Local Markets Strategy

RBS
The Royal Bank of Scotland

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Top View | Predicting Sovereign Debt Crises

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- We apply a simple IMF decision tree (measuring risks pertaining to liquidity, solvency and volatility) used to try and predict sovereign EM debt crisis, across a range of Emerging market economies.

- The model identifies 8-9 economies in Emerging Europe as being potentially vulnerable to sovereign debt crisis, the results are broadly in line with current market risk perceptions as in recent years Emerging Europe has generally suffered from wide current account deficits and excessive foreign borrowing and hence large external financing requirements/relative to FX reserve positions. Rigid exchange rate regimes, predominant through the region, add an extra vulnerability, suggesting a very hard landing for these economies, with pass thru to banking sectors via rising NPLs.

- None of the major EM economies in Asia and Latin America surveyed appear vulnerable to crisis as per the IMF definition/methodology. The latter two regions' much better external financing positions, particularly reflect the maintenance of current account surpluses and relatively light external debt burden while the accumulation of healthy stocks of FX reserves during the "good years" provide an added degree of insulation.

- The analysis clearly has its limits as it only reveals "ability to pay". As recent debt crises (e.g. Argentina and Ecuador) in Latin America, in particular, have shown, "willingness to pay" is also critically important, but difficult to model. Countries could perhaps use the "cover" of the global crisis to manage their external liabilities lower by restructuring liabilities.

- The inclusion of Hungary, Latvia, Romania and Ukraine as potential risk countries tallies with the fact that all four have been forced to go to the IMF for emergency funding over the past year. Romania falls out of the risk category in 2009, however, reflective of the fact that its current account deficit, and hence external financing requirement is narrowing rapidly as domestic demand deflates.

- Perhaps surprisingly, Poland is identified as a risk country, reflective of its relatively high external financing requirements, and modest FX reserve coverage; this perhaps explains its decision to secure an FCL (precautionary) funding facility from the IMF earlier this year.

- Bulgaria; Estonia, Croatia and Lithuania are identified as potential risk countries, albeit none of the above have thus far gone to the IMF for financing.

- Turkey, Russia, the Czech Republic and South Africa escape identification as risk economies, and indeed all have thus far managed thru the crisis without the need to resort to IMF financing or indeed falling into arrears in terms of public sector liabilities falling due.

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Introduction

A quantitative study by the IMF ("Rules of Thumb for Sovereign Debt Crises", IMF Working Paper No. 05/42, March 1, 2005) of 47 emerging market economies for the period 1970 to 2002 identified threshold values for 10 macro economic variables that correctly "predicted" (ex-post) 89% of sovereign debt crises during the period. Sovereign debt crises are defined by the paper as either using S&P's definition of governments falling into arrears on principal or interest payments or by a country avoiding a crisis through acceptance of an IMF program. The IMF study uses the Binary Recursive Tree (BRT) approach to select explanatory variables and critical threshold levels that best discriminate between crisis and non crisis countries.

In this report we apply this framework to the current crisis using data for 2007-2008 to see if the rules of thumb would have helped identify the countries that had to go cap in hand to the IMF; no sovereigns to date during this crisis have fallen into arrears on their liabilities falling due. We also, apply the framework to forecast data for 2009, to highlight which countries still remain acutely vulnerable to a sovereign debt crisis.

The IMF Framework

Herein we provide a brief description of the 10 indicators used and Binary Recursive Tree (BRT) methodology used in the IMF framework.

Explanatory variables

The 10 selected variables measure liquidity, solvency and macroeconomic volatility:

Solvency: total FX debt/GDP; government FX debt/government revenues.

Liquidity: ST FX debt/FX reserves; External funding requirements i.e. (ST FX debt+ current account balance, we also include M&LT debt amortisations not included in the original IMF definition)/FX reserves. That both variables were retained in the BRT analysis suggests an interaction between current account balance and ST FX debt: for instance foreign investors could become more reluctant to roll over ST debts if the current account balance worsens.

Volatility: real GDP growth; inflation; exchange rate overvaluation; exchange rate volatility; years to next presidential elections; US treasury bill rate. The inflation and exchange rate variables are likely to proxy macro-economic imbalances, e.g. over-heating. The study tested the explanatory power of a number of political variables and found that years to the next presidential election (or benchmark election, e.g. parliamentary election) was the strongest. US Treasury rates were used as a proxy for EM ease of access to external funding.

It is important to note that the critical thresholds identified by the paper are based on data to 2002. Obviously, the world has changed since then and become a lot more volatile, the threshold levels will have changed. However, for the purposes of this paper we have not re-run the regressions to identify changes in the threshold levels and therefore some countries that could have been crisis prone may escape the scrutiny of the existing thresholds.

Combinations of weaknesses lead to crises

The key conclusion of the paper is that weakness in one indicator alone has limited predictive power. Rather combinations of weaknesses are the best predictors of sovereign debt crisis:

- 50% of the countries that went through a sovereign debt crisis had weak solvency and high volatility indicators;
- 21% of the countries that went through a sovereign debt crisis had weak liquidity and high volatility indicators;
- 14% of the countries that went through a sovereign debt crisis had weak solvency and high volatility indicators;
- 58% of the countries that did not go through a sovereign debt crisis had strong solvency and liquidity indicators as well as low volatility indicators.

Applying the approach to the current crisis

We have applied the IMF approach to the current crisis and report the decision trees and data tables in the Appendix for both 2008 and 2009 data.

2007 Results and IMF Programs

2007 Data (% 2006 FX Reserves): Bulgaria, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Ukraine are revealed as crisis prone.

2008 Results and IMF Programs

2008 Data (% 2007 FX Reserves): Bulgaria, Croatia, Estonia, Hungary, Latvia, Lithuania, Romania and Ukraine are revealed as crisis prone.

2009 Results and IMF Programs

2009 Data (% 2008 FX Reserves): Bulgaria, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, and Ukraine are revealed as crisis prone.

Key take outs

Perhaps it will come as no surprise that the 8-9 economies identified as being most vulnerable are all located in Emerging Europe. Indeed, the potential vulnerability of the region in the context of the current crisis is something that we have highlighted consistently over the past year (see for example RBS Top View: *"Dambusters set to roll on through CEEMEA"* September 18, 2008, and RBS EM Top View: *CEEMEA vulnerability indicators revisited"*, November 24, 2008).

The framework highlights that Latin America and Emerging Asian economies are not particularly prone to a sovereign debt crisis. We attribute this relative durability to the fact that these economies in general have built up significant current account surpluses, and have low levels of external and public sector debt; the latter reflects yeas of high real GDP growth, and relatively prudent fiscal policies.

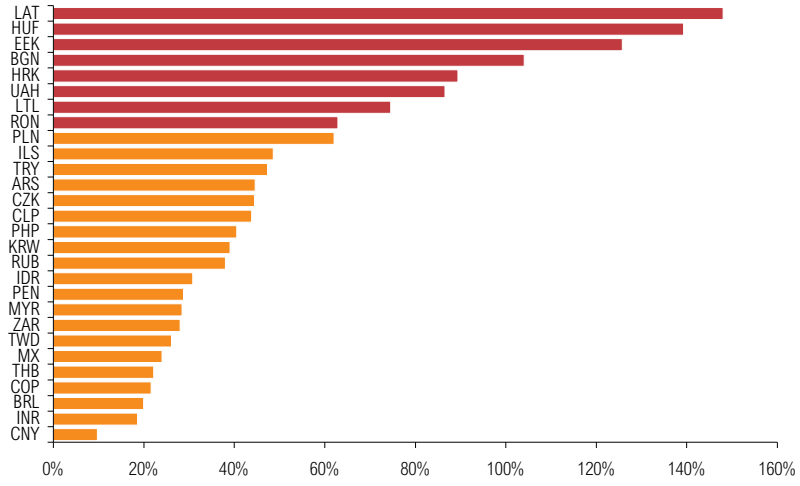
One major caveat does though need to be added in respect to Latin America's apparent durability against sovereign debt crises in that the one significant sovereign debt default which has occurred over the past year has actually taken place in this region, i.e. Ecuador. This does indicate the limits of the above analysis which essentially reflects ability and not necessarily willingness to pay;

albeit as noted above the original IMF analysis only had an 89% predictive ability. Ecuador herein is a prime example where the IMF methodology as above does suggest relatively low vulnerability from an "ability to pay" perspective, albeit as events have proven, policy makers opted to use the cover of the global crisis to restructure external liabilities. Countries could follow Ecuador's lead where they see limited downside from restructuring, i.e. peer pressure is weak, and market access is expected to be limited even in a scenario where they remain current on their obligations. In Emerging Europe, while ability to pay is somewhat more stretched, the willingness to pay is still strong, and this is reflected in countries willingness to seek IMF assistance as a means to avoid falling into default. Whether IMF support programmes will ultimately enable countries to manage through without formally falling into default is open to question, especially given the huge imbalances that need to be squared.

Vulnerabilities in Emerging Europe essentially reflect years of gorging on cheap foreign credit, which fed wide current account deficits, and saw the accumulation of hefty stocks of external liabilities. Financing wide current account deficits and rolling over large external liabilities was not problematic when global markets were flush with liquidity between 2000 and 2007, but as liquidity tightened post the collapse of Lehman, these countries appeared increasingly vulnerable.

The adjustment process for many of these economies is now in motion with current account deficits narrowing, and REER depreciation of currencies. However, many of the vulnerable countries have rigid exchange rate regimes, and as such the economies have not been able to adjust via this outlet, finding themselves hugely uncompetitive to regional floating peers. These economies now face a huge deflation in domestic demand which will weigh on budgets (cutting revenues), while the need to reign in spending just adds to the depth of the recession, increasing the chances of a sovereign debt crisis.

External Debt % GDP 2009



Source: RBS, Moody's

Interestingly, of the 8-9 economies identified as being vulnerable over the period 2007 – 2009 in the BRT methodology, only Ukraine, Hungary, Romania, and Latvia have formally entered crisis mode, and secured IMF agreements as per the definition in the original IMF paper. Latvia and Ukraine appear the most vulnerable with a 68% probability of crisis according to historical precedents, with the other countries indicated with a 47% chance of crisis. In addition there has been speculation though that Bulgaria, Lithuania and indeed Croatia may

look to secure IMF agreements in the near term; not yet confirmed by governments in these respective countries. The BRT methodology clearly puts these countries at risk for 2009.

Of the various risk variables the external debt/GDP ratio (%) appears to be the most compelling single indicator of potential crises. Herein all the above crisis-potential countries have the highest ratios of external debt/GDP in the country data set. In terms, of country specifics Latvia is the most vulnerable, given the size of external debt to GDP (148%), but the other crisis-prone economies follow closely behind with Hungary (139%), Estonia (126%), Bulgaria (104%), Croatia (89%), Ukraine (87%), Lithuania (75%) and Romania (63%). Estonia & Lithuania also have very modest FX reserve cover (around 3 months); Bulgaria's is higher at 5-6 months, but this suggests that an IMF programme for these countries may still help by shoring up FX reserves. Note that the IMF recently warned that both Bulgaria and Latvia have worrying high ratios of short term debt/FX reserves.

Notable exclusions from the "at risk" category according to the BRT approach in Emerging Europe include EM heavy-weights, Russia, Turkey, the Czech Republic and South Africa. This is all the more interesting as in the immediate aftermath of the collapse of Lehman in September 2009, all four suffered heavy market corrections. Subsequently all four stabilised, albeit Russian markets (particularly equities) have pushed aggressively lower in recent weeks.

Turkey's ability to stay out of the "at risk" category reflects its relatively low external leverage (< 50% of GDP), while lower international oil prices, a deflation in domestic demand/FX weakening have helped narrow the current account deficit (to 1-2% of GDP now expected this year). While in nominal terms Turkey has hefty stock of external liabilities falling due in 2009, banks/corporates have proven adept at rolling over 60-70% of these liabilities, a reflection of long-standing relations with foreign banks and offshore Turkish bank lending back into the country. Turkeys banking sector has also proven resilient during the course of the current crisis, presumably reflecting the success of reforms instigated following the 2000/2001 crisis.

South Africa/Czech Republic both benefit from floating exchange rate regimes, low public/external debt ratios and relatively modest budget deficits. Both have seen only modest build ups in external borrowing by households/corporates relative to their peers in the Baltics/Balkans.

Russia benefits from relatively low favourable external debt/GDP ratios (~35%), and has modest public sector debt/GDP ratios (< 10% of GDP), and in recent years has been running current account and fiscal surpluses. While the current account surplus is likely to all but disappear in 2009, and the budget is expected to post a hefty deficit, Russia's still hefty stock of FX reserves (>US$400bn) and fiscal reserve (Reserve Fund & Welfare Fund have around US$190bn in funds, but these are included in CBR reserves as detailed above) suggest a very limited chance of sovereign default/resort to IMF financing for the foreseeable future.

Poland's inclusion in the "at risk" category for 2009 is perhaps surprising, albeit note that its resort to tap an IMF FCL facility perhaps supports the BRT's conclusions, even though the IMF FCL facility is in effect precautionary. Poland's vulnerability is its relatively high weight of external liabilities, relatively wide current account deficit and limited stock of FX reserves. Clearly its floating exchange rate regime will help ease the adjustment process, while its public finances stand in relatively good shape. Poland does also not have a huge problem with foreign borrowing by households/corporates, at least relative to its peers in the Baltics/Balkans.

Strategy

Eastern Europe underperforming Latin America and Asia still remains the key theme as the fallout in the Eastern European economies will be ongoing over the next several years, as the economies rebuild balance sheets once the global economy/Europe recovers. This analysis re-highlights the grave vulnerabilities in the region and highlights crisis-prone countries: Latvia, Lithuania, Estonia, Bulgaria, Croatia, Ukraine, Poland, Romania and Hungary. The market is now well versed in Latvia's problems and the possible regional fall out. At present the market consensus is that the other countries will not be as severely affected as Latvia perhaps, but this framework indiscriminately highlights all the countries as more or less equally vulnerable. Given we are still at relatively early stages in the folding of an external debt crisis mirroring Asia, market complacency is forming in the credit markets, as such we like buying CDS protection across the region as the 2nd leg of crises emerges. Our favoured plays are buying Hungary and Croatia. In FX, the Hungarian forint and Polish Zloty are the two floating currencies in the crisis prone group, and we remain solidly short HUF (see "Condemned to 3 years hard labour" 27 May 2009).

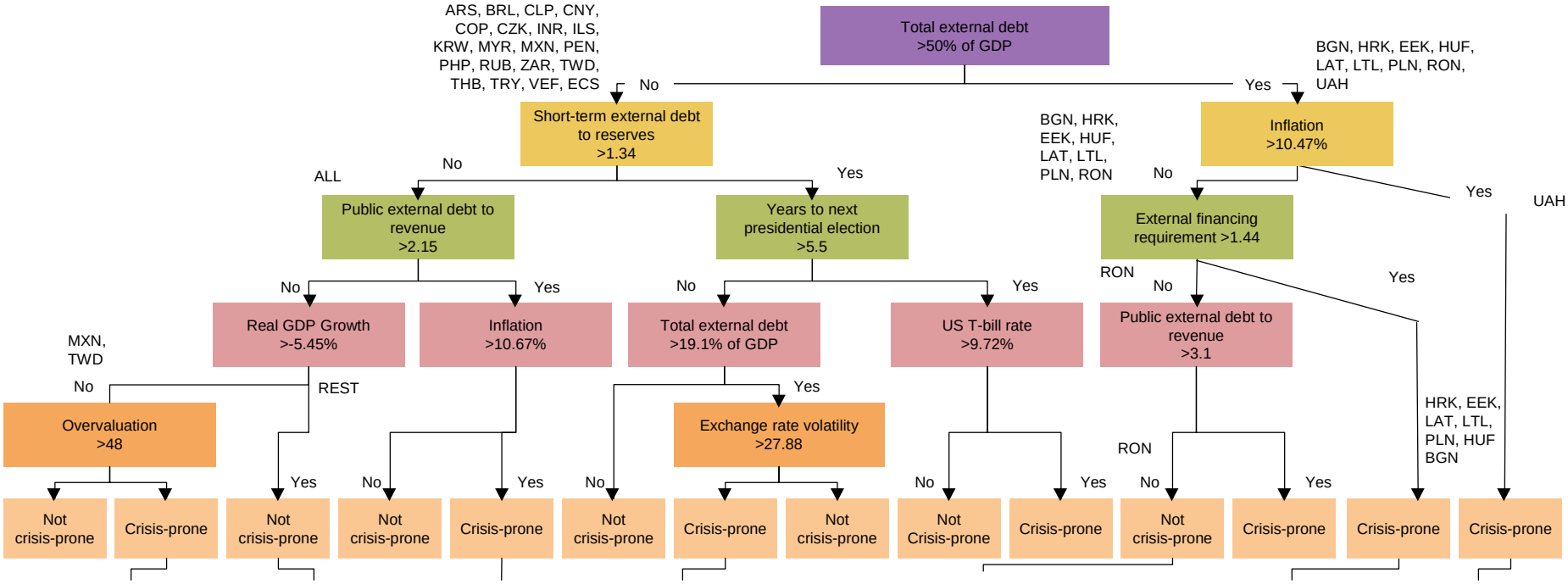
More specifically:

- Croatia 5Y CDS appears cheap on its peers; e.g. 300bps, versus ~ 410bps for Bulgaria;

- Bulgaria 5Y CDS (410bps) seems cheap on Lithuania, albeit the latter probably still suffers from close proximity to Latvia (725bps) which is still mired in an exchange rate crisis. However, as the IMF recently concluded, a crisis in Latvia would see fall-out to other rigid exchange rate credits throughout the region, including Bulgaria and Croatia; as well Lithuania which is arguably already priced in.

- We would probably be sellers of protection on the Czech Republic (perhaps against Slovakia), and perhaps even Turkey; where flexible exchange rate regimes, and favourable debt ratios provide some insulation. Turkey also has the added insulation that it is still viewed as "too big to fail" and would inevitably be able to secure IMF financing, if it so wished, as evidenced by the long drawn out negotiations over the past 6 months over possible IMF funding.

The Tree of Truth – Empirical tree for 2009 data



Crisis entries:
El Salvador 1981
Uruguay 1983

Crisis entries:
Venezuela 1983
South Africa 1976
Russia 1998
Argentina 1995
Thailand 1981

Crisis entries:
Guatemala 1986
Paraguay 1986

Crisis entries:
Pakistan 1998
Mexico 1982, 1995
Argentina 1982, 1989, 1993, 1989, 1993
Peru 1976, 1983
Brazil 1998, 2001
Jamaica 1978
Turkey 1978
Korea 1997
Trinidad & Tobago 1988
Ukraine 1998
Dominican Rep. 1981

Crisis entries:
Algeria 1991

Possible entries:
Bulgaria
Croatia
Latvia
Lithuania
Hungary
Poland
Estonia

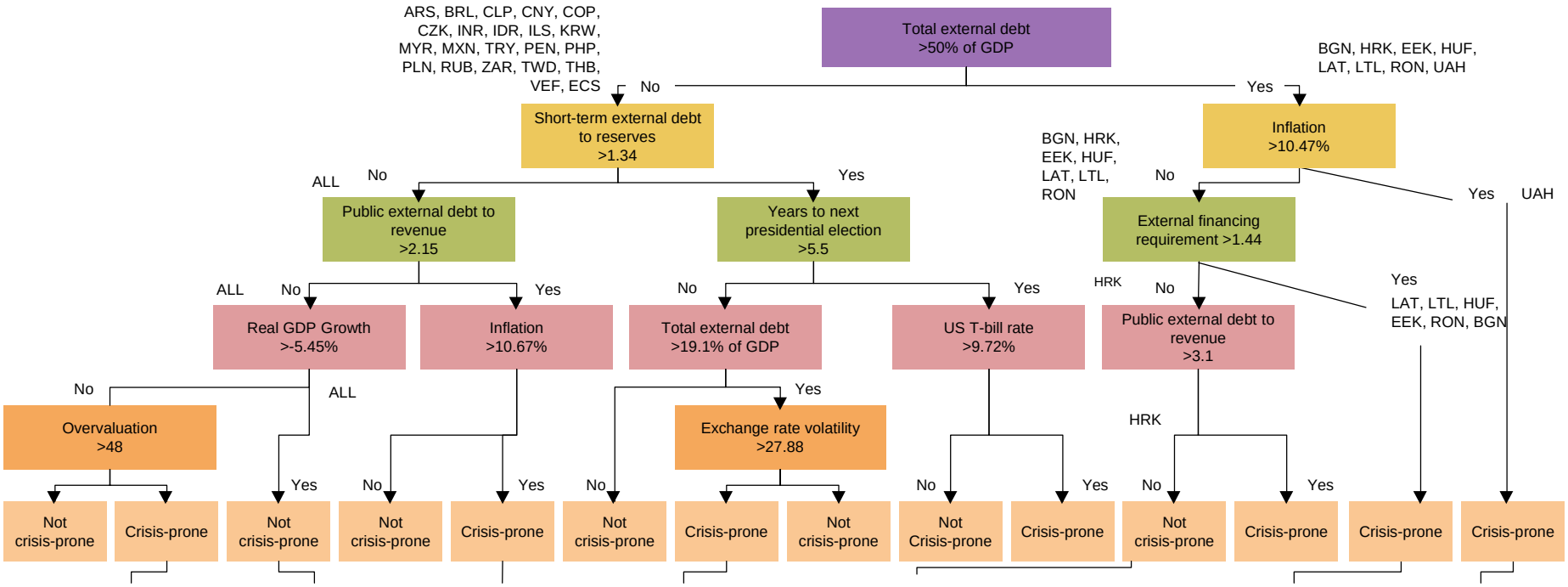
Crisis entries:
Chile 1993
Tunisia 1991
Panama 1983
Thailand 1997
Indonesia 1997
Philippines 1983
Argentina 2001
Jordan 1989
Morocco 1986
Costa Rica 1981

Possible entries:
Ukraine

Crisis entries:
Jamaica 1981-1987
Egypt 1984
Bolivia 1986
Peru 1978
Ecuador 1982, 1999
Uruguay 1987
Indonesia 2002
Bolivia 1980
Morocco 1983
Turkey 2000
South Africa 1985
Uruguay 1990
Brazil 1983
Venezuela 1990,1995

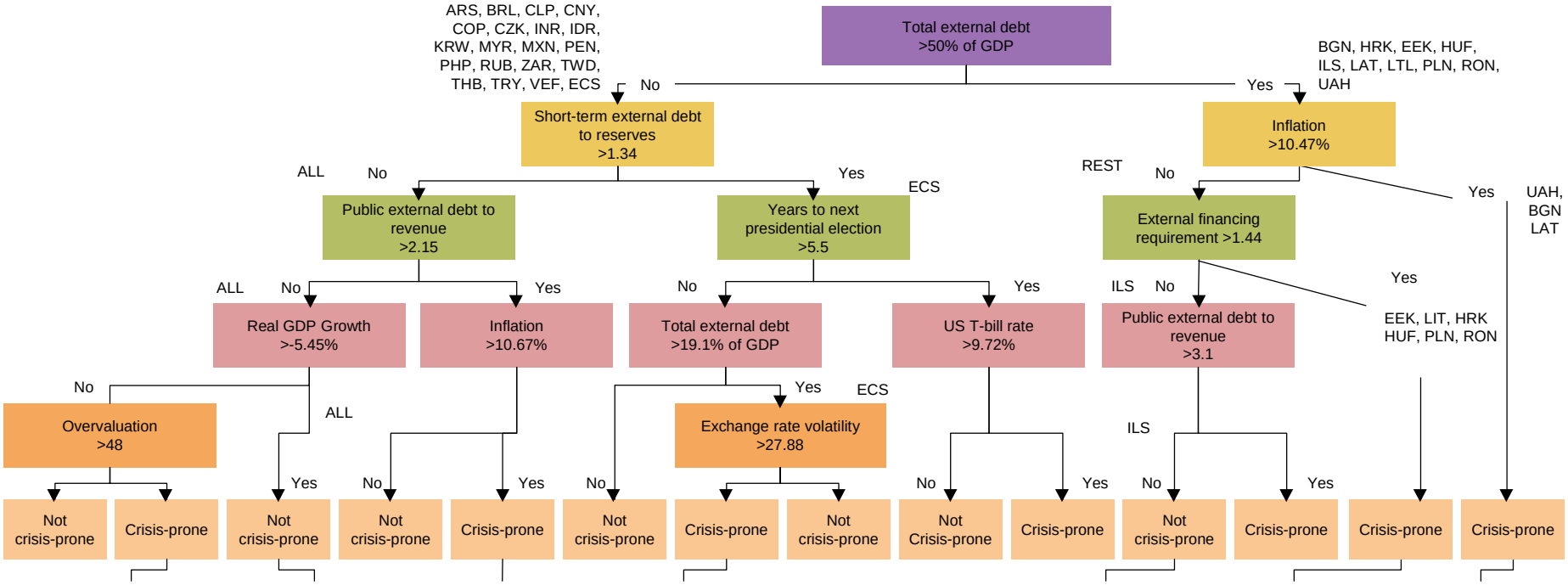
Source: RBS

The Tree of Truth – Empirical tree for 2008 data



Source: RBS

The Tree of Truth – Empirical tree for 2007 data



Crisis entries:
El Salvador 1981
Uruguay 1983

Crisis entries:
Venezuela 1983
South Africa 1976
Russia 1998
Argentina 1995
Thailand 1981

Crisis entries:
Guatemala 1986
Paraguay 1986

Crisis entries:
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Mexico 1982, 1995
Argentina 1982, 1989, 1993, 1989, 1993
Peru 1976, 1983
Brazil 1998, 2001
Jamaica 1978
Turkey 1978
Korea 1997
Trinidad & Tobago 1988
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Crisis entries:
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Croatia
Hungary
Poland
Romania

Crisis entries:
Chile 1993
Tunisia 1991
Panama 1983
Thailand 1997
Indonesia 1997
Philippines 1983
Argentina 2001
Jordan 1989
Morocco 1986
Costa Rica 1981

Possible entries:
Ukraine
Latvia
Bulgaria

Crisis entries:
Jamaica 1981-1987
Egypt 1984
Bolivia 1986
Peru 1978
Ecuador 1982, 1999
Uruguay 1987
Indonesia 2002
Bolivia 1980
Morocco 1983
Turkey 2000
South Africa 1985
Uruguay 1990
Brazil 1983
Venezuela 1990,1995

Source: RBS

2009 Key Vulnerability Data

Key Vulnerability Indicators 2009 (Using 2008 FX Reserves)

	FX debt % GDP	Govt FX debt % Govt Revenues	ST External debt % FX reserves	External funding requirements % FX reserves	Real GDP growth	Inflation	REER overvaluation
ARS	45%	115%	101%	141%	-1.0	15.0	-28.5
BRL	20%	15%	18%	52%	-1.5	4.3	15.9
BGN	104%	33%	83%	184%	-5.7	2.3	27.2
CLP	44%	10%	57%	147%	-0.8	3.0	-0.8
CNY	10%	4%	13%	2%	6.5	1.0	13.9
COP	22%	51%	23%	84%	0.0	4.5	-
HRK	89%	59%	50%	211%	-3.0	2.6	8.4
CZK	44%	9%	71%	117%	-2.7	1.1	19.3
EEK	126%	14%	209%	261%	-10.3	-1.0	15.6
ECS	25%	76%	60%	305%	-1.0	1.0	-
HUF	139%	66%	68%	150%	-6.3	4.2	4.4
INR	19%	21%	17%	31%	5.8	5.1	-4.5
IDR	31%	72%	29%	74%	3.8	5.8	1.4
ILS	49%	36%	83%	105%	-1.0	0.0	-3.2
KRW	39%	2%	70%	84%	-3.5	2.0	-20.8
LAT	148%	88%	189%	314%	-13.1	1.0	18.6
LTL	75%	53%	95%	210%	-11.0	-0.4	16.8
MYR	28%	13%	20%	5%	-1.5	1.0	-1.5
MXN	24%	36%	29%	92%	-5.8	3.5	-18.6
PEN	29%	74%	18%	48%	3.0	3.5	3.5
PHP	41%	153%	32%	50%	2.0	3.9	14.2
PLN	62%	34%	104%	201%	-1.4	2.8	-5.4
RON	63%	38%	59%	110%	-4.0	4.9	7.9
RUB	38%	8%	19%	52%	-4.3	12.3	18.6
ZAR	28%	12%	83%	142%	-1.1	6.5	-14.2
TWD	26%	17%	27%	21%	-5.7	-2.0	-13.7
THB	22%	6%	17%	31%	-3.5	1.0	6.4
TRY	47%	74%	61%	143%	-5.0	6.2	7.5
UAH	87%	37%	71%	128%	-8.0	15.0	-
VEF	19%	51%	49%	38%	-2.5	25.0	47.8

Note: Overvaluation calculated using average annual REER vs 10y average

Source: RBS, BIS, IMF IFS, Moody's

2008 Key Vulnerability Data

Key Vulnerability Indicators 2008 (Using 2007 FX Reserves)

	FX debt % GDP	Govt FX debt % Govt Revenues	ST External debt % FX reserves	External funding requirements % FX reserves	Real GDP growth	Inflation	REER overvaluation	FX Hist Vol
ARS	39%	115%	127%	154%	7.0	20.0	-32.1	-
BRL	17%	14%	20%	57%	5.1	4.8	30.1	21.8
BGN	106%	26%	107%	240%	6.0	7.7	23.9	-
CLP	38%	10%	89%	199%	3.2	7.1	3.3	16.0
CNY	11%	4%	18%	0%	9.0	1.2	6.4	2.5
COP	23%	48%	28%	102%	2.5	4.9	-	16.4
HRK	78%	56%	39%	142%	2.4	2.8	8.5	-
CZK	37%	8%	75%	123%	3.2	3.6	30.4	10.0
EEK	116%	8%	320%	437%	-3.6	7.0	14.7	-
ECS	32%	131%	80%	247%	5.3	8.8	-	-
HUF	112%	61%	99%	234%	0.5	3.5	19.0	12.7
INR	19%	24%	15%	34%	6.6	9.2	2.7	7.9
IDR	29%	77%	28%	73%	6.0	11.0	9.1	13.1
ILS	44%	30%	120%	139%	4.0	3.8	0.0	14.3
KRW	41%	2%	65%	88%	2.5	4.1	-6.5	20.7
LAT	124%	27%	254%	432%	-4.6	10.6	11.9	-
LTL	69%	30%	108%	285%	3.1	8.6	9.2	-
MYR	31%	13%	23%	-6%	4.7	5.8	0.6	6.8
MXN	18%	23%	31%	86%	1.3	6.5	-6.1	12.9
PEN	28%	77%	22%	57%	9.8	6.7	0.6	10.1
PHP	40%	155%	35%	51%	4.6	8.0	15.1	8.5
PLN	46%	27%	103%	218%	4.8	3.3	17.1	10.8
RON	61%	21%	70%	163%	7.1	6.3	18.4	11.0
RUB	29%	6%	17%	21%	6.0	13.8	36.3	7.9
ZAR	26%	12%	87%	178%	3.1	9.5	-14.5	24.4
TWD	25%	14%	31%	25%	0.1	1.0	-10.8	5.3
THB	24%	5%	29%	48%	4.0	2.0	9.5	5.3
TRY	39%	62%	69%	194%	1.1	10.1	16.8	20.6
UAH	57%	28%	69%	169%	2.1	22.3	-	20.8
VEF	19%	37%	72%	-61%	4.8	30.9	17.1	-

Note: Overvaluation calculated using average annual REER vs 10y average

Source: RBS, BIS, IMF IFS, Moody's

2007 Key Vulnerability Data

Key Vulnerability Indicators 2007 (Using 2006 FX Reserves)

	FX debt % GDP	Govt FX debt % Govt Revenues	ST External debt % FX reserves	External funding requirements % FX reserves	Real GDP growth	Inflation	REER overvaluation	FX Hist Vol
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BRL	18%	13%	46%	105%	5.7	4.5	22.3	11.8
BGN	105%	34%	132%	292%	6.2	12.5	18.8	-
CLP	34%	11%	57%	83%	4.7	7.8	0.9	5.5
CNY	11%	5%	21%	-9%	13.0	6.5	-2.0	1.6
COP	21%	48%	35%	132%	7.5	5.7	-	11.5
HRK	83%	54%	42%	144%	5.6	5.8	5.2	-
CZK	44%	8%	75%	124%	6.0	5.4	19.1	4.6
EEK	121%	4%	277%	498%	6.3	9.6	10.2	-
ECS	38%	168%	151%	590%	2.5	3.3	-	-
HUF	105%	44%	100%	216%	1.1	7.4	20.2	7.2
INR	19%	22%	23%	40%	9.0	6.6	8.0	5.3
IDR	32%	82%	35%	66%	6.3	6.5	20.2	6.6
ILS	55%	38%	119%	131%	5.4	3.4	-11.6	7.0
KRW	41%	3%	67%	87%	5.0	3.6	17.1	4.3
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LTL	77%	35%	137%	369%	8.9	8.1	5.6	-
MYR	30%	14%	20%	-5%	6.3	2.8	0.9	4.4
MXN	19%	25%	35%	84%	3.3	3.7	-3.0	5.3
PEN	31%	94%	36%	67%	8.9	3.9	-0.3	2.0
PHP	46%	140%	43%	54%	7.2	3.9	11.5	6.7
PLN	55%	26%	131%	256%	6.6	4.0	9.9	5.7
RON	50%	18%	94%	215%	6.2	6.6	28.2	6.5
RUB	36%	7%	37%	42%	8.1	12.0	31.8	3.1
ZAR	27%	11%	106%	223%	5.1	9.0	-4.7	13.3
TWD	24%	14%	31%	23%	5.7	1.8	-11.3	2.6
THB	25%	8%	33%	46%	4.8	3.1	10.8	4.9
TRY	39%	56%	71%	211%	4.7	8.5	18.9	13.4
UAH	58%	24%	101%	196%	7.9	16.6	-	3.6
VEF	24%	46%	53%	-4%	8.4	22.5	-3.2	-

Note: Overvaluation calculated using average annual REER vs 10y average

Source: RBS, BIS, IMF IFS, Moody's

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