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Economics Group

Special Commentary

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Developing Economies and Crisis Vulnerability

Executive Summary

In the second of two reports on prospects for near-term financial crises in developing economies, we analyze five economic indicators in an attempt to determine which of the 28 largest developing economies in the world may be the most vulnerable at present to potential crises. Our methodology suggests that Colombia, Argentina, Indonesia, and Turkey may be the most vulnerable to crisis at present while Kuwait, the United Arab Emirates, Saudi Arabia, and Algeria may be the best positioned to ward off financial crises.

We would stress, however, that financial crises are not necessarily inevitable in the countries that appear most vulnerable at present. Economic and financial imbalances can build up in a country over a period of years, and predicting actual crises has proved to be very difficult. Although we are not predicting that the countries that appear most vulnerable at present will necessarily experience crisis, we would advise readers to pay particular attention to those economies. Colombia, which has relatively low foreign exchange reserves, a current account deficit, and a strong currency is probably at greater risk of financial crisis at present than Kuwait, which has a large current account surplus, a stable currency and a declining credit-to-GDP ratio. If some event should occur that causes investors to generally turn more risk averse, we believe that countries that appear to be more vulnerable at present would be in greater danger than countries that appear to be more economically and financially stable.

What Economic Indicators Are Associated With Financial Crisis?

Which countries may be the most vulnerable to crisis at present?

In a recent report, we noted that current account deficits in many developing economies have widened to levels not seen since a wave of financial crises swept through the developing world in 1997-98.[1] We concluded in that report that "a wave of financial crises in the developing world is not imminent, but developments in those economies bear watching." We also acknowledged, however, that "the economic fundamentals in the developing world appear to have deteriorated at the margin," and we ended the report by asking "are there individual economies that may be more vulnerable to financial crisis at present than others?"

In an attempt to answer that question in this report, we initially focused on the 30 largest developing economies in the world.[2] Admittedly, confining ourselves to 30 economies is somewhat arbitrary. Clearly, economies that are smaller than Romania, with a nominal GDP of $170 billion that places it as the thirtieth-largest developing economy in the world, could experience financial crises in the near term. However, financial crises in individual small developing economies likely would not have the same systemic consequences for the global economy that a crisis in a larger developing economy could impart. Thailand, which triggered the wave of financial crises in 1997-98, was the eleventh-largest developing economy at that time.

[1] See "*Are Developing Economies Heading for a Crash?*" (Oct. 28, 2013) that is available upon request.
[2] Because we could not find data on real effective exchange rates for Iraq and Kazakhstan, which respectively are the 23rd and 25th largest developing economies in the world, we dropped them from the analysis.

Five variables seem to be associated most often with financial crises.

There have been a number of researchers over the past two decades who have endeavored to build "early warning system" (EWS) models of financial crises, and this literature was surveyed in a recent paper by Frankel and Saravelos.[3] In surveying the literature, Frankel and Saravelos found that the following five variables seem to be associated most often with financial crises: foreign exchange (FX) reserves, the real exchange rate, growth in credit, GDP growth, and the current account. That is, countries that have low FX reserves, an appreciated exchange rate, rapid credit and GDP growth, and current account deficits tend to have the highest probabilities for financial crises.

We follow Frankel and Saravelos by concentrating on these five indicators in this report. In the sections that follow, we rank countries by their vulnerability to financial crisis according to each indicator. We then aggregate the rankings to determine which individual economies appear to be the most vulnerable to financial crises at present.

Foreign Exchange Reserves

FX reserves can help to ward off crises.

Among the aforementioned five indicators, Frankel and Saravelos found that some measure of a country's foreign exchange (FX) reserves had the highest association with financial crises among the papers they surveyed. A country with a high level of FX reserves may be able to ward off a financial crisis by selling those reserves to private-sector institutions and individuals who seek the safety of convertible currencies like dollars and euros during times of financial stress. Because the adequacy of a country's FX reserves is directly related to the size of the economy, most researchers scale FX reserves by some measure of economy size such as GDP, imports or external debt. Figure 1 shows the 10 countries with the lowest ratios of FX reserves-to-GDP.[4] Because the FX reserves of Venezuela total only $6 billion, which is equivalent to only 1.6 percent of GDP in that country, Venezuela would seem to be the country most at risk of a financial crisis when this one indicator is viewed in isolation. Egypt and Pakistan also have low FX reserves-to-GDP ratios.

Figure 1

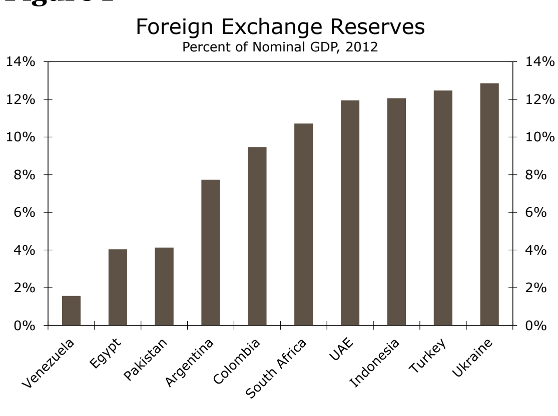
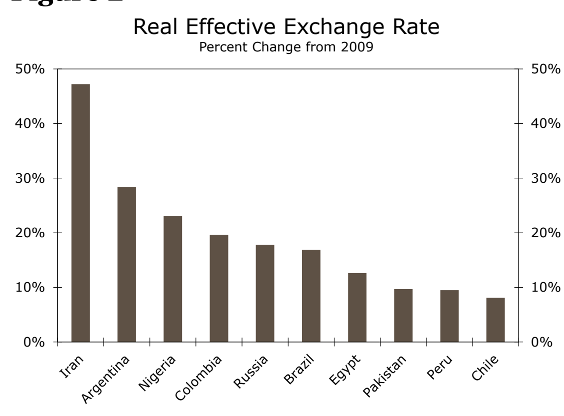


Figure 2



Source: International Monetary Fund, Institute of International Finance and Wells Fargo Securities, LLC

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3 See Jeffrey Frankel and George Saravelos, "*Are Leading Indicators of Financial Crises Useful For Assessing Country Vulnerability: Evidence from the 2009-09 Global Crisis,*" National Bureau of Economic Research Working Paper 16047, June 2010.

4 A country's total reserves include its foreign currency reserves (the value of the foreign currencies it owns), its holdings of special drawing rights at the IMF, and the value of the gold that it owns. For 27 of the 28 countries that we ranked, we used the narrow measure of foreign currency reserves because it is the most liquid measure of a country's reserves. For Iran, we used the slightly broader measure of foreign reserves excluding gold because we could not find data on the more narrow measure. For consistency across all countries, we used the stock of a country's reserves at the end of 2012.

Real Exchange Rate

Next to FX reserves, a country's real effective exchange rate (REER) has the highest association with financial crises.[5] Because real exchange rate appreciation tends to lead ultimately to current account deficits that need to be financed by foreign capital inflows, it can eventually make a country more vulnerable to a financial crisis. Figure 2 shows the 10 countries that experienced the largest rise in their respective REERs between 2009, when the currencies of most developing economies bottomed versus the dollar, and 2012.[6] The real exchange rate in Iran appreciated nearly 50 percent between 2009 and 2012, placing that country at the top of the list. Argentina, Nigeria, Colombia, and Russia round out the Top 5 countries that experienced the greatest amount of real exchange rate appreciation between 2009 and 2012.

Real exchange rate appreciation can lead to current account deficits.

Growth in Domestic Credit

Countries that experience rapid growth in credit can ultimately be vulnerable to financial crises because rapid credit growth often goes hand-in-hand with relaxation in lending standards. A financial crisis may ultimately ensue if enough debtors are unable to service their debts. Countries that may be especially at risk of eventual financial crises are those economies in which credit expands faster than GDP.

Rapid credit growth often goes hand-in-hand with relaxation in lending standards.

Figure 3 shows the 10 countries that registered the largest percentage point increases in domestic credit to the private sector (measured as a percent of GDP) between 2009 and 2012.[7] Thailand, the first domino to fall in the wave of financial crises that occurred in 1997-98, saw its credit-to-GDP ratio rise to 148 percent in 2012 from 116 percent of GDP in 2009, an increase of 32 percentage points. Brazil and Turkey also experienced outsized increases in private-sector domestic credit. China, which posted the ninth largest increase in the credit-to-GDP ratio, experienced rapid credit growth between 2009 and 2012. However, it also registered strong GDP growth, which limited the rise its credit-to-GDP ratio.[8]

GDP Growth

Speaking of GDP, the EWS literature has found that strong GDP growth is often associated with eventual financial crises, which may seem counterintuitive. However, strong GDP growth is often caused by robust credit growth that, as discussed above, is often associated with eventual financial crises. Moreover, rapid GDP growth can often lead to current account deficits, which we will discuss in more detail in the next section.

Strong GDP growth is often caused by robust credit growth.

Between 2009 and 2012, real GDP in Qatar rose 40 percent, which made it the fastest growing developing economy among the 28 countries that we rank. Closely behind Qatar was China, where real GDP grew 30 percent between 2009 and 2012. Rounding out the top 10 are Nigeria, Peru, Saudi Arabia, India, Turkey, Argentina, Indonesia, and Malaysia where real GDP rose between 15 and 25 percent during the three-year period.

[5] A country's real effective exchange rate measures the value of a country's currency relative to the currencies of its trading partners, adjusted for the price differences among those countries. Even if nominal exchange rates remain fixed among countries, an individual country could experience an appreciation of its real exchange rate if the prices of its good and services rose relative to its trading partners. In other words, a country would experience deterioration in its price competitiveness if its real effective exchange rate rose.

[6] For 27 of the 28 countries that we ranked we used data on real effective exchange rates that are calculated by the Institute of International Finance (IIF). The IIF does not calculate a REER for Pakistan, so we used the REER index that the IMF publishes for Pakistan.

[7] We used World Bank data on domestic credit to the private sector. Because data for 2012 for Iran and Kuwait were not available, we used the 2011 values as the endpoints for these two countries. In both cases, the ratios declined between 2009 and 2011.

[8] For further reading on Chinese debt see our special report entitled *"Does China Have a Debt Problem?"* (September 23, 2013) that is available upon request.

Figure 3

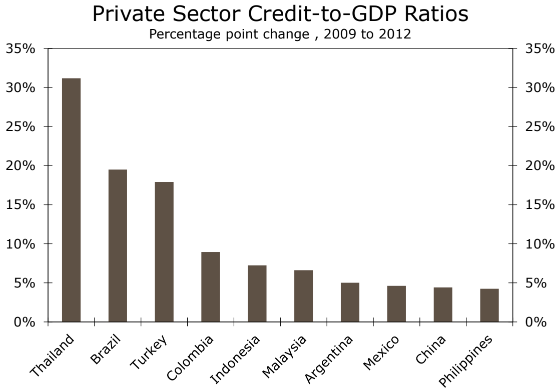
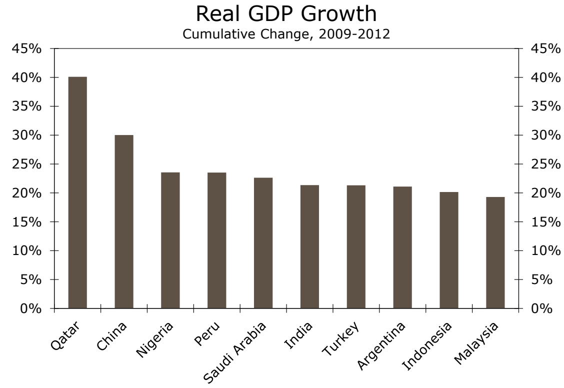


Figure 4



Source: World Bank, International Monetary Fund and Wells Fargo Securities, LLC

Current Account Deficit

Current account deficits need to be financed by capital inflows from abroad.

As we discussed in our earlier report that was referenced in footnote 1, current account deficits need to be financed by capital inflows from abroad. Not only are foreign investors exposed to the varied risks that are inherent in any asset, but they also face foreign exchange rate risk. A sharp depreciation of the local currency against their home currency can sharply reduce returns on the assets investors own in foreign countries. Therefore, at the first signs of trouble, foreign investors may dump their assets and bolt for the door, triggering a financial crisis.

Figure 5 shows the current account deficits that the IMF projects for 2013. With current account deficits in excess of 7 percent of GDP, Turkey and Ukraine top the list. South Africa, Peru, Chile, and India all have deficits that the IMF forecasts will exceed 4 percent of GDP this year.

Figure 5

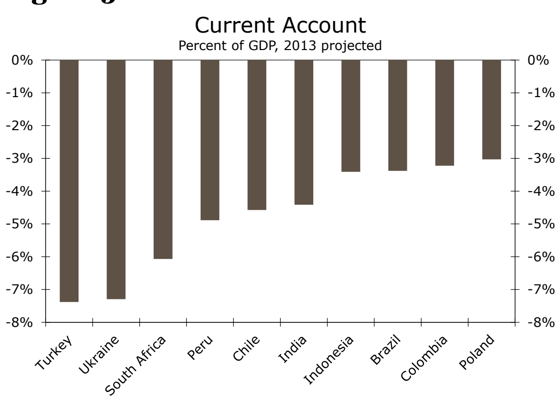
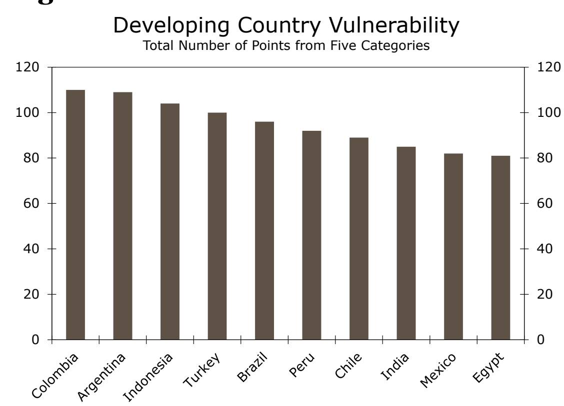


Figure 6



Source: International Monetary Fund and Wells Fargo Securities, LLC

Which Countries Are Most Vulnerable?

So where does our analysis leave us? Venezuela tops the list as the country with the fewest foreign exchange reserves (as a percent of GDP), but it does not crack the Top 10 for any of the other four indicators. Likewise, Iran has experienced the most real exchange rate appreciation over the past three years among the 28 countries that we analyze. However, it would not appear to be an accident-waiting-to-happen when the other four variables are considered. Is there a way that we can aggregate the information presented above to come up with a list of the countries that may be most vulnerable to a financial crisis at present?

Not only does the EWS literature make it clear that no single variable is universally associated with financial crises, but it also has little to say about how to weight different variables. Therefore, we adopt a simple method of aggregating the data by rank ordering the 28 countries for each individual variable and then "awarding" points on a descending basis. For example, Venezuela "earns" 28 points as the country with the lowest FX reserves-to-GDP ratio, Egypt gets 27 point for the country with the second-to-lowest ratio and so on. Algeria, which has the highest FX reserves-to-GDP ratio, "earns" only one point. We follow this methodology for the other four variables, and then aggregate all points. The country with the most points would appear to have the highest vulnerability to crisis, while the country with the least amount of points would appear to have the lowest vulnerability.

Colombia appears to be most vulnerable to crisis at present.

As shown in Figure 6, Colombia, which is the fifteenth-largest developing economy and which totaled 110 points, appears to be the most vulnerable country to a financial crisis at present. Colombia does not top the charts for any individual variable, but it accumulates a large number of points in each category. Specifically, Colombia has the fifth-lowest reserves-to-GDP ratio, the fourth highest rate of REER appreciation between 2009 and 2012, the fourth highest increase in its domestic credit-to-GDP ratio, the thirteenth-strongest increase in real GDP between 2009 and 2012, and the ninth-largest current account deficit. Close on the heels of Colombia are Argentina, Indonesia and Turkey, which each totaled 100 points or more. (A full ranking of all 28 countries that we analyzed is shown in Appendix 1. The absolute values for all five variables for each country are shown in Appendix 2.) Interestingly, the currencies of Indonesia and Turkey depreciated sharply between mid-May and early September when many investors thought that Fed "tapering" was imminent. Brazil and India, which are among the Top 10 in terms of total points, also experienced significant currency depreciation during the summer.

Conclusion

After developing countries spent a decade cleaning up their economies in the wake of the 1997-98 wave of financial crises, economic fundamentals in the developing world have deteriorated at the margin over the past few years. As we noted in our Oct. 28 report, another wave of financial crises does not appear imminent. However, we concluded that report by noting that some countries may be more vulnerable to crisis at present than others. We have attempted to determine in this report which economies may be the most vulnerable to crisis at present.

We should stress, however, that crises are not necessarily inevitable in the countries shown in Figure 6. Economic and financial imbalances can build up in a country over a period of years. The country may appear ripe for a crisis, but it may eventually be able to avoid one. An economy's self-correcting mechanisms may start to function and/or policymakers may take steps to correct the imbalances in the economy before a full-blown financial crisis transpires. In that regard, an important policy change that has occurred is that many more developing economies today have flexible exchange rates, which act as automatic shock absorbers, than 20 years ago. As we discussed in our previous report, the fixed exchange rates of the 1990s encouraged residents in developing economies to borrow foreign currencies, which exacerbated the ensuing financial crises.

We would advise readers to pay particular attention to those economies that appear to be most vulnerable to crisis.

When investing in foreign economies, investors should always do their diligence. Although we are not predicting that the countries that appear in Figure 6 will necessarily experience crisis, we would advise readers to pay particular attention to those economies. Colombia, which has relatively low foreign exchange reserves, a current account deficit, and a strong currency is probably at greater risk of financial crisis at present than Kuwait, which has a large current account surplus, a stable currency and a declining credit-to-GDP ratio. Colombia and the other countries that are near the top of the table in Appendix 1 may not experience crisis anytime soon. However, if some event should occur that causes investors to generally turn more risk averse, we believe that these countries would be at greater risk of experiencing financial stress than the countries like Kuwait, the United Arab Emirates, Saudi Arabia and Algeria, that appear at the bottom of the table in Appendix 1.

Appendix 1: Rank Ordering of Countries

Developing Country Vulnerability Based on Points						
Country (GDP Size)	FX Reserves (Percent of Nominal GDP)	Real Exchange Rate (Percent Change from 2009)	Real GDP (Percent Change from 2009)	Domestic Credit to Private Sector (Percent of GDP, Percentage Point Change since 2009)	Current Account (Percent of GDP)	Total
Colombia (15)	24	25	16	25	20	110
Argentina (11)	25	27	21	22	14	109
Indonesia (6)	21	17	20	24	22	104
Turkey (7)	20	4	22	26	28	100
Brazil (2)	13	23	12	27	21	96
Peru (24)	6	20	25	16	25	92
Chile (19)	14	19	17	15	24	89
India (4)	15	6	23	18	23	85
Mexico (5)	18	13	14	21	16	82
Egypt (20)	27	22	5	9	18	81
Pakistan (22)	26	21	11	8	15	81
South Africa (12)	23	14	4	12	26	79
China (1)	5	15	27	20	11	78
Ukraine (27)	19	16	6	6	27	74
Nigeria (18)	12	26	26	4	6	74
Philippines (21)	7	18	18	19	10	72
Thailand (16)	3	12	15	28	13	71
Russia (3)	9	24	13	14	8	68
Poland (10)	10	10	10	17	19	66
Malaysia (17)	4	9	19	23	5	60
Iran (9)	17	28	2	2	7	56
Venezuela (14)	28	2	3	13	9	55
Qatar (25)	11	3	28	5	2	49
Romania (28)	8	7	1	11	17	44
Algeria (23)	1	11	7	10	12	41
Saudi Arabia (8)	2	5	24	7	3	41
UAE (13)	22	1	9	3	4	39
Kuwait (26)	16	8	8	1	1	34

Source: World Bank, International Monetary Fund, Institute of International Finance and Wells Fargo Securities, LLC

Appendix 2: Economic Indicators in Developing Economies

Indicators of Developing Country Vulnerability

Country (GDP Size)	FX Reserves (Percent of Nominal GDP)	Real Exchange Rate (Percent Change from 2009)	Real GDP (Percent Change since 2009)	Domestic Credit to Private Sector (Percent of GDP, Percentage Point Change since 2009)	Current Account (Percent of GDP)
Colombia (15)	9.5	19.6	15.3	8.9	-3.2
Argentina (11)	7.7	28.4	21.1	5.0	-0.8
Indonesia (6)	12.1	7.6	20.2	7.2	-3.4
Turkey (7)	12.5	-4.5	21.3	17.9	-7.4
Brazil (2)	16.1	16.9	11.4	19.5	-3.4
Peru (24)	30.8	9.5	23.5	3.1	-4.9
Chile (19)	14.8	8.1	18.1	2.5	-4.6
India (4)	14.2	-2.3	21.3	4.2	-4.4
Mexico (5)	13.0	5.4	13.2	4.6	-1.3
Egypt (20)	4.0	12.6	9.4	-6.4	-2.6
Pakistan (22)	4.1	9.7	11.0	-7.1	-1.0
South Africa (12)	10.7	6.6	9.4	-1.0	-6.1
China (1)	40.3	7.1	30.0	4.4	2.5
Ukraine (27)	12.9	7.4	9.7	-14.0	-7.3
Nigeria (18)	16.2	23.0	23.5	-17.7	3.2
Philippines (21)	28.6	7.9	19.2	4.2	2.5
Thailand (16)	46.8	4.8	14.9	31.2	0.1
Russia (3)	23.3	17.8	12.7	2.4	2.9
Poland (10)	20.5	2.8	10.6	3.4	-3.0
Malaysia (17)	44.3	2.1	19.3	6.6	3.5
Iran (9)	13.5	47.2	7.1	-20.6	3.1
Venezuela (14)	1.6	-13.6	8.4	1.7	2.8
Qatar (25)	16.6	-12.6	40.1	-15.8	29.6
Romania (28)	24.2	-0.4	1.7	-1.2	-2.0
Algeria (23)	90.3	4.2	9.8	-2.2	1.8
Saudi Arabia (8)	90.1	-3.4	22.6	-8.0	19.3
UAE (13)	11.9	-22.3	10.2	-20.2	15.2
Kuwait (26)	14.1	-0.4	10.2	-23.5	38.7

Source: World Bank, International Monetary Fund, Institute of International Finance and Wells Fargo Securities, LLC

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