.5
Hungary	-1.6	220	-0.5	0.5	0.5
Norway	2.8	485	4.3	4.7	4.7
Poland	3.0	857	0.1	0.7	0.7
Russia	1.2	1,894	1.8	2.5	2.5
Sweden	3.2	756	3.0	3.2	3.0
Switzerland	8.5	945	9.3	6.4	3.0
Turkey	-3.7	971	-1.4	-0.7	-0.7
United Kingdom	-2.0	3,357	-3.3	-3.2	-3.0
Western Hemisphere					
Argentina	0.7	482	0.7	0.6	0.6
Brazil	0.3	1,891	-0.7	-0.6	-0.6
Canada	-2.0	2,193	-2.2	-2.4	-2.4
Chile	-1.6	368	-0.9	-0.9	-0.9
Colombia	-4.0	352	-3.8	-3.7	-3.0
Mexico	1.2	1,306	-2.0	-2.9	-2.9
United States	-2.1	25,783	-2.0	-1.9	-1.9
Venezuela	-4.1	42 ^a	-4.6 ^a
a. 2022					
... not available					

The third column of the table reports the Fund’s 2025 current account projections. The fourth column then adjusts the 2025 outlook to take account of the change in exchange rates from the base period used in the October WEO to the October base used in this report.⁸ The adjustment applies the percent change in the real effective exchange rate (REER) to the current account impact parameter (“gamma”, the percent of GDP change in the current account for a 1 percent rise in the country’s REER).⁹

The FEERs methodology sets ± 3 percent of GDP as the permissible external imbalance.¹⁰ A deficit of 3 percent of GDP could eventually bring the economy to a precariously high level of net external debt. The ceiling of 3 percent on the surplus is meant to provide symmetry for the purpose of global adding-up. The final column of table 2 accordingly shows the target current account as either ± 3 percent of GDP (the limit) or the actual projected current account if it is within this limiting range. The four oil-exporting economies are exceptions, with no limits imposed because they are primarily transforming resource wealth into financial wealth rather than increasing total wealth.

Table 3 reports the results of running the Symmetric Matrix Inversion Model (SMIM) to obtain the globally-consistent set of exchange rate changes that most closely approximate the target changes of REERs needed to bring the current account imbalances to their target levels (Cline, 2008). The first column shows the target change in the current account as a percent of GDP. This change is the difference between the ± 3 percent limit and the baseline projection for 2025 if it is outside this limit. As usual in this series, there are large required reductions in the surpluses of Singapore (by 11 percent of GDP), Taiwan (by about 6 percent of GDP), and Switzerland (by about 3 percent of GDP). There are also meaningful required reductions for Hong Kong, Thailand, and Korea (by 1.6 percent of GDP, 1.3 percent, and 0.8 percent, respectively). Japan is found to need only a marginal reduction in its surplus (by 0.1 percent of GDP).

Only two of the 34 economies show required improvements in current account balances to limit their deficits to no more than 3 percent of GDP: Colombia (by 0.7 percent of GDP) and the United Kingdom (by 0.2 percent of GDP). There are no required corrections for the United States, the euro area, or China.

⁸ The October WEO uses July 24-August 21 as its base period (IMF, 2020c, p. 115). The adjustments here approximate this period using the full month of August. Changes in the real effective exchange rate (REER) from August to October use the Bank of International Settlements “broad” series (BIS, 2020a).

⁹ This parameter is essentially an overall export price elasticity set at unity, applied to the size of exports of goods and services relative to GDP. The relationship is less than linear and is subject to a ceiling of 0.5, such that for a small open economy with exports at 100 percent of GDP a 1 percent rise in the REER would reduce the current account by 0.5 percent of GDP. Note that for the adjustment from the WEO base month, the calculation further applies only one-half of the normal impact calculation, reflecting past experience with slowly-changing IMF projections of the long-term current account. There is also a special adjustment reducing Switzerland’s estimated surplus by 3 percent of GDP to account for the fact that current account data do not separate out the portion attributable to foreign multinational companies.

¹⁰ For a summary of the FEERs methodology, see Cline and Williamson (2012), Appendix A.

Table 3: 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	Oct 2020	Percentage Change	
Pacific							
Australia*	0.0	0.2	0.0	-1.0	0.71	1.7	0.73
New Zealand*	0.0	0.2	0.0	-0.9	0.66	1.4	0.67
Asia							
China	0.0	0.2	0.0	-1.1	6.73	1.5	6.63
Hong Kong	-1.6	-1.3	3.3	2.7	7.75	5.7	7.33
India	0.0	0.2	0.0	-1.0	73.5	0.8	72.9
Indonesia	0.0	0.2	0.0	-1.0	14733	3.7	14211
Japan	-0.1	0.1	0.6	-0.3	105	2.2	103
Korea	-0.8	-0.4	1.9	1.0	1144	3.4	1107
Malaysia	0.0	0.5	0.0	-1.0	4.15	4.2	3.99
Philippines	0.0	0.2	0.0	-0.9	48.5	3.3	47.0
Singapore	-11.0	-10.4	22.0	20.8	1.36	23.7	1.10
Taiwan	-5.9	-5.5	13.6	12.7	28.7	15.3	24.9
Thailand	-1.3	-0.8	2.7	1.7	31.2	4.5	29.9
Middle East/Africa							
Israel	0.0	0.2	0.0	-0.7	3.39	0.8	3.37
Saudi Arabia	0.0	0.3	0.0	-0.8	3.75	1.5	3.69
South Africa	0.0	0.2	-0.2	-0.8	16.45	0.6	16.35
Europe							
Czech Republic	0.0	0.3	0.0	-0.6	23.1	-0.2	23.2
Euro area*	0.0	0.3	0.0	-1.3	1.18	0.0	1.18
Hungary	0.0	0.3	0.0	-0.5	308	-0.2	308
Norway	0.0	0.2	0.0	-0.7	9.28	-0.2	9.29
Poland	0.0	0.2	0.0	-0.7	3.86	-0.4	3.87
Russia	0.0	0.2	0.0	-0.6	77.7	0.3	77.4
Sweden	-0.2	0.1	0.6	-0.2	8.83	0.2	8.81
Switzerland	-3.4	-3.1	7.6	7.0	0.91	7.8	0.85
Turkey	0.0	0.2	0.0	-0.7	7.96	0.1	7.95
United Kingdom*	0.2	0.4	-0.8	-1.6	1.30	-0.6	1.29
Western Hemisphere							
Argentina	0.0	0.2	0.0	-1.2	77.42	-0.4	77.76
Brazil	0.0	0.1	0.0	-1.2	5.62	-0.1	5.63
Canada	0.0	0.1	0.0	-0.4	1.32	0.1	1.32
Chile	0.0	0.3	0.0	-0.9	788	0.2	787
Colombia	0.7	0.8	-4.0	-4.9	3834	-4.2	4000
Mexico	0.0	0.1	0.0	-0.4	21.3	0.1	21.3
United States	0.0	0.2	0.0	-1.4	1.00	0.0	1.00
Venezuela	0.0	0.2	0.0	-0.9	...	0.6	...

* dollars/currency

... not available

The second column of table 3 reports the actual changes in the current accounts achieved in the globally-consistent simulation. Reflecting the asymmetry between sizable surplus reductions required for several economies but only small deficit reductions required for just the UK and Colombia, the globally-consistent solution under-adjusts for excess surplus countries by about 0.3 to 0.5 percent of GDP and correspondingly generates an improvement of typically 0.2 to 0.3 percent of GDP for economies not needing any improvement.

The third column shows the change in the REER implied by the target change in the current account. Thus, for Singapore, the target reduction in the current account surplus by about 11 percent of GDP requires an appreciation of the REER by 22 percent in view of the “gamma” coefficient (constrained to the maximum allowed in the model, 0.5 percent of GDP change for 1 percent REER change). The fourth column shows the change in the REER accomplished on a globally-consistent basis in the SMIM simulation. There is a 1.4 percent REER depreciation needed for the United States for this global adding-up, even though for its own equilibrium the US does not need any depreciation.

The fifth column in table 3 reports the average exchange rate for each country against the US dollar in October 2020. (BIS, 2020b). The sixth column shows the percent change in the dollar rate obtained in the globally-consistent simulation. The final column applies this percent change to the actual rate in October to arrive at the FEER-consistent dollar exchange rate for each country. This rate is 1.18 dollars per euro, 103 yen per dollar, 6.63 Chinese yuan per dollar, and 1.29 dollars per pound sterling. Australia and New Zealand have FEER-consistent US dollar rates of 71 US cents and 66 US cents, respectively.¹¹

Figure 5 shows the percent changes in exchange rates needed to bring current accounts into alignment with the FEERs targets. The economies are ordered from the largest REER appreciations to the largest REER depreciations. Following the pattern usually found, for the Asian economies there tends to be a greater (positive) difference between the amount of change needed in the bilateral rate against the dollar than in the multilateral REER. The countries with the highest needed appreciations tend to be in Asia (Singapore, Taiwan, Hong Kong), and the countries with high trade shares with these economics also tend to be in Asia. These regional trading partners tend to need to appreciate against the dollar to avoid experiencing a depreciation in the multilateral effective exchange rate as key partners appreciate against the dollar.

Vietnam

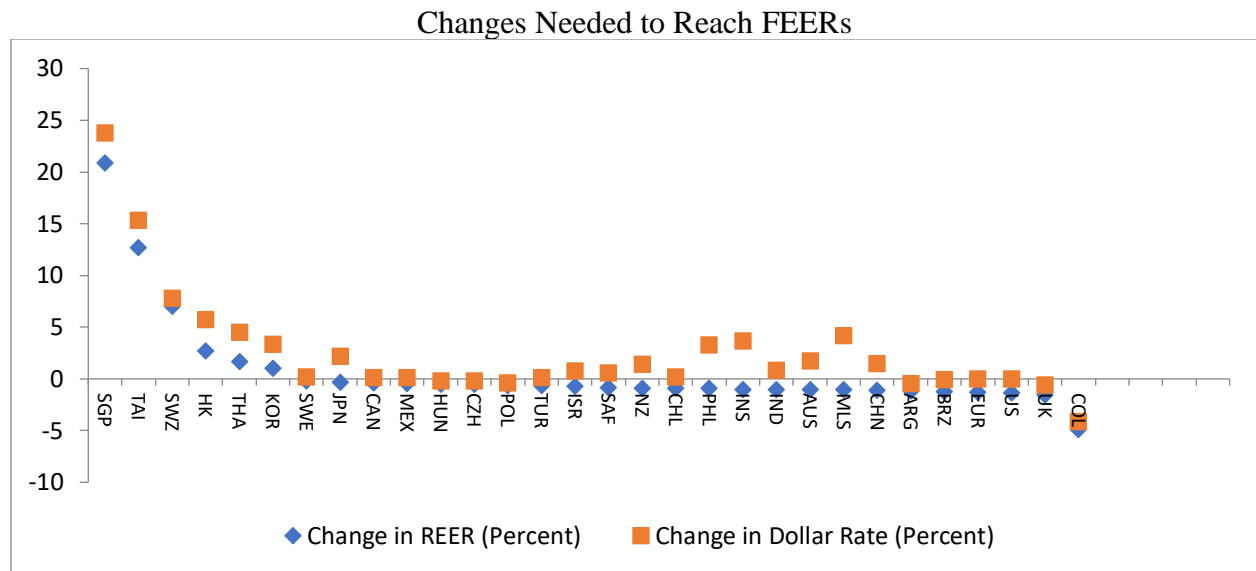
The IMF (2020b) projects the current account of Vietnam at 1.16 percent of GDP in 2020, down from 3.42 percent in 2019. It projects further decline over the next 5 years, placing the 2025 current account balance at virtually zero (-0.002 percent of GDP). On this basis, Vietnam does not need to change its real effective exchange rate to meet the zero balance target of this study.

However, the value of the Vietnamese dong would need to rise significantly against the US dollar if all countries moved to the zero-balance targets calculated here. The magnitude of

¹¹ There is no estimate for Venezuela, where hyperinflation and import controls turn an estimate meaningless.

this bilateral appreciation can be obtained by examining the weights of each of the major economies in table 1 in the external trade of Vietnam.

Figure 5



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

FEER: Fundamental Equilibrium Exchange Rate

REER: Real Effective Exchange Rate

Conclusion

Despite the severe shock to the international economy from the coronavirus pandemic, there has not been a widespread increase in exchange rate misalignments as a consequence – as can be seen by the close adherence of the great majority of the needed REER changes in figure 5 to the zero axis. The major economies are not misaligned, and the principal misalignments remain those of a familiar group of excess-surplus economies (Singapore, Taiwan, Switzerland, Hong Kong).

One pattern that warrants special attention is the finding that even though a half-dozen major emerging market economies have experienced severe real depreciations, their currencies are not found to be undervalued by the FEER criteria. As shown in table 1, Colombia, Mexico, South Africa, Turkey, and Brazil experienced bilateral real depreciations against the dollar averaging about 13 percent from February to October. Yet none of these economies is identified as having become undervalued as a consequence (and indeed, Colombia is one of only two countries that are identified as overvalued). In part this outcome reflects the wide range of acceptable current account outcomes (a range of 6 percent of GDP from ceiling surplus to floor deficit). However, this pattern also seems to reflect surprisingly limited response of the IMF's projected long-term current accounts of these economies in the face of such large depreciations.¹²

¹² From August 2019 to August 2020 (the base months of the IMF's October 2019 and October 2020 WEOs, respectively), the REERs of the five large-depreciating emerging market economies shown at the bottom of table 1 fell by an average of 12.7 percent (BIS data). Their average "gamma" coefficient is -0.25, indicating that a 12.7 percent REER depreciation would be expected to boost the current account by 3.17 percent of GDP. Yet the Fund's change in the current account projected for 2024 in the two respective WEOs was an average of only 0.88 percent. Commodity prices do not seem to provide the explanation (except for Russia, with the plunge in oil prices). For example, both of Brazil's largest commodity exports, iron ore and soybeans, have enjoyed substantial price increase over the past year (by 35 percent from October 2019 to October 2020 for iron ore, and by 24 percent from end-2019 to end-October 2020 for soybeans; Statista and Reuters).

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