The shortcomings of models in country risk management

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Abstract   Risk management models are supposed to help anticipate and manage risks; that is, to reduce the level of uncertainty. The objective is to come up with a number of early warning signals that will awake the attention of financial analysts and fund managers. Overall, econometric models aim at simplifying the current reality to better predict the future around a limited number of scenarios. Too often, however, risk management models are based on unrealistic assumptions and assume normal probability distributions. Despite incorporating expertise and judgment to avoid any dogmatic view of models, they fall short of representing the true picture and complexity of a sovereign country with its complex legal, economic, institutional and cultural characteristics. Whatever the quality of econometric models, data sources and economic intelligence, they will never match the information and signals that domestic residents receive and accumulate daily. Country residents are embedded into an endless flow of sociopolitical, cultural, economic and financial inputs. This paper discusses a pragmatic solution to enhance the quality of risk assessment models, eg incorporating capital flight as an early warning indicator of country risk volatility. There is large evidence that in countries with weak institutions, private capital outflows and dollarisation are the by-product of a political and regulatory environment that is not conducive to dynamic and inclusive socio-economic growth.

Keywords: *country risk, econometric models, ranking, ratings, volatility, crisis, capital flight*

INTRODUCTION: MODELLING UNCERTAINTY AND RISK

Risk management models are supposed to help anticipate and manage risks; that is, to reduce the level of uncertainty. The objective is to come up with a number of early warning signals that will awake the attention of corporate boards and their management, financial analysts, fund managers and policymakers. Risk, indeed, arises from uncertainty regarding current or future situations, where information about the situation's outcome is insufficient, lacking or simply wrong. Uncertainty itself derives from a deficit of information, hence the randomness of results. In return, information

scarcity requires taking action that might produce negative and costly consequences, including investigation time, transaction costs and delays. A country that is unable or unwilling to provide timely and reliable information regarding its economic and financial situation sends out risk signals. Econometric models thus attempt to mimic financial markets and country economic and sociopolitical situations to detect abrupt changes in volatility. Models rely on a number of data, including balance of payments, debt, inflation, budget and governance to transform uncertain future events into calculable and creditable scenarios. Those latter are useful for risk management. In any event, the by-product of country risk assessment models will be as good or as bad as the information that feeds the econometric regressions, whatever their sophistication. Overall, econometric models aim at simplifying the current reality to better predict the future around a limited number of scenarios. As we shall discuss in this paper, modelling country risk is a complex adventure that can lead to diminishing returns, when the number of qualitative and quantitative variables increase to take into account a country's specific characteristics as well as its interactions with the globalised system. The Appendix sums up the key features of a number of country risk models by private and public institutions.

Most of the risk assessment tools assume that the future is in linear continuity with the past and that no major, exceptional and systemic break in volatility will occur. They also assume that the distribution of probabilities follows a Gaussian law or 'bell curve'. Exceptional events are marginal. The data is 'normally distributed' around the mean. This type of data is more adapted for measuring people's height than for measuring stock market prices, external debt ratios or floating exchange rate variations. Mandelbrot warned that normal distribution models are not appropriate when one expects a significant fraction of outliers; that is, exceptional events that imply 'fat tails', or in other words, values that lie many standard deviations away from the mean and least squares.[1] In Mandelbrot's words, these events stem from wild risk where volatility is strong and erratic. His recommendation that is applicable for country risk managers is: 'Do not add model risk to market risk'[2] He was critical of the unrealistic risk management models that assume normal probability distributions, and of financial and economic data that supposedly incorporate all relevant information. Mandelbrot stressed the broad scope of market turbulences and the consequent volatility that standard financial theories and models do not capture. Rare and unpredictably large deviations have a dramatic impact on long-term returns. Accordingly, debt defaults and bubbles are not exceptional events.[3] Country risk is fractal to the core.

Sornette, of the Zürich-based Financial Crisis Observatory, follows Mandelbrot's and Taleb's[4] views on the limitations of traditional risk modelling. He explores the emergence of extreme risks such as epidemics, wars, debt defaults and financial crises, which imply system changes. He concludes that outliers imply a deviation from power laws. 'Dragon Kings', thus, are extreme events that are both very large and born of unique origins and respond to amplifying mechanisms. These outliers are a class of their own. Their volatility, totally non-linear, is missed by standard risk management tools owing to its endogenous origin.[5] Contrary to the popular black swan concept that assumes that extreme events are unpredictable, Sornette proposes identifying the numerous early warning signals of abrupt crises and exponential non-linear trajectories to obtain a degree of predictability. Self-reinforcing imitations, that is, herd instinct phenomena, are crucial triggers behind country risk volatility.[6]

COUNTRY RISK AND VOLATILITY

The dynamics of a country's economic, financial and sociopolitical phenomena, as well as interactions of these with the global economic system, are too complex to be captured by mathematical formulae and econometric models — even though the latter give the reassuring but illusory comfort of being 'hard science'. Country risk analysts try to see patterns and look for thresholds, such as debt ratios, inflation levels or current account and budget deficits; however, markets are deceptive. Reading 'meaning' into these ratios, as technical analysts do, is often fatuous. As we shall see later in this paper, much of the debt sustainability depends

less on the sheer level of debt/GDP or debt/export ratios than on the composition of the debt, that is, its structure by creditors, maturity, interest rate and creditors, as well as on the structure of export revenues regarding products, import components, and geographic markets. Two countries of equivalent solvency ratios can have very different debt payment trajectories. In country risk analysis, shrinking the economic and sociopolitical complexity of national systems into a few numbers is not only hard to do, it is also risky.

Most risk managers are aware of the conceptual pitfalls of the underlying assumptions of models that become axioms. Meanwhile, risk managers tend to continue using the simplified correlations based on incorrect axioms wrapped up in sophisticated equations. As Bouchaud notes: 'In reality, markets are not efficient, humans tend to be over-focused on the short-term and blind to the long-term: errors get amplified, ultimately leading to collective irrationality, panic and crashes. Free markets are wild markets.'[7] Risk managers cannot assume that they grasp the full dimension of a country's multifaceted risks when dealing with national economic, financial and sociopolitical variables. The globalised market system has added the spill-over effects of regional crisis contamination to the mix, not to mention systemic risks such as structurally important financial institution failures, global warming and terrorist threats. Market globalisation increases uncertainty due to the integration of complex economic and financial systems that breeds volatility contagion and regional crisis contamination. As noticed by Goldin and Kutarna (2017): 'Growing complexity poses a severe challenge for risk management. The more complicated our interactions become, the harder it is to see relationships of cause and effect. We develop cognitive blind spots in our vision of the events around us.'[8]

THE PROS AND CONS OF COUNTRY RISK RATINGS

Since the 1980s' debt crisis in developing countries, country risk modelling has aimed at measuring and comparing risk across time and across countries under the form of ratings and rankings. Almost every feature of a country's socio-economic system has been metricised, including liquidity and solvency, productivity and competitiveness, transparency and civil liberties, innovation and regulations, governance and bribery, as well as corruption and slavery. It is tempting for country risk analysts and managers to shrink a large number of underlying risk variables into one single number. Scoring, rating and ranking make cross-country comparisons across time simple, if not simplistic. A sovereign credit rating is a quantitative assessment of a government's ability and willingness to service its foreign debt obligations in full and on time. As such, a rating is a forward-looking estimate of crisis probability and it can be based on a large number of economic and social parameters. The appraisal is thus both quantitative and qualitative, even though the ultimate output is a grade or rank. As S&P observes: 'The quantitative aspects of the analysis incorporate a number of measures of economic and financial performance and contingent liabilities, although judging the integrity of the data is a more qualitative matter. The analysis is also qualitative due to the importance of political and policy developments.'[9]

Despite a history of ineffective prediction, country risk analysts keep relying on risk ratings that remain popular although disasters keep coming. One reason is that ratings make cross-country comparisons easy. Another reason is precisely that ratings are widely used. To paraphrase Keynes[10] on investors, an astute country risk manager stays clear of innovation and is only as right or wrong as the herd. A third reason is that ratings are influential. Should a country want access to international capital markets, a credit rating is a prerequisite. In the globalised markets, only a handful of countries shun credit ratings, including North Korea and Algeria. In the global markets, if you cannot be measured, then effectively you cannot borrow. The influential nature of ratings also comes from their wide use by sovereign wealth funds, pension funds and other institutional investors to gauge the creditworthiness of countries. As such, ratings have a large impact on a country's borrowing costs. In addition, country ratings put pressure on countries' policy efforts to improve scoring and to keep attracting investment

Advantages/Pros	Shortcomings/Cons
Simple and easy to incorporate in graphs and country reports	Often simplistic and 'black box' Assumptions, methodology, and weightings are not always transparent
Shrinks large number of variables into one single grade	Reductionist given the complexity of country risk
Cross-country comparisons	Risk of self-fulfilling prophecy
Comparison across time	Little predictive value
Useful tool for statistical and econometric analyses	Weighted average tends to bury salient trends and 'fat tails'
Reliable for smooth risk evolution without abrupt worsening	Gives biased market consensus that often follows the herd

Figure 1: The usefulness and shortcomings of country risk ratings

flows. Figure 1 summarises the pros and cons of risk ratings.[11]

RECURRENT PITFALLS IN THE METHODOLOGY AND INTERPRETATION OF RATINGS

One can briefly consider several main shortcomings of model–based country ratings.

Country ratings often create a risk of self–fulfilling prophecy. Country ratings might trigger the herd instinct and have a spill–over effect, hence transforming a national crisis into regional destabilisation. As observed through several country risk crises, the rating agencies lag the market. Spreads and credit default swaps (CDSs) prices react to worsening risk signals before agencies adjust their ratings. Downgrading is often abrupt and the rating's adjustment overshooting fuels investors' over-reaction. S&P and Moody's, for instance, attach a negative, stable or positive outlook to their ratings as a signal of another possible down/upgrade in the medium term. That is supposed to anchor investors' expectations and to avoid excessive reactions. In practice, the change in outlook tends to have the effect of a self-fulfilling prophecy on investors' portfolio rebalancing strategies. Different kinds of indicators may be useful for different purposes and over different time horizons. Some may be useful in the short term (eg liquidity) but have

less value in the longer term, whereas investment, growth, employment and solvency are of higher importance.

Country ratings often incorporate bullish or bearish biases. There is a well-documented 'home bias', whereby rating agencies from the USA and China rate their respective domestic countries better than others. The US rating, for example, was long designated 'AAA' by S&P and only 'A' at most by Dagong Global Credit Rating (the Chinese agency). Credit rating agencies may be tempted to replicate the political features of developed countries and may score the rest of the world on the basis of their own domestic values. This is the main argument of China's Dagong in differentiating itself from Western agencies.

Composite ratings incorporate a set of risk weights to encompass the effect of risk triggers such as economic, financial, sociopolitical or external risk factors. Risk weightings, then, allow for cross-country comparisons across time; however, the stability of weightings across country and across time is crucial to obtain long series data while the stability of weights is highly questionable. Should one give a 25 per cent political risk weigh to both Cuba and Germany, or a 30 per cent financial risk weigh to both Singapore and Ivory Coast? Credit rating agencies, as well as the International Country Risk Guide, Euromoney and Institutional Investor use risk categories whose weights are stable across countries of very different structures.

➢ **Solvencia**	➢ **Liquidia**
Debt/GDP ratio = 100%	Debt/GDP ratio = 100%
1. Diversified export base	1. Main export = hydrocarbons
2. Diversified export markets	2. Main export destination = EU
3. Mainly official creditors (Paris Club & IFIs)	3. Main creditors: London Club banks and bond holders
4. Long-term maturities = 12 years	4. Average debt maturity = 5 years
5. Fixed rate = 80% of debt	5. 60% of debt on floating rates
6. Similar currency structure (export revenues/external liabilities)	6. Currency mismatch (€ export revenues/$ debt servicing)
7. Share of foreign holders of bonds: 20%	7. Share of foreign participation in bond market: 60%

Figure 2: Comparison of two external debt strategies

Rating agencies often ignore the historical similarity in crisis triggers. As former Federal Deposit Insurance Corporation (FDIC) Chairman Irving Sprague observed: 'Unburdened with the experience of the past, each generation of bankers believes it knows best, and each new generation produces some who have to learn the hard way.'[12] This syndrome of 'ignoring history' often co-exists with the syndrome of 'this time it is different'. Investors should never forget that payment crises and defaults might have similar root causes although in different socio-economic and institutional environments.

External debt is an important element in country risk models. The 'big three' rating agencies are first of all credit rating agencies. Country ratings focus on liquidity and solvency indicators although the specific structure of assets and liabilities is often ignored. The focus on the debt/GDP ratio should not overlook the growth engines of the denominator while scrutinising the maturity and creditor structure of the numerator. Analysing the structure of the debt requires a focus on the long, medium and short maturities of both public and private liabilities. In addition, the debt's structure by creditors is to be closely analysed, focusing on public and private creditors, namely, official bilateral and multilateral creditors, private banks, credit agencies, bond markets and trade credits. Figure 2 illustrates the debt trajectories of two countries whose debt structures substantially differ.

COUNTRY RISK, RATINGS AND MODELS

Despite the growing number of rating agencies worldwide, the quality of country ratings is still questionable. How can one explain this 'halo of uncertainty' surrounding ratings quality? Econometric forecasting models — with their over-reliance on complex mathematical correlations — lead to diminishing returns for providing reliable risk signals. These models rely on 'dynamic systems' that are highly sensitive to the initial hypotheses used by forecasters. Other models aim to quantify so-called 'black swan events' — that is, abrupt shifts in trends, found in the fat tails of probability distributions. 'Extreme events' or 'extreme value' movements are analysed in the same way that insurers try to assess the likelihood of natural disasters such as floods or earthquakes, despite historical evidence that suggests that such an approach is flawed.

A country's risk trajectory depends on both its ability and its willingness to meet current and future debt serving obligations. Ability to meet external payments depends on a number of liquidity and solvency criteria. The willingness to pay depends on a number of soft and complex

qualitative criteria including sociopolitical stability, governance, and the country's financial leaders' weighing of the consequences of past defaults. The risk of 'conventional payment default' is often analysed using the same methods and models that conventional finance theory uses to assess credit risk. The willingness to pay is modelled through maximising the so-called state's welfare. It takes into consideration how a country will weigh the cost and benefits of default and which of such trade-offs will maximise social welfare. Clearly, the country might face a short-term benefit in defaulting but this also incurs a long-term cost — being excluded from capital markets for many years or facing a higher cost of financing. How 'long term' the default cost is, actually, depends on the country's reputation as a serial defaulter, its speed of creditworthiness recovery, investors' search for yield and creditors' memories. Usually, the main types of costs from an international sovereign default include reputational costs, international trade exclusion costs, domestic economic costs with lower consumption and higher import prices, banking system tensions owing to worsening portfolio quality, the threat of a bank run and tighter access to interbank markets, and sociopolitical turmoil.

Depending on the root causes of the default and on the subsequent debt restructuring process, the economic costs can be substantial but short-lived and market access recovery can be within a few years with gradual improvement in credit ratings and spreads. Defaults often occur in waves owing to external shocks, tighter market liquidity and cross-country contamination.

The reputational cost of debt default assumes that a country faces an embargo on future loans by private lenders.[13] Default, thus, makes re-entry into private capital markets difficult. Argentina's inability to access the global capital market for 15 years in the wake of its 2001 default is a good illustration of markets' memory. As noticed by Pronina and Doff[14] 'As Argentina prepares amid much fanfare its first international bond sale since a record default 15 years ago, a little reminder of its less-than-stellar financial past crept into its sales pitch. On page 8 of the 266-page prospectus, a paragraph states that from time to time, the Republic carries out debt-restructuring transactions.' Argentina has

been a serial defaulter with eight debt defaults since the 1820s.

Until the 1990s, country default modelling was subject to a relatively 'small sample' size. A study by Bloomberg in 2013 estimated that 'only' 251 sovereign defaults had occurred during the past 200 years, roughly 1.25 per year on average, which is far from being enough to draw any meaningful inferences.[10] This limitation has, however, been somewhat offset by new developments in big data and data mining, alongside the development of bond market data for emerging countries and financial data providers (eg Bloomberg, Reuters and others). The choice of explanatory variables remains a challenging exercise owing to the number of variables that are correlated between themselves. The preferred statistical method to assess correlations is often the ordinary least square (OLS) model for estimating the unknown parameters in a linear regression model. The OLS method allows quick and easy analysis of the relationships between the explanatory variables and the observed dependent variable. The popular method means that the estimated relationship between the variables is linear, however, even though the evolution of financial or political crisis probabilities might be non-linear. The OLS statistical method also treats the dependent variable as continuous (default, rating, crisis) whereas this is very unlikely.

In addition, each crisis has its specific features, hence the choice of variables is an ad hoc process in itself. The unit of analysis is unavoidably the country, with its complex economic, sociopolitical and institutional characteristics. Consequently, it is very difficult to identify exogenous variables. The interpretation of many results in the literature is clouded by the inclusion in the estimated relationships of many endogenous variables as explanatory variables.[15] A number of scholars have incorporated various aspects of chaos theory to explain the complexity and contagion risks in the global economy. Among fat-tail risks, geopolitical risk is probably the hardest to predict. The spread of terrorism across boundaries in the Middle East and beyond illustrates the complex influence of the rise of transnational agents that show a growing impact on financial markets' valuation, the cost of insuring risks and the methodology of rating agencies.

Geopolitical volatility thus remains a difficult risk to assess and model for all these reasons, including the fact that its frequency, magnitude and timing are so difficult to determine.

THE CHALLENGE OF COMBINING COUNTRY-SPECIFIC VARIABLES AND GLOBAL ENVIRONMENT INPUTS

Country risk modelling requires defining a complex interplay between country-specific economic, financial and sociopolitical inputs with the globalised framework, including exchange and interest rates, capital and trade flows, foreign direct investment, commodity prices, rating agencies and multilateral institutions. One can briefly describe this complex interaction as follows.

Feeding models with country-specific quantitative economic and financial variables

Quantitative risk analyses encompass a number of key features, including the following.

Indicator/variable screening

The purpose is to define which variables will be explanatory, with the least feasible correlations between them to avoid statistical bias. In country risk, 'one size does not fit all' and the screening must be targeted at the most salient variables. For instance, the public debt/GDP ratio is less relevant for some countries that are not dependent on foreign capital. An extreme case is Japan which has large current account surpluses, and accordingly no need for foreign currency financing. Japan can finance a public debt/GDP of up to 400 per cent by capturing large domestic savings. A relatively low share of private consumption in the country's GDP frees savings that are invested in domestic debt securities by an aging population.

Indicator threshold setting

To score risk levels and risk tolerance requires setting thresholds beyond which sovereign default looms. The risk profile can differ between the short– and long-run. In the short-run, 'push factors' can be excluded but high-frequency data of vulnerabilities can efficiently be used to shape early predictors. In the long-run, institutional and structural factors must be considered as they evolve. Also important are external pull–factors and rising global threats. Thresholds may change over time. In the 1970s and 1980s, hyperinflation was frequent, with many economies sustaining inflation of over 20 per cent for several years. But from the 1990s onwards, a growing number of central banks became independent and their wish to build credibility resulted in a reduction in tolerance for inflation. Since the Global Financial Crisis, inflation has been subdued, and central banks have striven to increase domestic prices with little success during the 2008 to 2018 period.

Solvency indicators

The challenge is defining when and where 'how much is too much'. The clock starts ticking when rising external financing requirements cannot be met, and the crisis will stem from higher debt cost, shorter maturities, shrinking market access or a combination of the three. Are debt levels weak or strong predictors of growth outcomes? Risk analysts have debated whether there is a threshold in the level of government debt to GDP above which a nation's medium-term economic growth prospects are compromised. Reinhart and Rogoff[16] and Reinhart *et al.*[17] argue that there is a threshold effect: when debt in advanced economies exceeds 90 per cent of GDP, there is an associated dramatic worsening of growth outcomes. For developing countries, the threshold is closer to 60 per cent owing to structural weaknesses and little production and export diversification. In practice, since the Global Financial Crisis, Organization of Economic Development and Cooperation (OECD) countries exemplify much higher solvency ratios than emerging market countries, owing to the combination of large budget and current account deficits. Their economic growth tends to slow down. As the following figure illustrates, the developed countries' solvency ratios are much higher than the academic thresholds. Figure 3 shows the over-indebtedness of OECD countries whose debt ratios reach 266 per cent, with a two–third share of private debt.[18]
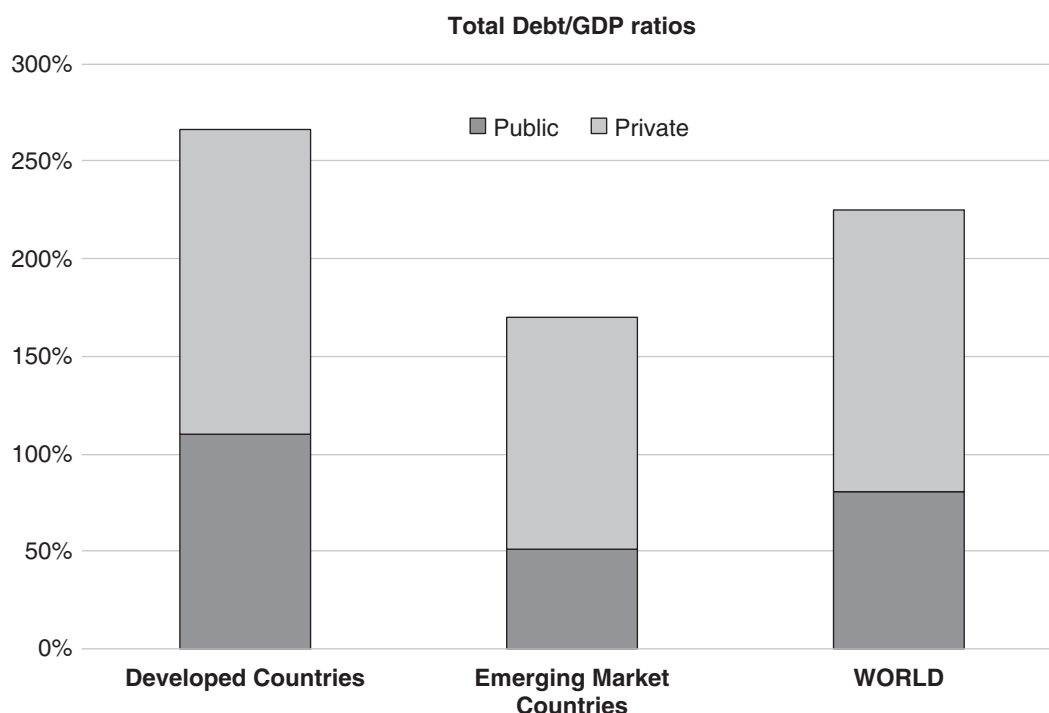
Total Debt/GDP ratios

Figure 3: Total debt/GDP ratios

Others dispute the threshold notion while suggesting that it is weak growth that causes high debt rather than high debt that causes weak growth.[19,20] A recession and a currency depreciation will raise the debt-to-GDP ratio because the denominator (GDP) decreases. Much depends on the debt structure, the regional and global macroeconomic situation, and whether countries have dealt with their budget deficits. The term structure and maturity profile of debt is far more important than the actual debt/GDP ratio, whose denominator is of questionable value for the purpose it is being used. In addition, in country risk models, moderate debt/GDP ratios can hide a relatively large share of private sector debt, hence damaging impact on investment, employment and growth in case of higher interest rates or lower market access for refinancing. Figure 4 illustrates the share of private sector debt in total debt in a number of countries.

The risk analyst should also take into account 'who' holds the government's debt, that is, domestic or foreign investors. Less than 30 per cent of the UK government debt is held by foreign investors versus

40 per cent of South Africa's debt and 65 per cent in the case of France. The share of debt held in the hands of global investors is traded depending on country risk perception, as well as yield and spread volatility. Since the end of the financial crisis, central banks' accommodative monetary policy has kept interest rates ultra-low. As a result, yield hungry investors have over-weighted their portfolios with corporate debt and emerging market bonds that they will shun as soon as concluding that the tide has turned, due to higher rates of interest and declining capacity to repay.

Assigning relative weights to indicators

Paolo Manasse and Nouriel Roubini[21] compared the importance of 50 indicators in the two periods 1970–2002 and 1990–2002. They found that most of the top-ten indicators were stable over time. These included total external debt/GDP and short-term debt/GDP, short-term debt foreign-exchange reserves and several variations of these. Other indicators — such as current-account balance/GDP,
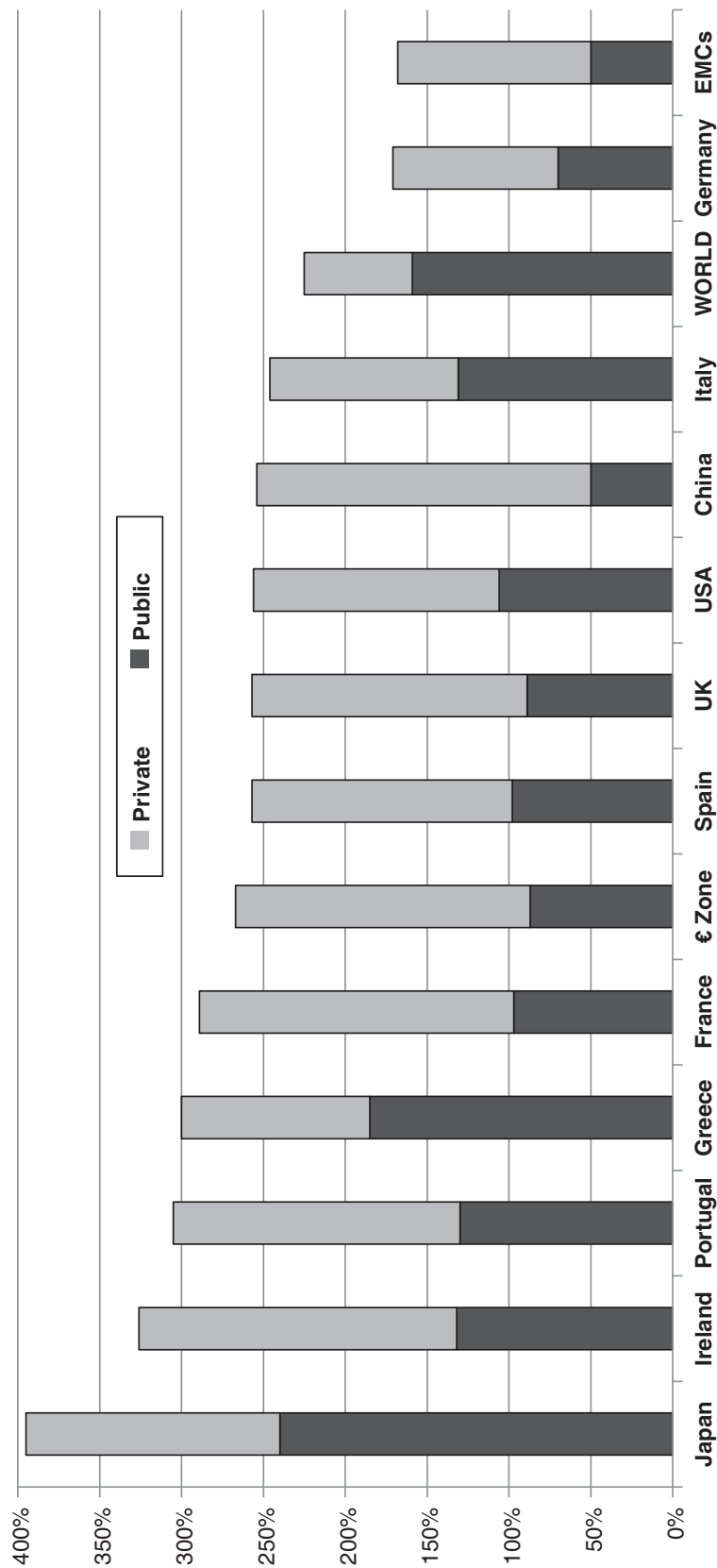
Figure 4: Developed countries' indebtedness ratios

terms-of-trade volatility and openness — increased in importance when tested in the 1990–2000 period, reflecting the effect of increased liberalisation and the global integration of financial markets compared with the earlier decades. Since the 2011 European debt crisis, many credit rating agencies (CRAs) have decided to put more emphasis on GDP growth as one of the most efficient ways for countries to pay back their debt and improve solvency indicators.

Understanding the limits of modelling

Many economic indicators and ratios are shaped by the need to perform replicable measurements. Nevertheless, these measurements do not always accurately reflect the phenomenon that is being investigated. Moreover, many variables are not always observable. For instance, even if the predominantly used debt/GDP ratio is convenient and intuitive, it does not compare like with like. Which part of the country's annual revenue should be used to pay back the whole debt? Is annual national income growth enough (with the budgetary 'primary surplus' generated) to face the outstanding debt burden? Debt is a stock whereas GDP is a sum of added value flows generated by annual production. GDP, thus, does not include a country's wealth and assets, nor do the production factors reflect loss of value since GDP is a 'gross' indicator. Pettis[22] warns risk analysts not to read GDP growth as an indicator of countries' underlying economic performance, in particular for emerging countries such as China: 'In China, bad debt is not written down and the government is not subject to hard budget constraints. … Reported GDP growth overstates the real increase in wealth by the failure to recognise the associated bad debt.'

The relative importance of quantitative indicators may change over time

In China, credit growth is increasingly channelled through the shadow financial system, which tends to reduce the impact of the central bank's monetary policy, hence making regulatory policy less efficient. An illustrative example of the historical evolution of country risk can be found in the various changes in the risk assessment methods of Coface, the French credit export agency, over recent decades. In the 1980s, Coface's analysis was mainly focused on external debt ratios. That narrow focus originated in the definition of country risk by scholars, including Nagy, one of the pioneers of country risk analysis: 'Country risk is the exposure to a loss in cross-border lending, caused by events in a particular country which are, at least to some extent, under the control of the government.'[23] Coface gradually began to include political factors after the Soviet Union breakup and the Gulf War of 1991. The Mexican financial crisis of 1994 forced rating agencies to consider financial instability as well. And the 1998 Asian Crisis led rating agencies to incorporate governance and institutional factors.[24]

Feeding country-risk models with external inputs

Feeding models with the complex set of interactions and spill-over effects between a country and the globalised market economy requires incorporating the impact of many external variables on a country's financial and economic situation. Ulrich Beck[25] developed an analysis of the global risk society at the turn of the millennium where current decisions and technological developments triggered long-term global impact, such as climate change, terrorism, pollution and financial deregulation. Country risk models are at pains to take into account the interplay between a country's socio-economic and political features with the globalised environment, which is a source of complex feedback and spill-over effects.

The key variables include foreign rates of interest, exchange rate volatility, global growth, capital and trade flows, foreign direct investment flows, regional ratings and international financial institutions' (IFIs) policy decisions and macroeconomic forecasts. For instance, an abrupt rating downgrading of an emerging market country will affect its neighbours. Elsewhere, in Europe for example, the financial crisis deepened in 2012 after Standard & Poor's stripped France of its coveted AAA credit rating in a mass downgrade of nine Eurozone countries.
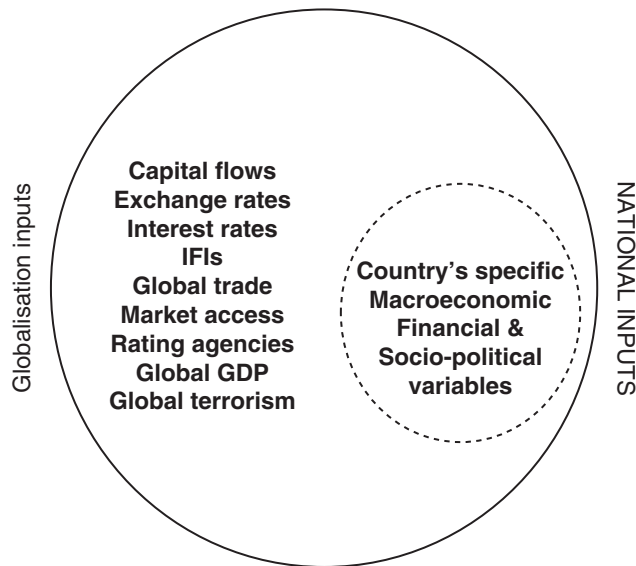
Globalisation inputs

Capital flows
Exchange rates
Interest rates
IFIs
Global trade
Market access
Rating agencies
Global GDP
Global terrorism

Country's specific Macroeconomic Financial & Socio-political variables

NATIONAL INPUTS

Figure 5: The interplay of country risk variables with the global economy

The rating agency concluded that Europe-wide budget austerity was driving the region even deeper into financial crisis as it also cut Austria's triple-A rating, and relegated Portugal and Cyprus to junk status.[26] As illustrated in Figure 5, external variables in country risk models increase the challenge of modelling different economic and institutional features of both developed and emerging market countries.

THE WAY FORWARD: DEVELOPING AN EARLY WARNING SIGNAL OF COUNTRY TURBULENCES

A wide number of observations, reports, ratings, cross-country data, models and ratios fall short of representing the true picture and complexity of a sovereign country with its complex legal, economic, institutional and cultural characteristics. The major challenge and frustration that country risk analysts face are to gauge uncertainty while being 'outsiders'. Whatever the quality of econometric models, data sources and economic intelligence, they will never match the information and signals that domestic residents receive and accumulate daily. Country residents, however, are embedded into an endless flow of sociopolitical, cultural, economic and financial information inputs. Ideally, country risk managers should put themselves into 'the shoes of foreign residents' to absorb all the available information coming from private and public economic agents in the country. Local 'intelligence' is the key to detecting risks and opportunities, although it may be difficult to gather and costly to process while being of doubtful quality, such as outdated information from central banks and finance ministries. This is often the case in African countries. Debt, official reserve assets and balance of payments data are sometimes outdated, partial or wrong.

A crucial component of country risk assessment is expatriated private savings — that is, capital flight. When citizens consistently over time transfer their money abroad, country risk managers should 'pay attention'. When citizens suddenly shift their savings to offshore accounts, such arbitrage requires the analyst's attention. In short, capital flight matters. There is large evidence that in countries with weak institutions, private capital outflows and dollarisation are the by-product of a political and regulatory environment that is not conducive to private investment and savings mobilisation. The lack of a favourable economic policy climate and deeply embedded corruption are detrimental to dynamic domestic savings, along with other factors such as exchange rate overvaluation, negative real rates of interest and macroeconomic mismanagement.[27] Capital flight is bound to rise when government officials loot the country's assets, particularly when savers do not trust the legal, banking and regulatory frameworks; and when the political and economic system is so volatile that investors fear their assets might be confiscated or subject to arbitrary decisions. The stock of private deposits held in international banks by non-bank citizens outside their countries of origin is a good proxy of capital flight. County risk managers can find these data at the Bank of International Settlements (BIS). Econometric research confirms the close correlation between bad governance, country risk and capital flight. As illustrated in Figure 6, the larger the share of hydrocarbon and mining export resources, the higher the corruption. In most emerging and developing countries that depend on raw materials,
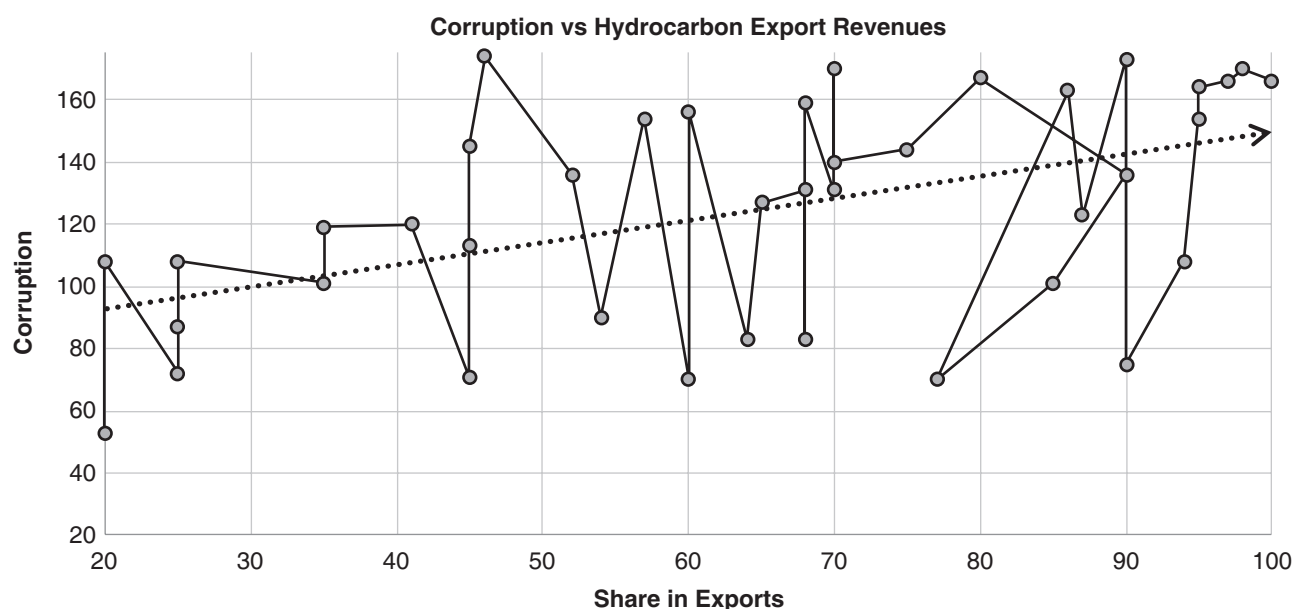
Corruption vs Hydrocarbon Export Revenues

Figure 6: The correlation between corruption indices and the share of hydrocarbon in exports

one observes growth without inclusive development, owing to weak institutions, bad governance and significant capital flight.[10] Including expatriated capital in country risk models would be a major step towards capturing upcoming country risk volatility.

CONCLUSION: MODEL DEFICIENCIES JUSTIFY INCORPORATING ECONOMIC AND HUMAN INTELLIGENCE

The limitations of using econometric and mathematical models to imply causality or predictability have led country risk managers to use a pragmatic approach, which is to assess country risk on a relative basis, incorporating elements of both quantitative models and qualitative analysis. It is crucial to remember that country risk models simplify a complex and evolving macroeconomic and sociopolitical environment. Expertise and judgment are key factors to avoid any dogmatic view of models.

It is wishful thinking to hope predicting the exact timing of debt crises. Useful signals, however, can be identified from a wide array of changes in creditworthiness indicators and in countries' socio–institutional stability. Capital flight, that is, expatriated private savings, can be a useful early warning indicator of country risk volatility. A number of risk signals, however, cannot be measured accurately nor quantified, including the role of institutions and the consequence of sociopolitical tensions on the country's debt servicing capacity and willingness. As Peter Bernstein emphasised: 'Risk management is the process of maximising the areas where we have some control over the outcome while minimising the areas where we have absolutely no control over the outcome.'[28]

Acknowledgment

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APPENDIX 1

Institution	Type of countries	Type of risks	Objective	Type of models	Sectors of analysis
IMF	Overall, 185 countries: Emerging markets. Advanced countries. Low-income countries.	Sudden macroeconomic growth declines and output growth volatility.	Combining model-based assessment with IMF field experience and scenario analysis for each country with >0 and <0 inputs from the global economy.	Core set of indicators for early warning of sudden economic growth declines with specific crisis thresholds. Signal extraction model of crisis vulnerability: For each indicator a threshold is defined to flag vulnerability while minimizing missed crises and false alarms.	External: current account, external debt/exports, real exchange rate. Real economy: real GDP growth, private external FC debt, household debt. Public: gross debt, average debt maturity, primary balance, interest expense. Financial: capital ratios, return on assets, loans/deposits, property prices. Contagion: regional EMBI spread, change in export demand growth, external banking liabilities/Vix.
OECD	170 countries (excluding OECD members)	Transfer and convertibility Cases of force majeure: war, expropriation, revolution, civil disturbance, floods and earthquakes.	Country risk: classification with eight risk classes. Agreement on minimum premium fees for official export credits.	Two-step methodology: (1) Quantitative country risk assessment model. (2) Qualitative assessment by OECD country risk experts to set 'sovereign risk flags'.	Three groups of risk indicators: Payment experience, financial situation and economic situation (based on IMF macroeconomic indicators).
TAC France	130 developing countries and mature economies across all continents (usually updated every quarter).	Economic & financial risk rating: Set of macro-models based on advanced/extended purchasing power parity theory incorporating traditional/structural determinants for developing countries, eg international openness, and productivity growth or monetary trends	Provide financial & corporate planning departments of international companies (treasury/forex management) with short-, medium- and long-term projections on exchange rates	Definition of a central scenario for currency outlook (against $, €, £) and computation of confidence intervals around central projection through Monte Carlo simulations. Large range of quantitative tools both for short- to medium-term (up to 18 months) and long-term (from 2 to 10-year horizon).	Combination of two approaches: (1) Econometric modeling including 'traditional' determinants of exchange rates (interest rates, inflation and external accounts). (2) Another approach is based on a risk monitor tool, which provides a synthetic exchange rate risk rating through a set of non-linear models, and using both a consensus outlook and TAC ECONOMICS macroeconomic and financial scenarios.

Euromoney	Country risk rating of 187 individual countries. Risk scoring : 1-100 with 5 Tiers. 80-100: => AA stable. 65-80: A-/AA corruption. 50-65: BB+/A- volatility. 36-50: B-/BB+ unstable. 0-36: D/B- weak state	15 categories that relate to economic, structural and political risk (corruption, governance, government stability, regulation, demographics, institutional strength, information, labour, transparency and infrastructures).	Evaluating the investment risk of a country, such as risk of default on a bond, risk of losing direct investment and risk to global business	Consensus expert scores, combined with data from the IMF/World Bank on debt indicators, survey of debt syndicate managers at international banks on access to capital, coupled with Moodys/Fitch credit ratings.	Six risk categories: Three qualitative expert opinions: political risk (30% weighting), economic performance (30%) and structural assessment (10%). Three quantitative values: debt indicators (10%), credit ratings (10%), access to bank finance/capital markets (10%).
S&P's Ratings Services	103 individual countries Scale: • '1': very low risk • '2': low risk • '3': intermediate risk • '4': moderately high risk • '5': high risk • '6': very high risk.	Range of economic, institutional, financial market and legal risks that arise from doing business with a specific country.	Measuring mix of economic risk, institutional and governance effectiveness risk, financial system risk, and payment culture and rule-of-law risk	Equal weighting of the four sub-factors (economic, institutional, financial system, payment culture/& rule of law, with judgmental weighting on a case-by-case basis.	Economic: income levels, growth prospects, economic diversity and export volatility. Institutional & governance: predictable policymaking, stable and robust institutions, transparency and accountability. Financial system: banking capital and depth of capital markets, credit access. Payment culture/rule-of-law: control of corruption, insolvency and regulatory regimes
Institutional Investor	Country credit ratings and ranking of 179 countries with six-month and one-year change	Economic, financial and sociopolitical risks.	Broad assessment of sovereign credit risk for foreign creditors and investors with eight regional ratings.	Ratings based on information provided by senior economists and sovereign-risk analysts at leading global banks and money management and securities firms.	Domestic real economy, financial sector, and external payments (external debt, solvency and liquidity ratios).

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APPENDIX 1 (Continued)

Institution	Type of countries	Type of risks	Objective	Type of models	Sectors of analysis
EULER-HERMES Allianz	241 countries & territories. Six country risk levels from AA to D, with quarterly updates.	Transfer and currency convertibility risks and 'doing business conditions' assessment.	Combining three imbalances assessment: (1) Macroeconomic weaknesses: (budget, money, debt, growth). (2) Institutional framework: (corruption, regulations, law). (3) Government effectiveness and political stability.	Structural country risk features are combined with two short-term risk alerts: financial flows indicator and cyclical risk indicator.	Econometric model combines domestic economic, financial and political parameters with external sources of turbulences to set four risk categories: high risk, medium risk, sensitive risk and high risk.
BlackRock (Sovereign Risk Index)	Credit risk in 60 countries.	Country credit risk.	Breaking down risk data into four main categories for each country: Fiscal capaccity (40%) Willingness to Pay (30%), External Finance Position (20%) and Financial Sector Health (10%).	Ratios of capacity and willingness to meet external debt payments fully and in time	Fiscal Space: debt/GDP, per capita GDP, proportion of domestically-held GDP, term structure of debt, demographic profile, growth and inflation volatility, debt/revenue, depth of funding capacity; default history; reserve currency status; interest rate on debt. willingness to pay: political and institutional factors with soft and qualitative aspects (government effectiveness, legal rights and process, payment delays, repatriation risk, corruption, democratic accountability, government cohesion, government stability and support, bureaucratic quality). External finance position: external debt/GDP (net of foreign exchange reserves), current account position. Financial sector health: bank credit quality and size.

| Beyond Rating Agency | 146 countries over 70 quarters (2000-15). Agency initially focused on public bond issuers to later extend its scope to infrastructure bonds and utilities. | Country Risk with alternative focuses on "sustainable finance" -oriented investments and ESG criteria | **Enhanced Methodology:**
• Integration of new systemic risks such as climate change, inequalities, and biodiversity loss;
• Build on innovative initiatives such as Waves, Inclusive Wealth Index;
• Develop existing International Public Sector Accounting Standards,
Open Governance:
• Public-private ownership
• The management overseen by a Supervisory Board gathering key international stakeholders, including not-for-profit organizations;
• Methodology transparent, and regularly audited by an external Scientific Committee Collective Intelligence:
• The methodology continuously improved thanks to a network of partner organizations (academics, foundation, think tanks, NGO) | Balanced approach between Economic & Financial criteria from one hand, and Sustainability criteria, on the other. | **Economic & Financial criteria** include 4 topics proxied through 42 indicators:
• Economic Performance (45%),
• Public Finance (35%),
• Banking System (10%),
• External positions (10%), |

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APPENDIX 1 (Continued)

Institution	Type of countries	Type of risks	Objective	Type of models	Sectors of analysis
Fitch Rating	Ratings on more than 200 countries and territories that collectively account for 99.99 per cent of world GDP.	Covers a wide range of topics ranging from economic growth prospects to monetary policy, exchange rate dynamics, commodity prices, etc → holistic view.	Assessing both capacity and willingness to pay with scenarios on both economic and political risks facing a global market.	Incorporates a combination of historical, current and forward-looking data. 18 variables (sorted into 4 analytical pilars) employed in the SRM (sovereign risk model) are derived from a range of sources, including the sovereign issuer itself, the BIS, the IMF and the World Bank.	Four analytical pilars are reviewed: (1) Structural features (governance quality, wealth and flexibility of economy, political risk, banking sector). (2) Macroeconomics performance, policies & prospects (classical indicators). (3) Public finance (classical indicators). (4) External finances (current account balance, commodity or sector dependence, structure and volatility of capital flows, external debt service, sustainability of external debt, stock of external assets and liabilities and net foreign asset position. Focus on net rather than gross external debt, maturity and currency structure, official sector vs. market debt, external liquidity, international liquidity ratio, willingness of non-residents to extend credit and purchase domestic assets, reserve currency flexibility.
Economist Intelligence Unit	131 Countries covered in country risk service.	Focus on risk of cross-border transactions such as bank loans, trade finance and investment in securities.	Providing 'objective' ratings: unlike international CRAs, they are not compensated by governments for their country ratings. • Constant vigilance: 3 updates a year to ensure catching volatility and risk worsening. • Expertise: no more than two or three countries monitored by one single analyst.	Model tailored to the user's needs. Possibility to modify the scores of any of the indicators in the model and see how changes impact on the overall scores. It provides risk scores (on a scale from 0–100) and ratings of six risk categories (sovereign debt, currency, banking sector, political, economic structure and overall).	Politics: External conflict, governability/ social unrest, electoral cycle, orderly transfers, event risk, sovereignty risk, institutional effectiveness, corruption, corruption in the banking sector, commitment to pay. Economic policy: Quality of policymaking/policy mix, monetary stability, use of indirect instruments, interest rates, fiscal balance/GDP, Fiscal policy flexibility: Transparency of public finances, public finance/debt indicator, unfunded pension and healthcare

Economist Intelligence Unit	liabilities, exchange-rate regime, black-market/dual exchange rates. Economic structure: Income level, official data (quality/timeliness), current-account balance, volatility of GDP growth, reliance on a single goods export, external shock/contagion, public debt/GDP, external solvency indicator, default history. Financial regulation and supervision: Macroeconomic/cyclical, Real OECD GDP growth, credit as % of GDP, growth, real GDP growth, inflation, trade-weighted real exchange rate, exchange-rate misalignment, exchange-rate volatility, export receipts growth, current-account balance, asset price bubble. Financing and liquidity: Transfer and convertibility risk, IMF programme/excessive, deficit procedure, international financial support, access to financing, gross financing requirement, debt servicing indicator, interest charges ratio, debt term structure, Forex reserves/public debt currency structure debt liquidity indicator, FDI and external financing, import cover/government deposits as percentage of interest charges, OECD short-term interest rates, non-performing loans, banks' credit management, banks' foreign asset position/yield curve.

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APPENDIX 1   (Continued)

Institution	Type of countries	Type of risks	Objective	Type of models	Sectors of analysis
PRS GROUP ICRG	ICRG provides ratings for 140 countries on a monthly basis, and for an additional 26 countries on an annual basis	ICRG rating comprises 22 variables: Three subcategories of risk: political, financial and macroeconomic risk. A separate index is created for each of the subcategories.	Presenting a comprehensive risk structure for the country with ratings for its overall risk and specific ratings for political, financial and and economic risks.	Composite political, financial and economic risk rating: The political risk rating contributes 50% of the composite rating, while the financial and economic risk ratings each contribute 25%. CPFER (country X) = 0.5 (PR + FR + ER)	The political risk index is based on 100 points, financial risk on 50 points and economic risk on 50 points. The total points from the three indices are divided by 2 to produce the weights for inclusion in the composite country risk score. The scores, ranging from zero to 100, are then broken into categories from Very Low Risk (80 to 100 points) to Very High Risk (zero to 49.9 points).
Brookings Tiger Index	G-25 countries	Tracking the global economic recovery based on a set of macroeconomic, financial and confidence variables.	Objective to construct indicators of comovement across all variables in the dataset. Each variable is given an equal initial weight.	Composite indexes created separately for the groups of advanced economies and emerging markets covering the economic, financial and confidence variables.	Real Activity Indicators: GDP growth, Employment, Exports, Imports, Retail sales, Capacity utilisation. Industrial Production. Financial Indicators: Stock market, credit growth, TED Spread, VIX, EMC Bond Spread. Confidence Indicators: Business Confidence and Consumer Confidence.
COFACE	160 country evaluations, drawn up on the basis of macroeconomic, financial and political data.	Assessing the risk of a country's businesses defaulting, and on the other to evaluate the overall quality of the business environment in a given country to which one wishes to export goods or services.	The likelihood of default fo short-term commercial transactions takes into account 7 types of risks: political factors, risk of currency shortage, sovereign risk, risk of currency devaluation, risk of systemic banking crisis, cyclical risk, and payment behaviour.	The overall risk is a combination of business-specific factors and factors relating to the country in which the business operates.	Country assessments focus on business climate assessments coupled with sector risks assessments for 13 sectors worldwide, with 4 cornerstones: corporate default estimate, payment periods recorded by buyers, forecasted financial results, and payment experience for each sector. The sector risk assessment is based on four steps of riskiness.