Economics International Inc

Estimates of Fundamental Equilibrium Exchange Rates, May 2021

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This study updates estimates of Fundamental Equilibrium Exchange Rates (FEERs) using April 2021 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, 2021a, b). I apply the real effective exchange rate series of the Bank of International Settlements (BIS, 2021a) to take account of changes in real exchange rates subsequent to the base period used in the WEO.

Recent Trends in Exchange Rates

Over the six months since the previous estimates in this series, two forces have dominated exchange rate trends: evolving performance in pandemic management, and evolving long-term interest rates in the face of continued Zero Interest Rate Policy (ZIRP) for short-term rates and Quantitative Easing for long-term rates. Looking forward, potentially large exchange rate pressures could emerge from the massive fiscal expenditures adopted for pandemic relief in the United States and some other economies.

Table 1 reports the percent change in nominal exchange rates against the US dollar from October to April, for the 33 other major economies covered in this series. The rise of 7 to 8 percent against the US dollar for the Australian and New Zealand dollars likely reflected the continued benefit of the two countries' isolation from the Covid-19 pandemic during the period of its most severe escalation in the United States.

The euro rose only 1.6 percent against the dollar, reflecting renewed pandemic pressures and the slower rollout of vaccinations as well as a rise in the US interest rate differential. From October to April the US 10-year treasury rate rose by 85 basis points from 0.79 percent to 1.64 percent, as the 10-year rate for France rose only 29 basis points (from -0.30 percent to -0.01 percent; FRED, 2021). The interest differential effect seems likely to have been the main influence on the yen, which fell about 4 percent against the dollar in this period as its 10-year rate rose only 5 basis points (from 0.04 to 0.09 percent).

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Table 1

Exchange Rates against the US Dollar, October 2020 and April 2021

	Oct	Apr	% change
Pacific			
Australia*	0.71	0.77	8.0
New Zealand*	0.66	0.71	7.3
Asia			
China	6.73	6.52	3.2
Hong Kong	7.75	7.77	-0.2
India	73.5	74.5	-1.3
Indonesia	14733	14538	1.3
Japan	105.2	109.0	-3.5
Korea	1144	1118	2.3
Malaysia	4.15	4.12	0.8
Philippines	48.5	48.5	0.1
Singapore	1.36	1.33	1.9
Taiwan	28.7	28.2	1.6
Thailand	31.2	31.3	-0.2
Middle East/Africa			
Israel	3.39	3.27	3.7
Saudi Arabia	3.75	3.75	0.0
South Africa	16.4	14.4	14.2
Europe			
Czech Republic	23.1	21.6	6.8
Euro area*	1.18	1.20	1.6
Hungary	307.9	301.3	2.2
Norway	9.28	8.39	10.5
Poland	3.86	3.81	1.3
Russia	77.7	76.1	2.1
Sweden	8.83	8.50	3.9
Switzerland	0.91	0.92	-1.1
Turkey	7.96	8.18	-2.7
United Kingdom	1.30	1.38	6.7
Western Hemisphere			
Argentina	77.4	92.7	-16.5
Brazil	5.62	5.57	0.9
Canada	1.32	1.25	5.8
Chile	788	708	11.4
Colombia	3834	3651	5.0
Mexico	21.3	20.0	6.2

*dollars per currency
Source: Federal Reserve (2021); BIS (2021b)

As noted in the November issue in this series, severe emerging market currency declines in 2020 from the pandemic risk-off shock occurred for Mexico (real decline of 11.6 percent against the dollar from Q4:2019 to Q3:2020), South Africa (11.7 percent), Turkey (13.8 percent) and Brazil (22.7 percent). Easing of the risk-off environment likely was the main reason for the sharp reversals for these currencies over the past six months. The large rise in the South African rand (by 14 percent) represented a reversal of a comparably large decline from Q4:2019 to Q3:2020. Similarly, the small nominal decline of the Turkish lira despite high relative inflation represented a partial reversal of the sharp real decline earlier.

For Mexico, the 6.2 percent rise in the nominal bilateral rate against the dollar reversed about half of the sharp earlier decline. The failure of the Brazilian real to stage a substantial reversal of the large decline seems highly likely to have reflected the rise of Brazil to the second-largest country by number of Covid cases.[2] For Canada, the 5.8 percent rise in the Canadian dollar may have reflected better pandemic performance than in the United States, as well as a slightly larger rise in the 10-year rate than in the United States.[3] For Argentina, the sharp decline reflects high domestic inflation (which was 42 percent in 2020; IMF, 2021a).

Table 2 reports the real effective exchange rate (REER) for the United States, as estimated by the BIS (2021a), as well as the 10-year Treasury rate and known Covid-19 infections as a percent of population, for selected benchmark months.

Table 2

US REER, 10-year Treasury Rate, and Covid-19 Cases as Percent of Population

	REER (a)	i-10 %	Cases %
Dec19	115.9	1.92	0.00
Apr20	123.9	0.61	0.19
Jul	120.2	0.64	1.15
Oct	117.0	0.74	2.52
Jan21	112.4	1.11	7.37
Apr	115.1	1.56	9.84

(a) 2010 = 100

Source: BIS (2021a); FRED (2021); Worldometer (2021)

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[2] At 32.3 million cases in the United States and 14.7 million in Brazil at the end of April. Cases rose from 2.8 percent of total population at end-October to 9.8 percent at end-April for the United States; from 2.6 percent to 6.9 percent for Brazil; from 0.7 percent to 1.8 percent for Mexico; and from 0.6 percent to 3.2 percent for Canada. During the month of April, the increase for Brazil (by 1.05 percentage point of population) exceeded that for the United States (0.67 percentage point). Worldometer (2021).

[3] The Canadian 10-year rate rose by 92 basis points, from 0.60 percent in October to 1.52 percent in April.

The outbreak of the global pandemic in March 2020 brought a safe-haven boost to the REER for the dollar that caused it to peak in April at 6.9 percent above its December 2019 level. The REER then eased by 5.6 percent by October. Then, as the fall wave of the pandemic caused known infections to surge by almost 5 percentage points of US population through January 2021, the REER fell an additional 3.9 percent to a trough in January – *despite* a substantial rise in the 10-year rate (from 74 basis points to 1.11 percent). Thereafter the slowdown in new cases, and importantly the rapid rollout of vaccinations, combined with an additional 45 basis point increase in the 10-year rate, contributed to a moderate (2.4 percent) rebound in the REER by April, to a level slightly below the December 2019 level.

Prospective Pressures from the Covid-19 Fiscal Shocks

The combination of sharp recessions and large pandemic relief expenditures has caused major increases in public debt for many major economies. As shown in Table 3, from 2019 to the projected outcome for 2021, general government gross debt will have risen by more than 20 percent of GDP for Australia, Japan, the United Kingdom, Canada, and the United States.[4] For the euro area, the increase is placed at 14 percent.

There are theoretical and empirical reasons to expect higher public debt to put upward pressure on interest rates. Past studies have placed the relationship at about 2.5 basis points increase in the 10-year rate for each percentage point of GDP increase in the debt to GDP ratio (see Cline, 2021). The Covid shock could thus represent interest rate increases for the first five economies noted in a range of about 55 to 72 basis points, and for the euro area, by 35 basis points. At present interest rates are abnormally low as monetary policy prods recovery, but as conditions normalize the higher interest rates would begin to be felt.

For the US dollar, higher interest rates would put upward pressure on the dollar relative to the euro and Chinese yuan, but not necessarily against the Canadian and Australian dollars or the pound sterling given comparable debt shocks in those economies. A spillover from a higher dollar would tend to be downward pressure on currencies of emerging market economies as capital inflows decline. Some economies could experience debt servicing difficulties. The fiscal shock aftermath of the pandemic thus poses risks not typically present in the standard FEERs estimates.

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[4] IMF (2021a). For Japan, the table uses the net debt concept, as Japan's public sector assets are exceedingly large at about 85 percent of GDP.

Table 3
General Government Gross Debt as Percent of GDP: 2019 and 2021

	2019	2021	Change
Pacific			
Australia	47.5	72.1	24.6
New Zealand	32.1	46.4	14.3
Asia			
China	57.1	69.6	12.6
Hong Kong	30.2	44.0	13.7
India	73.9	86.6	12.7
Indonesia	30.6	41.4	10.8
Japan (a)	150.4	172.3	21.8
Korea	42.2	53.2	10.9
Malaysia	57.2	67.0	9.8
Philippines	37.0	51.9	14.9
Singapore	129.0	129.5	0.5
Taiwan	39.8	44.8	5.1
Thailand	41.0	55.9	14.9
Middle East/Africa			
Israel	60.0	78.3	18.3
Saudi Arabia	22.8	31.0	8.2
South Africa	62.2	80.8	18.6
Europe			
Czech Republic	30.2	44.0	13.7
Euro area	84.0	98.2	14.2
Hungary	65.3	80.0	14.7
Norway	40.9	41.6	0.7
Poland	45.7	57.4	11.7
Russia	13.8	18.1	4.3
Sweden	35.1	40.4	5.3
Switzerland	39.8	44.8	5.1
Turkey	32.6	37.1	4.5
United Kingdom	85.2	107.1	21.9
Western Hemisphere			
Argentina (b)	90.2	103.0	12.8
Brazil	87.7	98.4	10.7
Canada	86.8	116.3	29.4
Chile	28.2	33.6	5.4
Colombia	52.3	64.2	11.9
Mexico	53.3	60.5	7.2
United States	108.2	132.8	24.6

a. Net debt
b. 2019 and 2020
Source: IMF (2021a)

Results of the Main Calculations

Table 4 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. The first column reports the IMF's projections of current account balances in 2021 in the April 2021 WEO. The second column reports the Fund's projection of the current dollar value of GDP for each economy in 2026.

The third column of the table reports the Fund's 2026 current account projections, as a percent of GDP. The fourth column then adjusts the 2026 outlook to take account of the change in exchange rates from the January-February base period used in the April WEO to the April base used in this report.[5] 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).[6]

The FEERs methodology sets ± 3 percent of GDP as the permissible external imbalance.[7] 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 4 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.

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[5] The April WEO uses January 18-February 15, 2021, as its base period (IMF, 2021b, p. 101). The adjustments here approximate this period using the average for January and February. Changes in the real effective exchange rate (REER) from January-February to April use the Bank of International Settlements "broad" series (BIS, 2021a).

[6] 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.

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

Table 4: Target Current Accounts (CA) for 2026

Country	IMF Projection of 2021 CA (percent of GDP)	IMF 2026 GDP forecast (billions of US dollars)	IMF 2026 CA forecast (percent of GDP)	Adjusted 2026 CA (percent of GDP)	Target CA (percent of GDP)
Pacific					
Australia	2.4	2,017	-1.2	-1.2	-1.2
New Zealand	-2.1	310	-2.8	-2.8	-2.8
Asia					
China	1.6	24,128	0.5	0.7	0.7
Hong Kong	5.5	478	4.0	3.9	3.0
India	-1.2	4,534	-2.5	-2.4	-2.4
Indonesia	-1.3	1,673	-1.6	-1.3	-1.3
Japan	3.6	6,533	3.2	3.6	3.0
Korea	4.2	2,221	4.3	4.3	3.0
Malaysia	3.8	565	3.4	4.3	3.0
Philippines	-0.4	591	-2.2	-2.2	-2.2
Singapore	14.6	469	13.5	13.6	3.0
Taiwan	14.5	968	12.7	12.7	3.0
Thailand	0.5	704	3.2	3.8	3.0
Middle East/Africa					
Israel	4.1	567	2.9	2.9	2.9
Saudi Arabia	2.8	966	-1.3	-1.3	-1.3
South Africa	-0.4	407	-2.8	-3.5	-3.0
Europe					
Czech Republic	0.9	362	0.3	0.3	0.3
Euro area	2.8	17,758	2.7	2.7	2.7
Hungary	-0.4	242	-0.2	-0.3	-0.3
Norway	5.4	516	3.0	2.7	2.7
Poland	2.0	924	0.1	0.2	0.2
Russia	3.9	2,004	2.1	2.1	2.1
Sweden	5.0	806	3.5	3.8	3.0
Switzerland	6.7	1,040	7.5	5.1	3.0
Turkey	-3.4	1,264	-1.7	-0.7	-0.7
United Kingdom	-3.9	4,028	-3.5	-3.7	-3.0
Western Hemisphere					
Argentina	2.3	510	0.4	0.0	0.0
Brazil	-0.6	2,172	-1.7	-1.5	-1.5
Canada	-0.8	2,467	-1.9	-1.8	-1.8
Chile	0.3	399	-0.9	-1.4	-1.4
Colombia	-3.8	400	-3.9	-3.6	-3.0
Mexico	1.8	1,495	-0.9	-0.6	-0.6
United States	-3.9	27,659	-2.0	-2.2	-2.2
Venezuela (a)	-0.8	40	-2.3	…	…

a. 2022 except 1st column

Table 5 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 2026 if it is outside this limit. As usual in this series, there are large required reductions in the surpluses of Singapore (by 10.6 percent of GDP) and Taiwan (by 9.7 percent of GDP). Also as usual, there is a required reduction for Switzerland, albeit by somewhat less than usual (this time by about 2 percent of GDP). There are also meaningful required reductions for Korea and Malaysia (both by 1.3 percent of GDP); Hong Kong, Thailand, and Sweden (by 0.8 to 0.9 percent of GDP); and Japan (by 0.6 percent of GDP).

Only three of the 34 economies show required improvements in current account balances to limit their deficits to no more than 3 percent of GDP: the United Kingdom (by 0.7 percent of GDP), Colombia (by 0.6 percent of GDP), and South Africa (by 0.5 percent of GDP). There are no required corrections for the United States, the euro area, or China.

An important feature of the WEO projections, however, is that they show the United States moving to a large deficit of 3.9 percent of GDP in 2022, which eases to 3.1 percent of GDP in 2023 and then below 3 percent in 2024-26. The outsized deficit by 2022 reflects the huge size of covid-relief spending in 2020 and 2021 and corresponding demand pressure. Thus, federal relief legislated in 2020 and early 2021 amounted to 27 percent of one-year's GDP (Cline 2021, p. 2). However, the FEER is meant to reflect a medium-term equilibrium, so the most distant projection is the basis for measuring whether the imbalance is excessive.

The second column of table 5 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 modest deficit reductions required for just the UK, Colombia, and South Africa, the globally-consistent solution under-adjusts for excess surplus countries by 0.2 to 0.3 percent of GDP for Japan and Switzerland, and by 0.5 to 0.7 percent of GDP for Hong Kong, Korea, Malaysia, Singapore, Taiwan, and Sweden. and Sweden. The simulation correspondingly generates an improvement of typically 0.2 to 0.4 percent of GDP for economies not needing any improvement.

Table 5: 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	Apr 2021	Percentage Change	
Pacific							
Australia*	0.0	0.3	0.0	-1.4	0.77	2.3	0.79
New Zealand*	0.0	0.3	0.0	-1.2	0.71	1.8	0.73
Asia							
China	0.0	0.3	0.0	-1.5	6.52	2.0	6.39
Hong Kong	-0.9	-0.4	1.7	0.9	7.77	4.9	7.41
India	0.0	0.3	0.0	-1.4	74.5	0.4	74.2
Indonesia	0.0	0.3	0.0	-1.3	14538	4.2	13954
Japan	-0.6	-0.4	3.5	2.2	109	5.5	103
Korea	-1.3	-0.8	3.2	2.0	1118	4.8	1067
Malaysia	-1.3	-0.7	2.7	1.4	4.12	8.2	3.81
Philippines	0.0	0.3	0.0	-1.1	48.5	3.5	46.8
Singapore	-10.6	-9.9	21.3	19.8	1.33	23.8	1.08
Taiwan	-9.7	-9.2	22.3	21.3	28.2	25.2	22.6
Thailand	-0.8	-0.1	1.6	0.2	31.3	4.1	30.1
Middle East/Africa							
Israel	0.0	0.3	0.0	-1.0	3.27	-0.1	3.28
Saudi Arabia	0.0	0.4	0.0	-1.0	3.75	1.3	3.70
South Africa	0.5	0.7	-1.7	-2.6	14.41	-1.7	14.66
Europe							
Czech Republic	0.0	0.4	0.0	-0.8	21.6	-1.2	21.9
Euro area*	0.0	0.4	0.0	-1.8	1.20	-0.9	1.19
Hungary	0.0	0.3	0.0	-0.7	301	-1.0	304
Norway	0.0	0.3	0.0	-1.0	8.39	-1.3	8.50
Poland	0.0	0.3	0.0	-0.8	3.81	-0.3	3.82
Russia	0.0	0.3	0.0	-0.9	76.1	-0.2	76.3
Sweden	-0.8	-0.3	2.1	1.0	8.50	0.7	8.44
Switzerland	-2.1	-1.8	4.8	4.0	0.92	4.5	0.88
Turkey	0.0	0.2	0.0	-1.0	8.18	-1.1	8.26
United Kingdom*	0.7	0.9	-2.6	-3.6	1.38	-3.1	1.34
Western Hemisphere							
Argentina	0.0	0.2	0.0	-1.5	92.73	-1.2	93.82
Brazil	0.0	0.2	0.0	-1.6	5.57	-0.6	5.60
Canada	0.0	0.1	0.0	-0.4	1.25	0.0	1.25
Chile	0.0	0.3	0.0	-1.2	708	0.0	708
Colombia	0.6	0.8	-3.9	-4.9	3651	-4.3	3814
Mexico	0.0	0.1	0.0	-0.5	20.0	0.1	20.0
United States	0.0	0.3	0.0	-1.6	1.00	0.0	1.00
Venezuela	0.0	0.2	0.0	-0.9	...	-0.2	…

* dollars/currency
 … not available

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 nearly 11 percent of GDP requires an appreciation of the REER by 21 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 1.6 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 4 reports the average exchange rate for each country against the US dollar in April 2021 (Federal Reserve 2021; BIS, 2021b). 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 April to arrive at the FEER-consistent dollar exchange rate for each country. This rate is 1.19 dollars per euro, 103 yen per dollar, 6.39 Chinese yuan per dollar, and 1.34 dollars per pound sterling. Australia and New Zealand have FEER-consistent US dollar rates of 79 US cents and 73 US cents, respectively.[8]

Figure 1 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 (especially Singapore and Taiwan) tend to be in Asia, 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.

A notable change in the results in table 4 and figure 1 from those in the November estimates of FEERs is the boost of Taiwan to the largest REER appreciation needed, ahead of Singapore. This time Taiwan is found to need a real effective appreciation of 21.3 percent, higher than that needed for Singapore (19.8 percent). The order has typically been the reverse (at 12.7 percent for Taiwan and 20.8 percent for Singapore in the November 2021 estimates, for example). The change underlying this shift is the sharp increase in the long-term current account surplus projected in the WEO for Taiwan (placed at 9.2 percent of GDP in 2025 in the October WEO but at 12.7 percent of GDP in 2026 in the April 2021 WEO).

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

Figure 5

Changes Needed to Reach FEERs
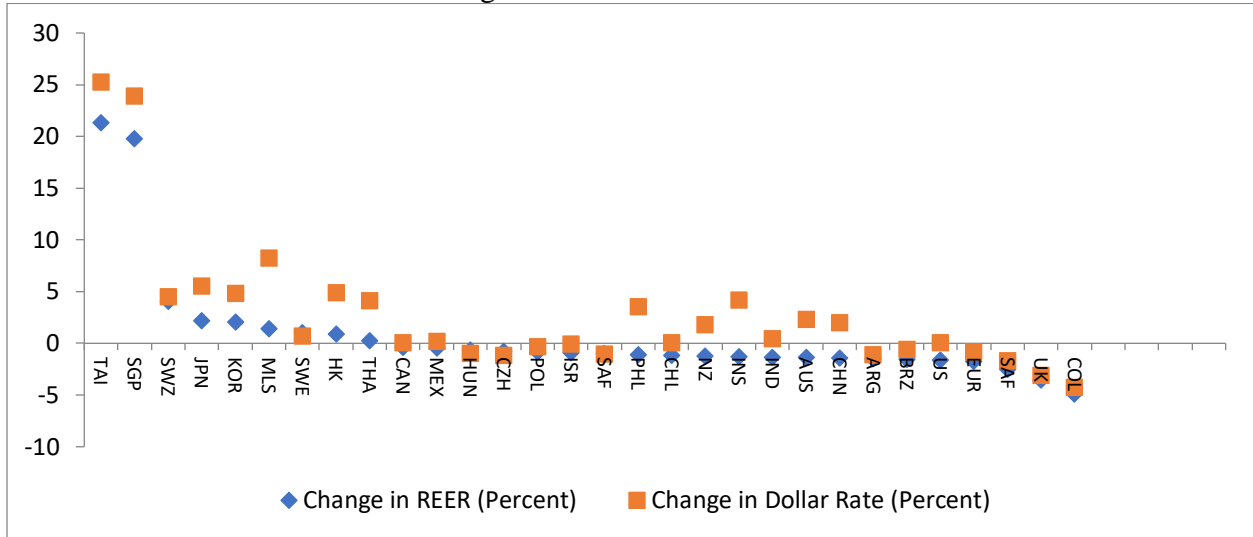
ARG = Argentina, AUS = Australia, BRZ = Brazil, CAN = Canada, CHL = Chile, CHN = China, COL = Colombia,
CZH = Czech Republic, EUR = Euro area, HK = Hong Kong, HUN = Hungary, IND = India, IDN = Indonesia,
ISR = Israel, JPN = Japan, KOR = Korea, MLS = Malaysia, MEX = Mexico, NZ = New Zealand, PHL = Philippines,
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

The principal misalignments of exchange rates identified in this study are highly
concentrated, with large real appreciations needed for Taiwan (about 21 percent) and Singapore
(about 20 percent). Other misalignments are much smaller and confined to just a few economies,
with REER appreciations needed for Switzerland (4 percent), Japan (2.2 percent), Korea (2.0
percent), Malaysia (1.4 percent), and Hong Kong (0.9 percent); and REER depreciations needed
for only Colombia (by 4.9 percent), the United Kingdom (3.6 percent), and South Africa (2.6
percent). Potential pressures on inflation, interest rates, external imbalances, and currency
misalignments are however subject to more than usual uncertainty in view of the large fiscal
shocks experienced by several leading economies as a consequence of the Covid-19 pandemic.

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