Methodology for Credit Rating Assignment to Sovereign Entities under the International Scale

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Contents

1 Summary

This rating methodology explains ACRA's approach to assigning credit ratings and credit estimates to sovereign issuers and issues using an international rating scale. ACRA's sovereign model combines a set of quantitative indicators, a core part, and a set of qualitative and quantitative modifiers, an adjustment part, which corrects the indicative rating provided by the core feature. Both the core model and the adjustment use the most relevant macroeconomic variables that, in ACRA's opinion, aptly explain the creditworthiness a sovereign entity. The weights within each block of the core part of the model as well as between each block indicate ACRA's view on the importance of each block and the factors within them in the final sovereign credit rating.

2 Introduction

ACRA's sovereign methodology provides an analytical framework for assigning credit ratings to sovereigns and their issues. This framework includes key rating definitions, a description of sovereign model structure, rationale for each analytical block of the model, the weights of indicators within each analytical block and across the blocks, an approach to assigning scores to countries based on their rank per each indicator, as well as a conversion of overall scores into a rating category.

ACRA realizes that developing a sovereign model capable of signaling financial crises, let alone sovereign defaults, is a very challenging task. The modeling of a stressed sovereign on the brink of default on its debt to private creditors comes in a wide variety of forms. Different stages of economic development, the vast variety of circumstances that different governments face, and the inability to forecast trigger points amplify the complexity.

Above all, there are too few countries that have defaulted and too few crises to build a reliable model. Therefore, a dynamic and flexible modeling tool is required, which goes beyond simply measuring a country's macroeconomic reality. Recognizing that, ACRA employs a mix of traditional sovereign-risk factors and a qualitative overlay.

ACRA's approach is a combination of key quantitative indicators, which form the core part of the model, and a set of quantitative and qualitative modifiers based on a combination of expert judgement on various sovereign policies and indicators signaling the efficacy of those policies. Qualitative modifiers adjust the core part of the model and capture tendencies and trends not fully reflected by the quantitative indicators in the core part of the model.

Importantly, the core part of the model incorporates not only traditional sovereign-risk factors, but also institutional indices compiled by international organizations that capture political and socioeconomic dynamics within the country over time, especially through business and political cycles. Moreover, ACRA supplements these indices with an in-house index. This index measures a population's health and the quality of education, which are key drivers for the long-term economic potential of a country and therefore its capacity to sustainably generate revenue to service its debt.

ACRA's data selection process limits the list of factors to those that are the most essential, avoiding an excess of positive correlations and insuring limited duplication. It also strives to ensure that indicators are standardized and unified across the large range of countries by the method they were compiled and by the scope they are covering. Finally, the availability of indicators across a large range of developed and developing economies was also an important selection criterion.

As a result, a large amount of data that ACRA uses comes from international organizations like the IMF, World Bank, United Nations (UN), Eurostat, and Bank for International Settlements (BIS). The list of data providers, however, is not restricted to the mentioned organizations. We also consult national statistical agencies if the quality of data is adequate.

ACRA relies on the accuracy and reliability of the data provided by international organizations, national authorities, or representatives of the sovereign. In the case of shortcomings in data related to coverage and reliability, we make concerted efforts to cross-check the data. If data shortcomings are substantial, ACRA can either withdraw an outstanding rating or refrain from assigning it.

ACRA revises its sovereign methodology at least once a year. However, ACRA revises the methodology more frequently if deviation from it occurs more than three times over a quarter of the year, new relevant sources of data become available, or, conversely, currently used sources of data cease to exist, etc. The methodology may be amended accordingly or remain unchanged.

3 Rating definitions

3.1. Sovereign

From the perspective of a rating agency, a sovereign is a national government (central or federal) that has primary authority over fiscal policies[1] and exercises its economic policy through a framework of incentives for, and restrictions on, economic activity in the country. Central banks are agents of the sovereign that usually enjoy autonomy from the government.

Both on the national and, frequently, international level, a government has exclusive powers to enforce its will. This makes creditors dependent on the willingness of the government to honor its debt. Recognizing that, ACRA takes into account not only the government's capacity but also its willingness to pay its obligations on time and in full. A sovereign issuer is unique in that it cannot go bankrupt[2], which gives creditors the opportunity to recover some losses in the case of a sovereign default[3], with the exception being a significant regime change.

3.2. Sovereign rating

A sovereign credit rating is ACRA's opinion on the sovereign's ability to fulfil a subset of its financial obligations. Sovereign credit ratings assigned by ACRA apply to debt owed to private creditors only. The assessment of the willingness and capacity to pay multinational creditors – either supranational institutions like the International Monetary Fund, the World Bank, or other governments through bilateral agreements or a Paris club – are beyond the scope of this methodology.

However, ACRA takes note of the sovereign's problems with regard to servicing these types of debts. If ACRA has enough information to make an informed judgement about the sovereign's debt restructuring/debt relief with multinationals and its implications regarding full and timely servicing of debt to private creditors, it makes relevant adjustments to the sovereign's credit rating within the scope of this methodology.

[1] Some limitations could be applied to those policies if the sovereign is a part of a union.

[2] The countries do break up occasionally which may or may not lead to a sovereign default.

[3] Meyer, Reinhart and Trebesch (2019) show that full repudiation is rare and the median haircut on sovereign obligations is below 50%.

ACRA assigns ratings to sovereigns as well as their debt instruments. Senior unsecure debt issued by a sovereign will usually bear a rating similar to that of the sovereign. Sovereigns rarely issue subordinated or structured debt.

3.3. Sovereign default

ACRA defines sovereign default as the occurrence of one or a combination of the following events[4]:

- Failure to service a coupon or principal on the sovereign's bond or loan on the specified due date or beyond a grace period, if granted;
- Missed coupon or principal of a security benefitting from unequivocal, irrevocable, and unconditional guarantees provided by the sovereign;
- Failure to service other debt owed to private creditors, excluding private-sector loans or bonds;
- Any sovereign-initiated material changes to the original terms of the contract, for instance an extension of maturities, reduced principal payment, coupon or interest, a change in currency denomination, a change from cash pay to pay-in-kind or other forms of non-cash payment and effective subordination.

If a sovereign announces that it will restructure debt, ACRA places the rating of that sovereign at the C category level indicating very high probability of default. The Agency will keep it in this category until the restructuring process is completed. Upon closure of the exchange offer and completion of the exchange, i.e. when the minimum threshold for participation has been met, ACRA places the sovereign in the D category if the overwhelming majority of sovereign debt is to be re-scheduled. If only a subset of debt is restructured, then the sovereign is placed in the SD category.

3.4. Local and foreign currency ratings

Using its international scale, ACRA assigns local and foreign currency ratings to sovereigns aimed at assessing a sovereign's capacity and willingness to pay in local currency (LC) and foreign currency (FC).

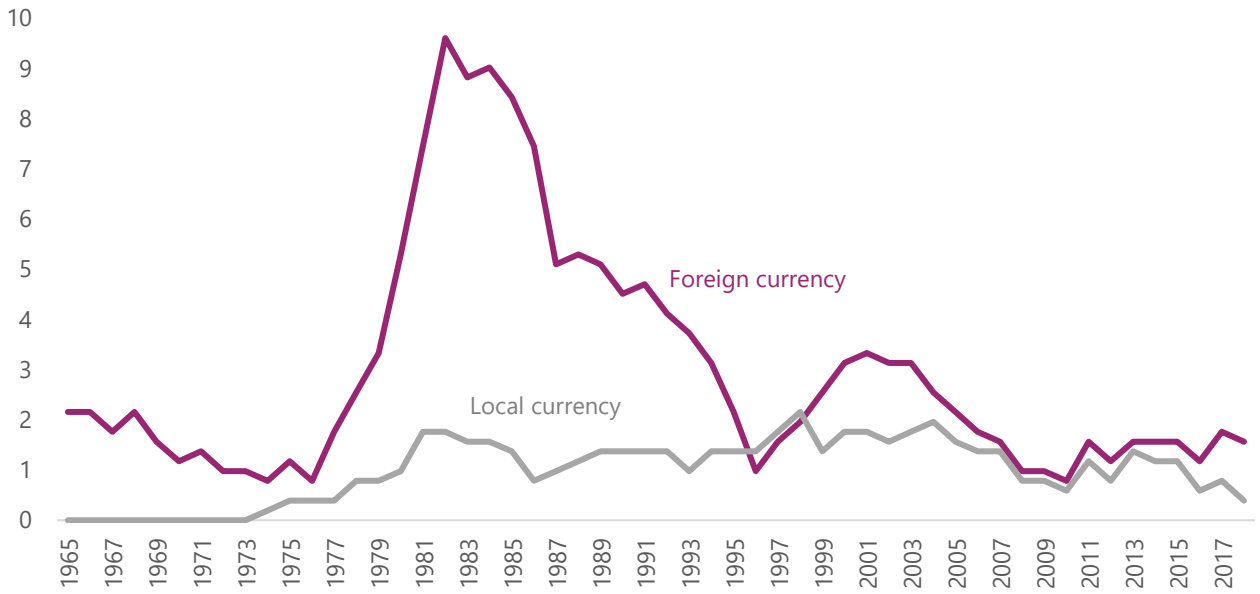
ACRA expects the LC and FC ratings to be equal for the majority of countries. The primary reasons for this are the increasing openness of countries' capital accounts and the larger share of non-residents investing in sovereign local currency obligations. This is driven by the globalization of capital markets as well as measures, usually in the form of substantial foreign-currency reserves, taken by sovereigns in developing countries to manage the volatility of their national currencies.

These trends have manifested themselves in the recent history of sovereign defaults[5] (see Figure 1). ACRA's research on sovereign defaults starting from mid-2000s shows that largely neither FC nor LC defaults have occurred more frequently than the other, providing no justification for a rating bias towards either of them. Sovereigns who are members of a monetary union or sovereigns with highly dollarized economies have no distinction between their LC and FC ratings.

[4] Debt burden alleviation via a high level of inflation does not constitute a sovereign default.

[5] We noted that sovereign defaults in foreign currency occurred much more frequently than in local currency from the mid-1970s to mid-1990s. See Reinhard and Rogoff (2009), Beers and Mavalwalla (2016). This could be explained by heavy FC borrowing by commodity exporters in the 1970s and 1980s and by Asian countries with pegged exchange rate regimes in the 1990s. Since then, many exporters have increased their resilience to FC shocks by accumulating FC reserves for "rainy" days, whereas pegged exchange rate regimes have become rarer.

Figure 1. Share of countries experiencing first year of default (5Y moving average)



Sources: ACRA's estimates, based on rating agencies' and Reinhart & Rogoff's definitions.

However, exceptions are possible. A sovereign's LC rating could be up to one or two notches higher than the FC rating under the following conditions:

a) Previous preferential treatment of LC debt;

b) Exceptionally strong public finance fundamentals combined with a weak external position;

c) Deep and diversified local debt market;

d) Low and controlled inflation coupled with a free floating currency;

e) Low proportion of LC debt in the sovereign's debt portfolio.

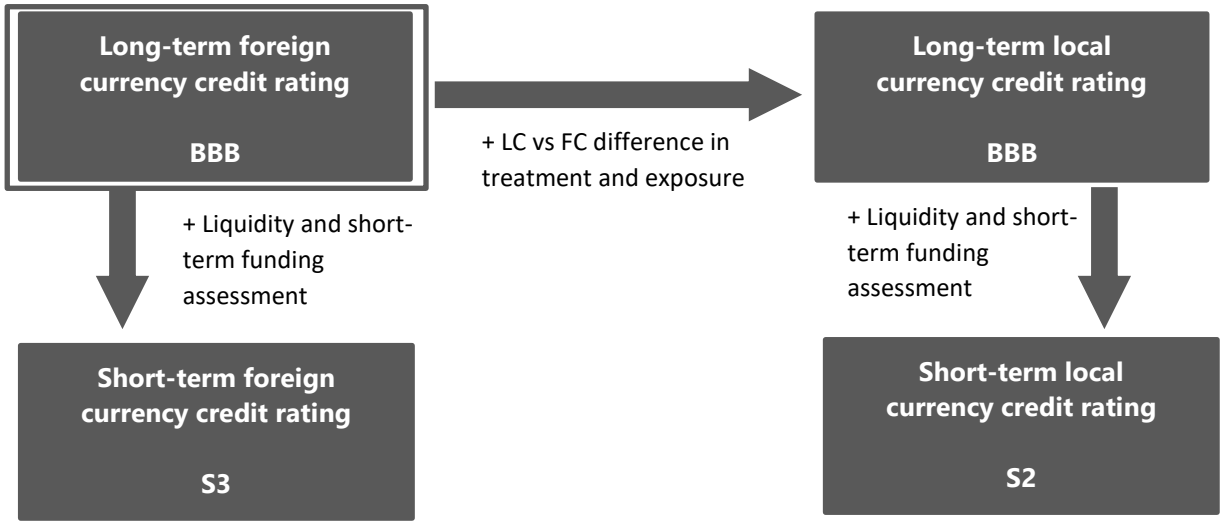
ACRA takes a case-by-case approach to justify the necessity of the rating differential as well as the gap between the LC and FC ratings.

3.5. Long-term and short-term ratings

ACRA differentiates between long-term (LT) and short-term (ST) sovereign ratings. LT ratings reflect ACRA's opinion on the creditworthiness of a sovereign's obligations with maturities beyond a 12-month period. ST ratings apply to obligations with maturities up to and not beyond 12 months (see Figure 2).

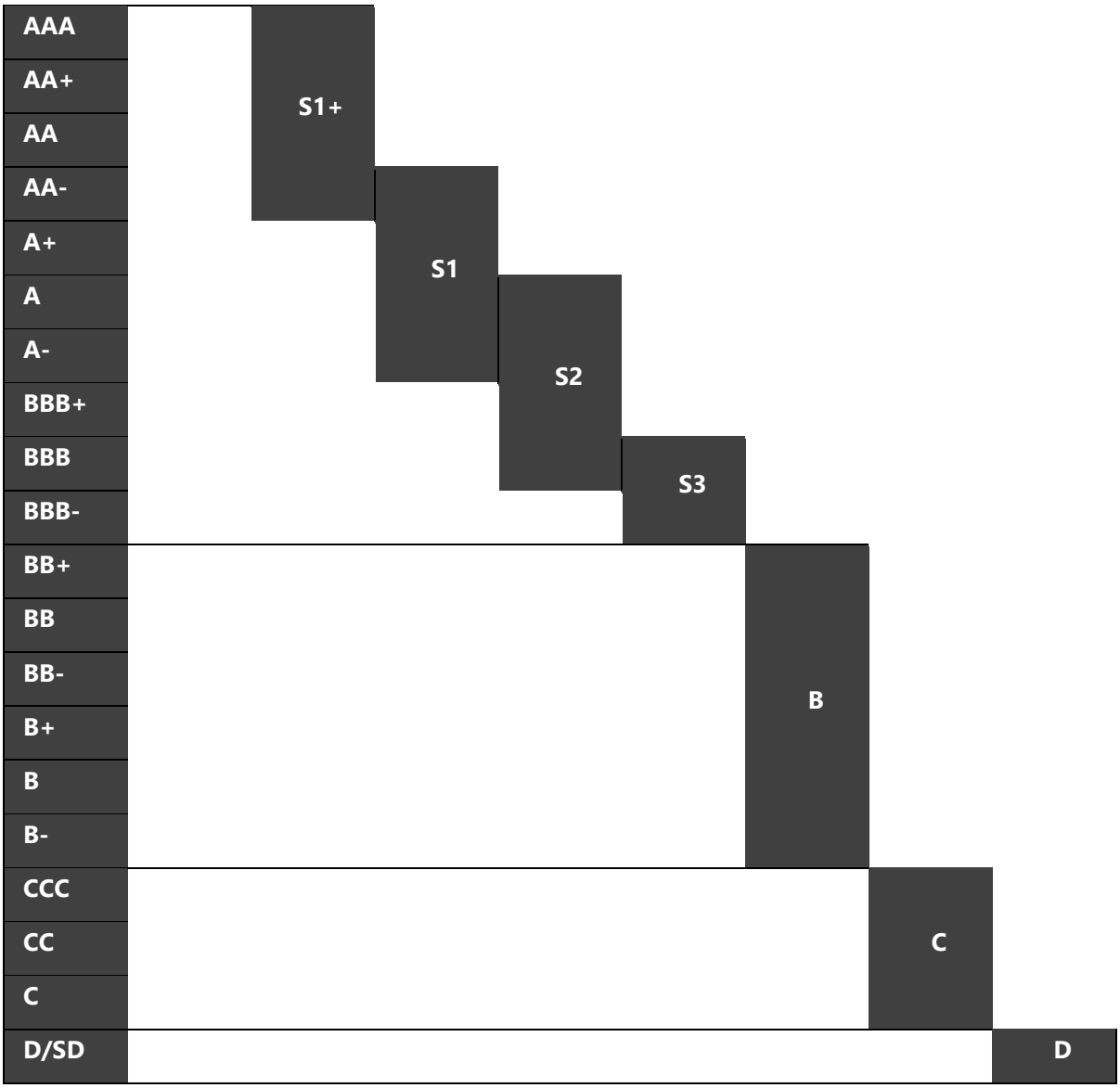
The level of a ST rating depends on the liquidity position of the sovereign as well as the sovereign's LT rating. The capacity of a sovereign to service short-term obligations like commercial paper or its equivalent depends on its access to liquidity and short-term funding. This is analyzed when the ST rating decision is made. As a rule, however, it depends on the overall quality of the LT sovereign rating (see Figure 3).

Figure 2. Analytical differences between sovereign rating types



Source: ACRA

Figure 3. Mapping from long-term to short-term ratings (applicable to foreign and local currency issuer's ratings)



Source: ACRA

Overall, our linchpin is a sovereign foreign currency long-term rating. Other ratings, including local currency long-term ratings and short-term ratings in both currencies are derived from the linchpin. The family of sovereign ratings is presented in Table 1.

Table 1. Sovereign issuer's rating types

Rating name	Rating object	Currency of debt	Months to maturity	Creditors
Issuer's long-term foreign currency	Outstanding or planned senior unsecured debt with corresponding features	Foreign	>12	Private
Issuer's long-term local currency	Outstanding or planned senior unsecured debt with corresponding features	Local	>12	
Issuer's short-term foreign currency	Outstanding or planned senior unsecured debt with corresponding features	Foreign	≤12	
Issuer's short-term local currency	Outstanding or planned senior unsecured debt with corresponding features	Local	≤12	

Source: ACRA

3.6. Rating outlooks/reviews

ACRA assigns an outlook to the LT foreign and local currency ratings of a sovereign, which refers to a prospective period of 12-18 months. A sovereign rating outlook can be positive, negative, stable, or developing. Assigned outlooks indicate the trends in credit rating quality but do not determine upgrades or downgrades in ratings. A developing outlook means that the rating could move in either direction.

A sovereign rating can be placed under review for possible upgrade, downgrade, or developing outlook. A review status indicates that a rating is under consideration for change, usually within 90 days. After 90 days, the review status is normally resolved via a rating upgrade, downgrade, or confirmation.

ACRA updates long-term and short-term sovereign ratings in local and foreign currencies of an issuer and its instruments no later than 182 days following the date of the last assessment or update.

4 Rating analysis structure

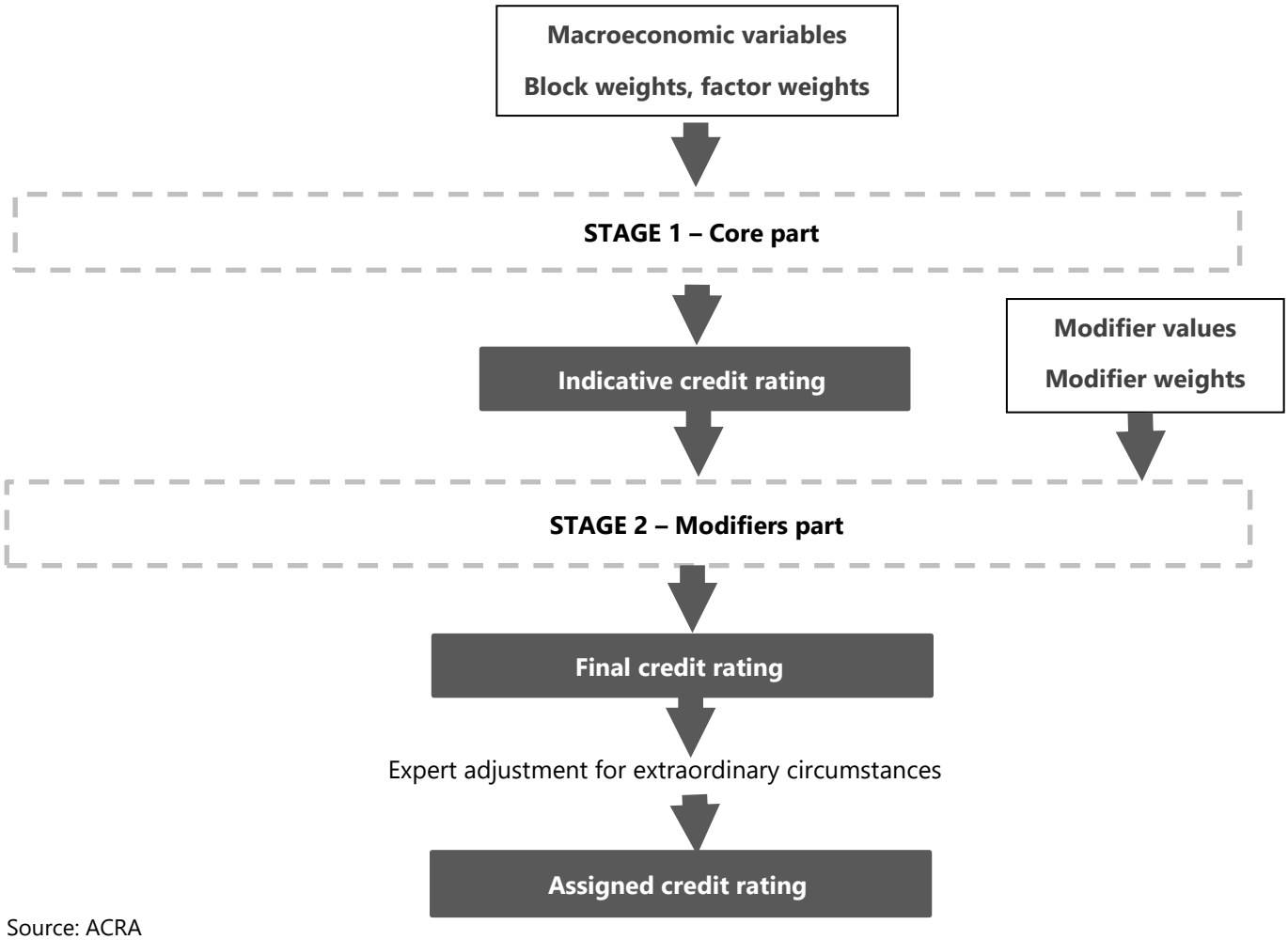
4.1. Description of the model

ACRA determines the long-term foreign currency sovereign credit rating through a two-staged process (see Figure 4, for a detailed scheme see Appendix 4). The starting point is an *indicative credit rating*. At this stage, the assigned *indicative credit rating* does not reflect the probability of default. This indicative credit rating allows for the relative comparison of a country with the rest of the world on a number of variables, which have strong predictive power on historical sovereign defaults and are tested on a vast variety of countries worldwide.

Once assigned, the indicative credit rating can be corrected at the second stage through a number of modifiers, which could move it up, down, or leave it at the same level. ACRA modifies the indicative credit rating through a notch-adjustment process with a potential notching range of +3/-3 for each of the analytical blocks in the core model. Potential modifier corrections to the indicative credit rating are capped at +3/-4. The result after the second stage is a *final credit rating*.

The final credit rating can be adjusted further by an expert judgement triggered by extraordinary circumstances, which are outlined below. The *assigned credit rating* is the final point of the rating process. At this stage, it reflects the probability of a sovereign default. The *assigned credit rating* is a credit rating on the international scale in foreign currency for long-term obligations of the issuer.

Figure 4. Rating process



Source: ACRA

The following extraordinary circumstances, which fall outside of the framework of both the core part of the model and its modifiers, can prompt the adjustment of the final credit rating:

- A sovereign rapidly heading to a complete meltdown triggered by a severe economic recession, accompanied by a banking crisis and the shutdown of internal and external sources of refinancing;
- A sovereign experiencing a 'low frequency' but 'high impact' event/events such as a natural disaster, a war conflict, or strong and violent uprisings;
- High probability of materialization of very high contingent liabilities on the sovereign's balance sheet;
- Hyperinflation and forced conversion of banking sector foreign currency assets/liabilities into domestic instruments;
- Extraordinary events not included in the first four above.

There might be a number of situations when we re-estimate the indicative core score (Appendix 4), a basis for the indicative credit rating, produced by the core part of the model.

The first is a shift in the core model results from one rating notch to another, either up or down. This is when the core score moves into a different rating notch , but stays close to the boundary of the indicative rating range in accordance with Table 3. In this case, the rating committee/meeting may decide to choose a rating category to use as a starting point to apply modifiers.

The second situation is a revision of the data by statistical sources of the information used to assign the rating. If the revision is substantial, the potential impact of the data on the rating will be decided during the next rating review.

Finally, limitations and/or great uncertainty of the data material for the rating consideration will be taken into account in a relevant analytical block either in the core part or in the modifier part with a largely negative impact on the final credit rating.

In addition, we allow a range of indicative credit ratings as a starting point to apply modifiers in case of a high historical volatility of the rating for a particular country. High volatility in this case is a shift by two and more notches in one year, which was observed more than once over the last 15 years. The level of the indicative credit rating within the range as a starting point to apply modifiers is chosen based on the following considerations: the depth of the shift, occurrence of the shifts in the past and future applicability of the factors that triggered the historical shifts.

4.2. Core part

The core part comprises four analytical blocks: macroeconomic position, public finance, external position, and institutional framework. Each of these blocks comprise a number of factors.

4.2.1. Core part: weights

The weights attributed to analytical blocks reflect ACRA's view on the importance of each block in evaluating sovereign creditworthiness. They are the following:

- Macroeconomic position - 25%
- Public finance - 30%
- External position – 22.5%
- Institutional framework – 22.5%

Within the core part, each block is analyzed in terms of a number of factors (see Table 2). Each of the factors is normally assessed (the factor's score is obtained) based on a single indicator (see Chapter 6) with rare exceptions (see the Public debt burden factor, for example).

ACRA periodically reviews the block and factor weights to reflect the evolution of the Agency's sovereign methodology and capture new tendencies and trends affecting sovereign credit risk assessment.

Table 2. Core model weights

Block	Block weight	Factor weight within the block	Factor
Macroeconomic position	25%	30%	Income level
		20%	Economic growth
		20%	Economic growth volatility
		30%	Inflation
Public finance	30%	10%	Fiscal balance
		65%	Public debt burden
		25%	External public debt
External position	22.5%	15%	Current account
		15%	Import cover
		15%	External debt
		25%	Export diversification
		30%	Exchange rate volatility
Institutional framework	22.5%	37.5%	Political stability
		37.5%	Government benevolence and effectiveness
		25%	Human Capital quality

Source: ACRA

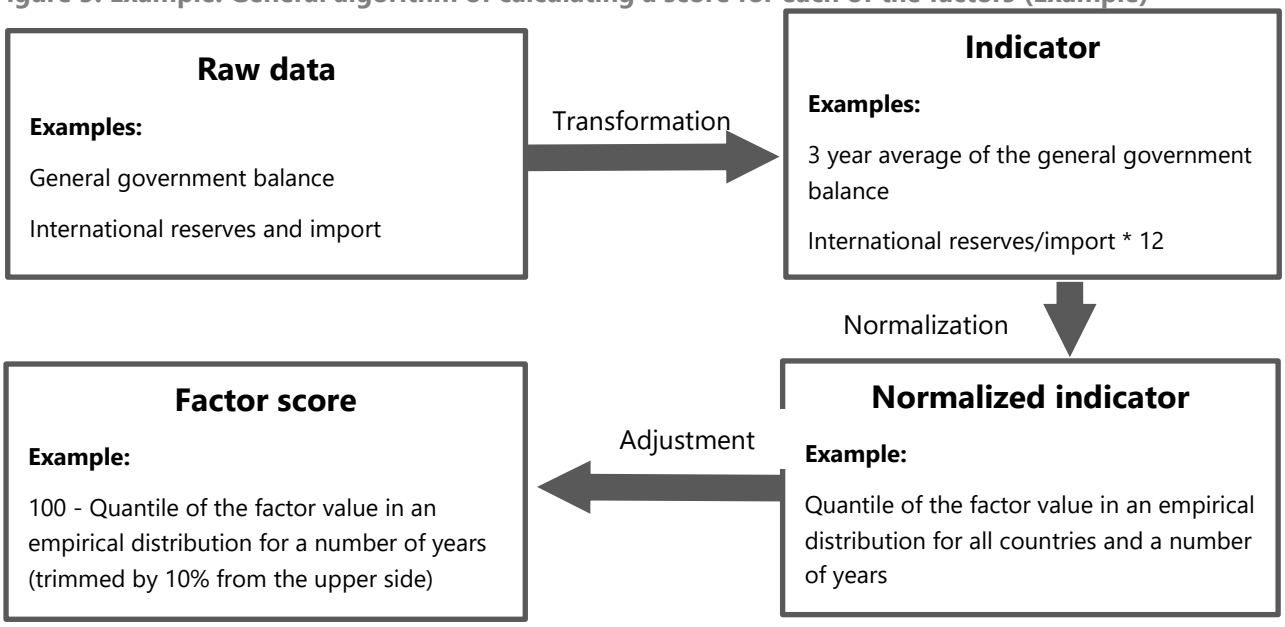
4.2.2. The core part: data transformation

ACRA has chosen 16 quantitative variables based on historical sovereign default studies from 1970 to present, economic literature on sovereign defaults, as well sovereign and banking crises. The core part allows for very limited subjective analytical input. It ensures measurement transparency and a unified approach, which allows cross-national compatibility over time.

All variables have been examined regarding their ability to predict sovereign defaults and the majority of indicators were statistically proven to have a strong correlation with sovereigns in financial distress. The set of variables was also chosen on the basis of their availability, the unified approach to calculating those variables, and their scope. Therefore, a vast majority of data is taken from databases compiled and maintained by international organizations like the World Bank, IMF, and UN. Occasionally, ACRA uses proxy variables whenever it makes sense from an economic point of view. For instance, for some countries we accepted variables compiled for the central government instead of the general government. This is because the structure of the government strongly dominated the central government with other parts of the public sector playing either a nonexistent or minor role.

We normalize indicator values based mostly on the ordinal approach[6] and map the indicator score on to a 0-100 scale. Countries with the strongest results for each indicator value are given higher scores, whereas the weakest get lower ones (see Figure 5).

Figure 5. Example. General algorithm of calculating a score for each of the factors (Example)



Source: ACRA

We apply two different approaches to assess factors for each country and generate factor scores: ordinal and cardinal[7]. We apply the cardinal approach for indicators where we want to put emphasis on tails of the distribution (i.e., inflation, governance indicators), while other indicators are normalized using the ordinal approach.

We use two methods of sampling: one year or all years in the sample (since 1996). We apply a one-year approach when indicators like GDP per capita or the Human capital index are trending up.

We also adjust a number of indicators based on current trends in capital markets. We adjust the import cover indicator for countries with reserve currency status, giving them the highest score despite the very low values of these indicators. We take into account global investor tendencies to treat assets nominated in those currencies, especially sovereign debt, as a safe haven in adverse market conditions. At the same time, we review the applicability of the reserve status of those currencies, taking into account current trends in the global market[8].

We acknowledge that countries with developed markets can place their debt for much longer periods at a low cost and therefore can afford relatively higher levels of public debt without compromising debt affordability. This ability is contingent on deeper domestic capital markets, lower inflation rates, and the absence of defaults in recent history, the reserve status of some of their currencies, negligible or no external borrowing, and the higher quality of institutions that

[6] The ordinal approach uses a country's quantile of the normalized indicator as a base for the factor score, whereas the cardinal approach takes the indicator value itself in a range between maximum and minimum sample values.

[7] See reference entry 6.

[8] ACRA notes that in 2018 the USD share in international reserves held by central banks globally dropped to 61.7%, the lowest since 1999. The share of the Euro slightly increased to 20.7%. Moreover, some countries expressed strong political will to establish an oil benchmark in other currencies, for instance the Euro. The overall concern is the willingness demonstrated by the US government to use its dominant position in the global financial markets for its own geopolitical goals.

sustain large amounts of debt repayments. We place less weight on debt size and more on debt service for countries with higher GDP per capita and vice versa.
Finally, we take into account that some countries acquired debt on non-market rate terms, which makes them look better in terms of the interest-to-revenue ratio compared to countries that borrow on the market terms. A good example is Greece, whose debt profile largely comprises obligations towards ESM (European stability mechanism) and EFSF (European financial stability facility), EU institutions that provided financial assistance to the distressed Eurozone country on preferential terms. We adjust the interest-to-revenue ratio of those countries to put them on par with the rest. A detailed description, rationale, and adjustments of the variables used in the core part of the model are summarized in Appendix 1.

4.2.3. The core part: indicative credit rating

We determine the *indicative credit rating* through a multi-step process. Initially, we calculate *block core scores* for each of the four analytical blocks by weighting each factor within a block and adding them up. The weights within the block and among them reflect our view of the importance of each weight in predicting sovereign defaults. Then we sum up the *weighted block core scores* and determine an *indicative core score*. The latter is translated into the *indicative credit rating* in accordance with Table 3. *The indicative block ratings* can also be obtained through a mapping of *block core scores* in accordance with Table 3.

Table 3. Correspondence between block core scores (indicative core score) and indicative (credit) ratings (of blocks) on the rating scale

Indicative (credit) rating (of a block)	Lower boundary of the block core score range / indicative core score[9]	Upper boundary of the block core score range / indicative core score
AAA	0.00000	1.00000
AA+	1.00000	1.17100
AA	1.17100	1.34200
AA−	1.34200	1.51300
A+	1.51300	1.68400
A	1.68400	1.85500
A−	1.85500	2.02600
BBB+	2.02600	2.19700
BBB	2.19700	2.36800
BBB−	2.36800	2.53900
BB+	2.53900	2.71000
BB	2.71000	2.88100
BB−	2.88100	3.05200
B+	3.05200	3.22300
B	3.22300	3.39400
B−	3.39400	3.56500
CCC	3.56500	3.90700
CC	3.90700	4.24900
C	4.24900	5.00000

Source: ACRA

[9] Only the lower boundary is included in the range for this rating.

4.3. The modifiers

The rigidity of the core part of the model is offset by the modifiers. They are designed to ensure that expert judgement on key factors, which cannot be quantified and/or not fully reflected in the core part within each analytical block, is taken into account. A detailed description of the modifiers broken down by analytical block can be found in Appendix 2, while their ranges are presented in Appendix 3.

We organize a notch-adjustment process using modifiers in the following way. Firstly, we place a country on a scale from -2/+2 using our expert judgements on the merits of the country in each particular modifier. Secondly, we calculate *the block modifier scores* and adjust them using weights for each modifier in a particular block. Thirdly, we convert the weighted sum *of block modifier scores* into a notch adjustment related to a particular block of modifiers and sum them up. Finally, we map the whole sum of the notch adjustments to a separate scale and the output (*notch adjustment to indicative credit rating*) is added to the indicative credit rating. The final rating is a combination of the indicative credit rating and notches in the international rating scale. The *final block ratings* can be obtained as a combination of the indicative block rating and notch adjustments related to a particular block (see details in Appendix 4). A peer group analysis is available at this stage.

4.4. Expected frequencies of defaults on the one-year horizon

ACRA's opinion in respect of the expected frequency of occurrence of events of default on the one-year horizon for respective credit ratings is shown in Table 4.

Table 4. Correspondence between the expected frequencies of occurrence of events of default and long-term ACRA ratings on the international scale in foreign currency

Credit rating assigned	Expected frequency of occurrence of events of default
AAA	0.003%
AA+	0.005%
AA	0.009%
AA−	0.017%
A+	0.031%
A	0.056%
A−	0.101%
BBB+	0.179%
BBB	0.315%
BBB−	0.547%
BB+	0.943%
BB	1.608%
BB−	2.714%
B+	4.537%
B	7.509%
B−	12.304%
CCC	19.961%
CC	32.063%
C	50.990%

Source: ACRA

5. Analytical blocks of sovereign credit risk assessment

ACRA's sovereign risk assessment comprises four analytical categories that are crucial in determining sovereign credit ratings. These blocks are macroeconomic position, public finance, external position and institutional framework. Each block includes a number of economic variables representing the core part of the model and a set of modifiers relevant to the block, which complements and adjusts the result of the core part. Below, ACRA explains the rationale for choosing specific variables and modifiers for a particular block.

4.5. Macroeconomic position

The analytical block titled 'Macroeconomic position' assesses the sovereign's ability to sustain viable long-term economic growth based on solid and sustainable economic potential, as well as diversified, competitive economic structure and commitment demonstrated by the authorities to pursue adequate monetary and structural policies. Sustainable long-term growth is key to a sovereign's ability to generate revenue in order to service its debt over the medium-terms and demonstrate its resilience to various shocks.

Weak economic fundamentals have been an important factor in past sovereign defaults acting as either an underlying cause of the default or a contributing factor[10].

4.5.1. Core indicators of macroeconomic position block

Income level

ACRA measures macroeconomic fundamentals by the level and relative performance of a number of economic indicators. We measure a country's income level using GDP per capita on a PPP basis. If the economic structure is well diversified and is not limited to a narrow range of commodities, higher GDP per capita is usually associated with higher economic and financial wealth. This suggests a broader potential tax base that the sovereign can employ to service its debt, as well as tolerance to a higher level of public debt. A description, rationale, measure, adjustments, and sources of information for the core indicators can be found in Appendix 1.

Economic growth

We measure economic growth by comparing an individual country's 10-year average economic growth with the 10-year average economic growth of its group. We have two groups - emerging market and developed market countries. Economic downturns and recessions, especially those that last for a number of years, significantly impair a sovereign's ability to generate revenue. Stagnating or even depleting revenue sources, accompanied by already high public debt, make it difficult for countries to continue servicing their debt fully and timely, which eventually results in a default. Prolonged economic downturns and extended recoveries are usually observed in small-sized economies or bigger countries with weak economic diversification that manifests itself via strong dependence on commodity exports, a narrow range of economic activities, or shallow domestic capital markets stemming from low savings rates.

[10] Tomz and Wright (2007) report a negative correlation between sovereign defaults and economic activity.

Economic growth volatility

We examine the volatility of GDP and its deviation from the average 10-year global GDP growth volatility. While a highly volatile GDP indicates certain imbalances in the economy and could impair the sovereign's ability to repay its debt timely and fully, a negative, multi-year deviation from the average global GDP growth rate suggests worsening competitiveness in the changing world and weakening economic potential, which can sustain lower levels of debt.

Inflation

Finally, in the core part of the model we analyze inflation rates using the CPI indicator. We also calculate the deviation from the inflation rate in the range of 0-3%, averaged for 3 years. Long periods of excessive and volatile inflation distort relative prices in the economy, undermine the purchasing power of economic agents, and, in the case of hyperinflation, undermine trust in domestic currency. This has a detrimental impact on economic growth and therefore, undermines the sovereign's ability to service its debt. Deflation, i.e., a prolonged period of falling prices, is equally harmful for economic growth. It adversely affects consumer and business confidence and therefore undermines economic growth. Moreover, periods of high inflation restrain the ability to issue debt domestically, whereas low inflation inflates the debt/GDP or debt/revenue ratios.

4.5.2. Modifiers for macroeconomic position block

ACRA adjusts core indicators in this analytical block by applying expert judgement on a country's economic potential, growth sustainability, economic efficiency, and structural and monetary policies. A description, rationale, and indicators for the modifiers can be found in Appendix 2.

Potential economic growth

In general, historical growth trends provide good perspective on a country's future growth. However, the sovereign's ability to service its debt in the long run, which usually has a long-term tenure, is defined by its economic potential and subsequent realization. ACRA analyses a country's growth prospects by examining whether the country grows above or below its potential. Running above potential can provide a temporary boost in terms of economic growth. Taking that into account means that the growth rate achieved in the past may be unachievable in the near future, meaning a prospective slowdown is inevitable. By contrast, slow growth in the past, if preceded by efficient growth-oriented policies, might boost the country's likelihood to grow in the future.

Sustainability of economic growth

The sustainability of economic growth is another aspect in ACRA's analysis of macroeconomic fundamentals. Sustainable economic growth allows a country to weather adverse economic conditions better than its peers and recover more quickly. Of the vulnerabilities that can halt economic growth, we pay attention to overreliance on a particular industry or economic activity. Lack of diversification, the oversized proportion of a particular industry in the country's added value, and/or exports titled towards a particular commodity create GDP and budget revenue volatility, especially when market conditions for that activity/commodity deteriorate.

We pay special attention to financial vulnerabilities that can arise from overreliance on credit growth. ACRA tries to capture early signs that point to the development of financial bubbles. We assess the level and affordability of private debt, trajectory of housing prices, affordability of housing, trajectory of equity prices, and the real exchange rate.

The banking crises in Ireland (2008) and Spain (2008), which were driven by overleveraged private sectors and erupted with the collapse of property prices, demonstrated how damaging the long-lasting effects of a bubble burst can be for economies and therefore for the creditworthiness of sovereigns. Financial imbalances are amplified when the banking sector constitutes a significant part of the economy measured as banking sector assets relative to GDP.

An additional financial imbalance is high dollarization/euroization of banks measured as a proportion of US dollar/euro denominated deposits/loans in total. This could signal not only weakening confidence in local currency, but improved conditions of the debt instruments denominated in foreign currency. Should the local currency depreciate, domestic banks could face increased volumes of non-performing loans with adverse consequences for their balance sheets and ultimately for the sovereign's.

Vulnerability can also arise from insufficient levels of savings in the economy. This makes different sectors of the economy dependent on external funding with adverse consequences for the whole economy when funding becomes too expensive or dries up. Conversely, countries with high levels of savings are better positioned to generate economic growth thanks to a bigger pool of available investments. Their problems, however, could arise from misallocation of capital.

Ecological and natural disaster probabilities are also taken into account. For countries with little territory, a substantial part of economic activity can be disrupted during a single flood or hurricane. This usually puts simultaneous pressure on the revenue and expense parts of the budget and may be associated with social unrest, casualties, unavoidable changes in government priorities, and less commitment to debt service in particular.

Rigidity in the labor market, which presents itself in institutional barriers preventing efficient reallocation of labor across economic activities, could hamper economic growth and weaken the country's ability to adapt to new challenges. An inflexible labor market is usually associated with a high unemployment rate with a significant portion of structural unemployment. An aging population leads to diminishment in the labor force and requires a boost in productivity to keep up with high growth rates. Constraints in labor could be resolved by the efficient use of the labor force, adequately allocated investment, the propensity for innovation, and institutions that can support a boost in productivity.

Efficacy of structural, economic and monetary policies

A country's structural imbalances could be alleviated by an effective and coordinated set of policies. The opposite is also true; the unaddressed or poorly addressed structural weaknesses of a country amplify negative effects on the economy, especially in adverse conditions. ACRA's assessment of a country's policy framework includes an evaluation of the credibility and flexibility of structural economic, and monetary policies, as well as the ability of the authorities to support economic growth by coordinating said policies (an important factor for countries in a union).

We also evaluate the extent to which structural and economic policies facilitate achieving and expanding the country's economic potential. We pay special attention to the ability of the authorities to provide adequate and timely responses to crises based on a sovereign's track record of managing past crises, efforts undertaken to implement institutional changes curbing systemic imbalances that triggered former crises, and their current capacity to deal with future crises.

ACRA examines the credibility of the monetary policy undertaken by a national central bank by assessing its track record in achieving its targets. The test for a central bank from a rating agency's perspective is price stability measured by the length of low inflation periods.

The independence of the central bank in using a variety of instruments and in timing its policy actions is an important consideration in our evaluation. We prefer to see legally guaranteed independence of the central bank from political interference and the persistent implementation of this principle in practice. A further consideration is the ability of the central bank to act as a last-resort lender, i.e., being able to provide liquidity to the domestic banking sector when sources of funding are in short supply. At the same time, prolonged use of this type of funding indicates structural problems in the banking sector.

We acknowledge that a shallow and poorly diversified domestic financial system and capital markets with weak transmission mechanisms of credit from financial institutions to the real economy could put constraints on the central bank's efforts to achieve its goals. Another constraint could come from a rigid exchange rate regime preventing the central bank from controlling the domestic policy rates. An imperative to maintain a local currency exchange rate at a certain level could be at odds with the central bank's other goals, especially if in managing the exchange rate regime political agenda issues prevail over macroeconomic logic.

Monetary policy in a currency union like the Eurozone, or highly dollarized economies, features less prominently in our analysis. The reason is the limited control that a sovereign exercises over its monetary and exchange rate policies. In those cases, we focus on the adequacy of fiscal and structural economic policies, i.e., their ability to facilitate adjustment measures aimed at improving the competiveness and flexibility of the economy as opposed to using exchange rate adjustments as a tool to improve competiveness.

Modifiers in this analytical block can correct the indicative rating of a country either upwards or downwards. (See upward and downward ranges of modifiers in Appendix 3).

4.6. Public finance

The 'Public finance' analytical block assesses the government's ability to balance its books and repay its outstanding debt. We measure this ability by the following core indicators: gross outstanding debt of the general government (GG)[11] as a percentage of GG revenue, GG balance as a percentage of GDP, interest payments as a percentage of GG revenue, and external debt of GG as a percentage of GDP. A description, rationale, measure, and sources of information for the core indicators can be found in Appendix 1.

4.6.1. Core indicators of public finance block

Fiscal balance

Overstretched public finances is one of the most common reasons behind sovereign defaults[12]. We calculate the three year average general government balance (% GDP). Persistent budget

[11] A general government usually includes central, local, and regional governments, as well as social security funds. Depending on realities of fiscal federalism in a particular country, its sub-sovereign debt could be considered as a contingent liability. ACRA assesses the circumstances which may prompt this type of debt to materialize on a sovereign balance sheet.

[12] Reinhart, Rogoff, Savastano (2003) report on the impact of high external debt on sovereign defaults in foreign currency; Reingart, Rogoff (2008) report on the impact of high public debt on sovereign defaults in local currency.

deficits, which last longer than the countercyclical fiscal policy justifies, point to structural issues and/or the lack of political will to tackle them. Left unaddressed, these structural weaknesses could gradually lead to the accumulation of unsustainable public debt, which is hard to service fully and timely.

Public debt burden

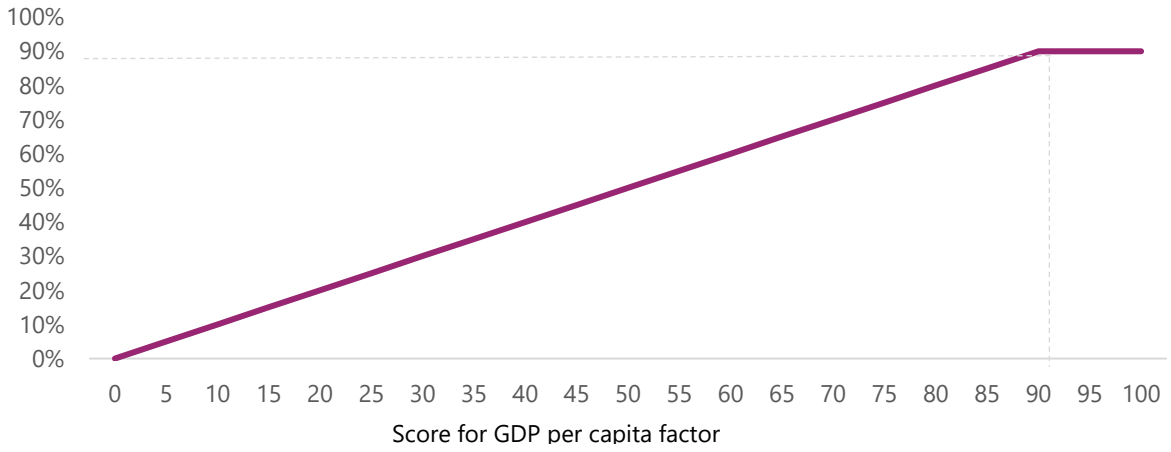
However, the ultimate test of debt sustainability is to what extent the sovereign is able to service its debt on an annual basis, which we measure by the ratio of interest payments to the sovereign's budget revenue. The tolerance to a certain level of debt varies among sovereigns and is untimely determined by debt tenure and funding cost; the longer the debt maturity and the lower the funding cost, the higher the debt capacity level. Countries with deep and diversified domestic capital markets are better positioned to withstand higher levels of debt. Apart from enjoying a lower cost of funding and being able to place their obligations with longer maturities, they have largely uninterrupted access to the capital market, which allows them to refinance their obligations at any time.

By contrast, high and rising levels of debt service stemming from shorter maturities and higher funding costs constrain a sovereign's ability to manage public finances. It compromises not only its solvency, but also the capacity to support the economy during downturns by implementing a countercyclical fiscal policy.

The score for the factor is obtained using a composite indicator combining debt service costs and the size of the debt:

$$Public\ debt\ burden\ score = Debt\ score * (1 - f) + Interest\ payments\ score * f$$ [13]

Figure 6. F calculation



Source: ACRA

External public debt

Another consideration is the amount of public debt held by non-residents, which is measured by external general government debt relative to GDP. We focus on external debt as a measure of a government's overreliance on external investors, which might impede its market access in the case of adverse conditions. We acknowledge that this indicator is more relevant to developing economies constrained by the insufficient depth and breadth of their domestic markets as a potential source of funding.

[13] The value of this indicator is determined by the GDP per capita factor.

The high and increasing levels of external debt in developed economies could signal investors' flight to quality, especially with domestic currencies enjoying the status of global reserve currencies. However, it is our opinion that even sovereigns whose currencies enjoy reserve status cannot allow their public debt to grow indefinitely.

4.6.2. Modifiers for public finance block

ACRA complements the analysis of the core indicators with a qualitative assessment of a sovereign's contingent liabilities, fiscal policy framework, fiscal flexibility, market access, sources of funding, and debt sustainability. A description, rationale, and indicators for the modifiers can be found in Appendix 2.

Contingent liabilities and risk of them materializing on the sovereign balance sheet

A sovereign might be exposed to a wide range of contingent liabilities that under certain circumstances could materialize on its balance sheet and increase its debt burden. Our assessment of the impact that contingent liabilities could have on the sovereign's creditworthiness is based on the size of these liabilities and the likelihood of them materializing on the sovereign's balance sheet. Accounting for contingent liabilities is complicated by insufficient and inconsistent information on them among countries.

We try to compensate for this by using reliable expert judgment and praising those countries that are sufficiently transparent about their off-balance obligations. We pay special attention to the sovereign's track record of bailouts provided to financial and/or non-financial institutions.

We identify three groups of contingent liabilities. The first group comprises potential liabilities that could come from the domestic banking sector.

A significant number of sovereign defaults have occurred because of systemic banking crises, which were resolved by a sovereign at the expense of its own balance sheet: public debt stock shot up because of banking sector rehabilitation measures[14]. Conversely, many banking crises have been caused by sovereign insolvencies. Unlike any other sector, banks represent a special contingent claim on national governments because of an immensely important intermediary function between the savings and investments of governments, households, and companies. If the banks cease to function, the economy grinds to halt[15].

We assess the quality of a country's banking sector oversight by the capacity to curb systemic risks and enhance the financial sector's ability to resist shocks and minimize contagion risks. We carefully examine past banking crises, their causes, and the authorities' reaction to them in terms of the timing and adequacy of the measures taken.

We acknowledge that policies applied by a specific government could be considered inadequate and inefficient in a different economic environment. There are examples where bank insolvency has been compatible with economic stability and even rapid economic growth; some large banks in China and Japan were considered insolvent by western accounting and business practices in the past. However, a raft of measures, including accounting forbearance and central bank actions used in both countries, has helped prevent a financial crisis similar to the one in Ireland.

[14] Reinhart and Rogoff (2011) discovered that public sector debt grew on average by 86% in three years after financial crises.

[15] Balteanu and Erce (2017), analysis of the mechanisms through which bank and sovereign distress feed into each other, using a large sample of emerging market economies; Jorda, Shularick and Taylor (2013) found that private sector deleveraging after crises leads to deeper recessions and longer recoveries if preceded by a combination of high public and private debt; the situation is worse if a crisis is driven by a credit boom.

A sovereign supporting the sector via fiscal authorities can take different forms ranging from direct recapitalization to the separation of a distressed bank into "good" and "bad" banks with the latter typically included in public sector debt or explicit guarantees. The size and timing of support depends on the credibility and capacity of the central bank to act as a last-resort lender, the propensity of a sovereign[16] to provide direct support without compromising its own solvency, and its assessment of the damage to macroeconomic stability that the failure of a large systemically important bank can bring.

The second group includes potential liabilities related to non-financial public sector companies. Frequently, a sovereign tries to achieve certain social or political goals through these companies, which could adversely affect their profitability and/or debt position, especially in periods of economic downturn. The deterioration of their financial health could prompt a sovereign to support them. We pay attention to the evidence of "soft budget" constrains in the country whereby the behavior of economic agents is marked by the expectations that the government will cover their losses.

The last group includes explicit sovereign guarantees on debt issued by other entities. We view unequivocal and unconditional guarantees issued by a sovereign as a very strong obligation that should be included in the sovereign's debt burden. However, we acknowledge that these guarantees could be issued to financially solvent entities able to service their debt themselves. In those cases, inclusion of the guarantees will inflate the sovereign's debt burden. We also include unfunded pension obligations and public-private partnerships (PPP) in the third group of contingent liabilities.

Fiscal policy framework and fiscal flexibility

We focus our assessment of fiscal flexibility on analyzing the rigidity of budget revenue and expenditures. An inflexible budget leaves little room to maneuver in economic downturns or external shocks. Revenue flexibility assumes a government's ability to raise extra revenue through higher tax rates, the expansion of the tax base, or the sale of assets. The government's expenditure flexibility is determined by the proportion of mandatory to non-mandatory expenditure, i.e., politically sensitive operating expenditure such as salaries, entitlements, or subsidies vs. the rest. Constitutional, political, and demographic constraints, e.g., expenses related to aging as well as the government's record on austerity measures, should be taken into account while assessing the potential extent of fiscal consolidation.

We assess the strength and stability of fiscal rules and adherence to them. We consider the fiscal policy efficient if it mitigates structural imbalances in revenue and expenditures and manages the debt burden over a business cycle with positive implications for debt servicing capacity.

Market access and sources of funding

While assessing a sovereign's market access and sources of funding we focus on the depth of the domestic market according to the investor base – local pension and other savings funds – and the resiliency of the local capital market to shocks. We assess the sovereign's ability to retain access to external markets when we look at the country's external position and analyze the risk of market access disruption not only for the sovereign, but also for broader sectors based on previous instances of market stress.

[16] Bank resolution regulations adopted in a number of countries demonstrated the reduced appetite of a sovereign to provide direct support to the banking sector.

Access to concessional and multilateral sources of funding is an advantage provided a government's willingness to secure policy-conditional funding from the IMF or other IFIs in a distress situation. At the same time, emergency support from multilaterals points to the deterioration of the sovereign risk profile.

Debt sustainability

We analyze a composition of public debt by maturity, interest rate, and structure (currency, floating vs fixed rate, market vs non-market, etc.). A high proportion of FX debt exposes a sovereign to sizable changes in its debt burden should the local currency depreciate. The history of sovereign defaults shows many examples of developing countries having difficulties servicing their FX debt after significant depreciation in domestic currency.

Longer-term debt with lower cost reduces rollover risk. We also analyze peaks in the public debt repayment schedule, which could increase refinancing risks.

We pay special attention to the size of a sovereign's liquid assets, including sovereign wealth funds. The governments' liquid assets, if not allocated for other purposes, can provide a good cushion in times of market distress, especially for highly leveraged governments.

ACRA's debt sustainability analysis focuses on the trajectory of GG gross debt and the debt service burden over the medium-term. We start with assumptions about budget balances and their link to the trajectory of public debt. If the government intends to run budget deficits in coming years, it is reasonable to anticipate an upward trend in public debt. A downward trend can be expected if its budget is in surpluses. At this stage our assumptions about the potential size and timing (when this can be established) of contingent liabilities materialization play an important role in assessing the overall debt outlook. We take a more relaxed approach to a country with growing public debt if its growth rates are on par or lower than those of nominal GDP.

Finally, we assess the sovereign's capacity to service its debt under various scenarios relevant to said sovereign and its peers. We check debt burden and debt service sensitivity to various assumptions on GG primary balances, interest payments, GDP growth, exchange rate, and other variables. Its comparison with the sovereign's liquid assets shows how long the sovereign can remain current on its obligations in the case of prohibitively high funding costs or market closure.

Modifiers in this analytical block can correct the indicative rating of a country either upwards or downwards. (See upward and downward ranges of modifiers in Appendix 3).

4.7. External position

The 'External position' analytical block entails the assessment of a sovereign's resiliency to external shocks. The history of sovereign defaults shows many examples of developing countries defaulting due to severe currency crises that erupted into banking and budget crises.

Moreover, examples in Greece (2011) and Cyprus (2012) revealed that overreliance on external funding, which is denominated in the same currency but comes from non-residents, could trigger a sovereign default, even for developed countries.

We evaluate this in the context of the whole economy taking into account that the sovereign and the private sector are interrelated vessels with the banking sector working as a conduit of external shocks into the domestic economy under global market stress. The link between the sovereign and broader public sector also plays a role in this context.

4.7.1. Core indicators of external position block

We measure the sustainability of the external position using a raft of indicators including current account (CA) as a percentage of GDP, import cover ratio, external debt (excluding GG external debt) as a percentage of GDP, local currency volatility, and diversification index. A description, rationale, measure, and sources of information for the core indicators can be found in Appendix 1.

Current account

Relatively large and persistent CA deficits indicate a buildup of liabilities towards non-residents, whereas current account surpluses point to the fact that the country is a lender to the rest of the world. CA deficits are less important for high-income countries in the short- to medium-terms, especially ones with sizable stocks of equity abroad, but may pose a significant risk for emerging market countries with less cross-border equity. A CA deficit for a country in a monetary union can serve as a medium-term indicator of a country's overall competiveness.

Import cover

The import cover ratio measures the number of months a country's international reserves are sufficient to cover imports in the case of a sudden cutoff from foreign currency inflows. The higher the indicator, the more comfortable the investors are about the country's ability to withstand external shocks. It is a meaningful medium-term indicator for emerging market countries that have pegged exchange rate or are in the process of switching to free floating regimes; however, it is less important for countries with free-floating currency regimes. This indicator is even less meaningful for developed countries, especially those with reserve currency status.

External debt

A heavy external debt burden accompanied by a currency mismatch could trigger balance-of-payment and/or exchange rate crises with its adverse effect on the sovereign's solvency. We use the ratio of external debt to GDP to assess the factor.

Exchange rate volatility

Countries with highly volatile local currencies are prone to more disruptions in the local economy, which could negatively affect sovereign creditworthiness. Volatility is measured using the standard deviation of an exchange rate to the US dollar over a 10-year average moving time window.

Export diversification

The diversification index helps to assess the extent to which the structure of merchandise imports and exports of a particular country deviates from that of the world. The closer to the world's structure, the more diversified both exports and imports of a country are, which, other things being equal, signals a lower probability of external shocks.

4.7.2. Modifiers for external position block

We complement our core indicators with a qualitative assessment of current account vulnerabilities, external debt sustainability, and the stability of the exchange rate regime. A description, rationale, and indicators for the modifiers can be found in Appendix 2.

Balance of payments vulnerabilities

We assess CA trajectory over the medium-term by analyzing its vulnerabilities and the fundamental factors driving its balance (e.g., savings/investments patterns in the economy). The volatility of CA receipts, which includes merchandise, service exports, and primary plus secondary revenue, undermines the country's ability to generate stable and reliable external revenue. Overreliance on a single commodity or service (oil, soybeans, tourism, etc.) or a single donor country for remittances may expose a sovereign to sharp downturns in commodity markets, trade partners, or donor countries. Structural vulnerability of imports comes from dependence on a particular import, for instance fuel. Countries with a free-floating exchange rate regime are better positioned to adjust to external pressures stemming from swings in oil prices or the economic fortunes of key donors or trade partners. These countries are more prepared to keep their CA swings at bay.

In addition, the CA outlook depends on national savings and investment balances. If a country's savings ratio is far above investments in its own economy, it exports capital and is likely, other things being equal, to keep its CA in surplus. The opposite is also true; a CA deficit country is likely to have its domestic investment far above domestic savings, thus importing capital to finance them. Another important consideration in analyzing CA vulnerabilities is identifying who the main contributor to the CA deficit is (i.e., the private or public sector).

An important aspect in the analysis is the nature of capital flows that finance the country's CA deficit. If investments from non-residents are mostly foreign direct investments (FDI) and equity inflows, the leverage is less onerous. These types of external investments are often associated with a boost in a country's productive capacity rather than consumption. Conversely, a much higher proportion of external portfolio investments, especially those short-term in nature, poses more concern. Portfolio investments are more volatile than FDI and their sudden stop due to a change in investor sentiment can precipitate a currency devaluation and potentially a recession. The housing booms and busts in Spain (2008) and Ireland (2008) are good examples of this. High CA deficits during the housing bubbles were an indication of domestic banks channeling money borrowed abroad to homebuyers and developers instead of facilitating a creation of export-generating capacities. When investor sentiment changed and property markets collapsed, the developers and homeowners were left with little or nothing to service/repay the imported capital.

External debt sustainability

Analyzing debt sustainability, we look at the amount of external assets compared to liabilities for the whole economy and the sovereign in particular. We also analyze short-term components of both external assets and liabilities and calculate a liquidity ratio. We use net international investment position (NIIP) to measure the difference between the market value of a country's external assets and that of its liabilities relative to GDP, taking into account debt investments as well as equity. This ratio serves as an indicator for potential balance-of-payments stresses. A country is considered to be a creditor to the world if its net asset position is positive. Conversely, a negative net asset position points to a borrower country and heightens the country's exposure to external shocks.

ACRA uses an external liquidity ratio to measure the ability of the economy to withstand a temporary loss of investor confidence and the capacity to continue servicing external debt with its own sources. The latter compares the country's international reserves with its external financing needs, including short-term external debt (original maturity short-term debt and a current year principal of long-term debt) and deposits of non-residents in domestic banks.

A closer look at the composition of the sovereign's assets and liabilities makes it possible to estimate the government's exposure to external risk, in particular foreign currency risk. We measure sovereign net foreign assets by comparing the international reserves and foreign-currency denominated (or indexed) assets of the government, i.e., the foreign currency part of sovereign wealth and stabilization funds, and GG and central bank foreign currency denominated (or indexed) debt, regardless of residency. Similar to the economy as a whole, a sovereign in a net creditor position has a greater level of external flexibility than a sovereign in a net debtor position. The foreign currency structure of assets and liabilities is more relevant for developing countries than developed ones.

Stability of currency regime

The external shock resiliency of highly indebted countries with managed or pegged exchange rate regimes strongly depends on the ability to maintain stability in said exchange rate regimes. The stability of pegged exchange rate regimes is determined by the level of international reserves, which should be credible for investors. A significant and sudden decrease in international reserves indicates the central bank's fight to maintain the local currency at a certain level.

Modifiers in this analytical block, except for the exchange regime modifier, can correct the indicative rating of a country either upwards or downwards. (See upward and downward ranges of modifiers in Appendix 3). The exchange regime modifier can only provide a downward adjustment.

4.8. Institutional framework

The 'Institutional framework' analytical block entails the assessment of a government's willingness to mobilize resources to fund debt payments and its efficiency in doing so[17]. The assessment also takes into account the risk that the capacity to pay could be interrupted by political instability, civil unrest, or external conflict.

4.8.1. Core indicators of institutional framework block

For the core part of the model, we use six World Bank Governance indicators (WGI), namely the Rule of Law, Control of corruption, Government effectiveness, Regulatory quality, Voice and Accountability, and Political stability and Absence of violence as a proxy for these intangible factors. Due to the high positive correlation with each other, we grouped the first four indices in a group called **Government benevolence and effectiveness**, which combines the perceptions of market participants on various aspects of governance. For the same reason, we aggregated the last two indices into a group called **Political stability**.

We examine the socioeconomic capacity to service debt in the medium-term using an in-house index group of indices that we call the **Human Capital index (HCI)**, which is less correlated with WGI. The HCI comprises three indicators aimed at assessing the quality of education and health

[17] North and Weingast (1989) examined how institutional changes transformed the economy and underpinned the development of capital markets in 17th century England.

of the adult population, in particular the education sub-index from the Human Development Index (UN), as well as the adult mortality rate and life expectancy at birth.

We noticed that WGI and human capital factors have become weaker predictors of sovereign defaults over the last 20 years (compared 1965-1996). However, we believe that they will remain a valuable input in the rating analysis in the future. We take into account the following reasons. Firstly, the country's institutional features, which range from political instability to weak budget management and governance, are related to the ability and willingness to repay debt and have to be assessed. Secondly, WGI are currently the most comprehensive indicators of institutional factors that are compiled in a unified approach; they cover a very wide range of countries and they are reliably published on an annual basis. A description, rationale, measure, and sources of information for the core indicators can be found in Appendix 1.

4.8.2. Modifiers for institutional framework block

We complement our core indicators with a qualitative assessment of the perceived willingness to repay debt, recent political events, and exposure to geo-political risks. A description, rationale, and indicators for the modifiers can be found in Appendix 2.

Willingness to pay

The perceived willingness to repay has to be taken into account, because unlike private entities such as corporates or banks, governments are not subject to bankruptcy laws or enforcement procedures. There are situations when a government can pay, however for different reasons decides that it is easier to default. Ecuador in 2008 and Argentina in 2014 are good examples of this. The former is an example of the current government refusing to honor debts incurred by the previous one. The latter is an example in which the government decided to avoid repaying debt to its bondholders because of a court decision in favor of holdouts. Honoring its obligation to the holdouts could have triggered payments to other bondholders in amounts much larger than the country was prepared to pay.

History of defaults

However, in general, willingness to pay can be assessed by analyzing default history. The history of sovereign defaults shows that countries whose governments defaulted in the past are more likely to use default as an option than countries without a history of defaults[18]. We take into account the time that has passed since the last default, the type of default that occurred (missed payments, distressed exchange, etc.), and the severity of bondholder haircuts. We try to analyze, if the information is available, whether restructuring debt solved the country's insolvency in addition to its liquidity problems. Willingness to pay fully and timely can also be assessed by a country's history of dealings with international donors and bilateral lenders. Yet another consideration is whether the debt incurred by the previous administration is questioned publically by the new one. We penalize serial defaulters, i.e., countries that have defaulted more than once.

Political instability and recent political decisions

We compensate for the lag in time, which usually occurs with WGI updates[19], by examining recent political events and key political decisions that could impact sovereign creditworthiness ranging from the frequency of changes in government to orderly transfer of power. We make no

[18] Asonuma (2016) argues that emerging countries that have defaulted on their debt repayment obligations in the past are more likely to default again in the future than non-defaulters, even with the same external debt-to-GDP ratio.
[19] Some of the indicators are based on data lagged 2-3 years.

judgement as to the type of government in place as long as debt repayment is not impaired by political structure. We believe that an authoritarian government with high legal certainty and a low level of corruption can be creditworthy despite lacking political liberties and civil rights. By contrast, a highly democratic government can experience difficulty exercising political will to instill fiscal order and repay its obligations on time.

Involvement in geopolitical conflicts, exposure to geo-political risks

Exposure to geopolitical risks and/or involvement in geopolitical conflicts could put the capacity and willingness to pay at risk. We take into account the geopolitical risks that can disrupt economic activity and have a detrimental effect on investment flows and business and consumer confidence.

Modifiers in this analytical block can correct the indicative rating of a country either upwards or downwards. (See upward and downward ranges of modifiers in Appendix 3).

Appendix 1. Variables used within the core part of the model

№	Variable	Definition	Rationale	Measure, adjustments and sources
1	GDP based on PPP, Per Capita	This is the ratio of gross domestic product (GDP) measured on purchasing parity power (PPP) divided by the country's population. GDP on PPP basis allows for better cross-country comparability compared to GDP per capita using current exchange rates. PPP attempts to account for the difference in costs of living, which is significantly affected by non-tradables less prone to convergence in external prices compared to tradable sectors. PPP measure reduces the income gap between rich and poor countries. Though the calculation of GDP on PPP is the subject of controversy, the figures produced by the World bank are accepted as the norm	The higher the GDP per capita, the broader the potential tax base that the sovereign can employ to service its debt. Higher GDP per capita is associated with higher economic and financial wealth	Ordinal approach, one-year sample. Source: IMF Sample period: the latest available data
2	10 year average real GDP growth rate, deviation from the global average[20]*	Real GDP is defined as the annual percentage change of a country's GDP in constant prices. This is an indicator that captures the fundamental change in domestic economic output and excludes inflation, which can distort the economic picture	A country's creditworthiness depends on its ability to generate long-term economic growth and display GDP growth at least on par with countries with a similar income level	Ordinal approach, full sample, distinguishing between emerging and developed markets. The upper threshold for emerging markets is 20,000 (current $ international) per capita. The lower threshold for developed countries is 40,000 (current $ international) per capita. Countries with GDP per capita in between are compared with the weighted 10-year average, measured as the difference between a country's 10-year average real GDP growth and the 10-year average of its group. Sources: IMF, WB, national statistical offices Sample period: since 1987

* To calculate average values, weighted averages are used. The 10-year/3-year average is weighted, with higher weights assigned to current years.

3	Real GDP growth, volatility*	GDP growth volatility is defined as the deviation of real GDP growth	A sovereign's ability to repay debt fully and on time can be adversely impacted by highly volatile economic growth	Cardinal approach, full sample, measured as the difference between the standard deviation of 10-year real GDP growth and that of the world for the same period. The lower threshold is 0.5%, the upper threshold is 3%. Source: IMF data, national statistical offices Sample period: since 1987.
4	Deviation from the "target" inflation rate, average for 3 years*	Inflation is measured by the change in the annual average consumer price index (CPI). CPI is based on a consumption basket of goods and services used for the idealized household within the country. The wider range of domestically produced goods is captured by the GDP deflator. Moreover, the CPI excludes asset prices and therefore understates the extent of liquidity that can give rise to price bubbles in asset markets	Long periods of excessive and volatile inflation distort relative prices in the economy having a detrimental effect on economic growth and therefore, undermining the sovereign's ability to service its debt. Deflation, i.e., prolonged period of falling prices, is equally harmful for economic growth, adversely affecting consumer and business confidence	Cardinal approach, full sample; the best score is between 0-3%, the worst score is a value higher than 18%, but lower than -5%. Source: WB data, national statistical offices Sample period: since 1996
5	GG gross debt, % of revenue	The gross outstanding debt of the general government (GG), which includes central, local, and regional governments, social security funds, and is compared to GG revenue. In instances where a central bank issues debt for nonmonetary purposes, this debt is included in GG debt. To be accounted for, this debt should be large enough and rise over the years as % of GDP, indicating its structural rather than cyclical nature. Data comprises domestically and externally contracted debt and excludes government guarantees	GG-debt-to-revenue is a more accurate ratio for assessing a government's creditworthiness than the commonly used GG debt-to-GDP ratio. This indicator provides a debt burden assessment relative to a government's existing revenue stream. A government may have a relatively low GG debt-to-GDP ratio but a high GG debt-to-revenue ratio, which indicates little room for maneuver to solve fiscal problems in the case of adverse conditions	Ordinal approach, full sample, adjustment is via floating weights between GG debt and interest payments based on GDP per capita (the wealthiest countries have weights for debt and interest 10%:90%, whereas the poorest have 100%:0%). Source: IMF, WB data and national statistical offices Sample period: since 1996
6	Average of three year GG Balance, % GDP*	General government balance is the difference between its revenue and expenditure, including interest payments on existing debt stock	A persistent GG deficit indicates a sovereign's constrained capacity to service its debt using its own resources and increasing reliance on the market to refinance its debt. A persistent budget deficit might indicate rising debt burden	Ordinal approach, full sample. Average of the last three years of GG balance as % of GDP. Sources: IMF, WB and national statistical offices Sample period: since 1996.

7	Interest Payments, % of Revenue	Interest payments include all payments on government debt regardless of its currency, residency, and maturity, and are compared with total government revenue	An important indicator of how expensive it is for the government to finance its interest payment relative to its revenue. A rising burden of servicing existing debt stock may put other government expenditures on halt limiting policy choices	Ordinal approach, full sample. The first adjustment is similar to that of GG debt to revenue, the second takes into account the share of non-market debt in the interest payments. Sources: WB, IMF and national statistical offices Sample period: since 1996
8	Gross external GG debt, % of GDP	Outstanding debt of GG owned by non-residents, including non-resident holdings of GG bonds and notes in local currency in the domestic market	A government's overreliance on external investors, regardless of the currency of debt, might impede its market access in the case of adverse conditions	Ordinal approach, full sample. An adjustment is made for reserve currencies based on their share in global reserves: the highest score is for shares above 50%, descending scores are applied for shares below 50%; for Eurozone countries and "other currency" countries, the data on the bond holdings for reserve purposes of individual countries are used. Source: WB, IMF and national statistical offices Sample period: since 1996
9	Current account balance, % GDP*	Current account (CA) comprises net balances of goods and services plus net primary income (dividends, interests, etc.) and secondary income (remittances and foreign aid). All of this is relative to GDP	Relatively large and persistent CA deficits indicate a buildup of foreign debt. However, if the debt is financed by direct foreign investment and equity inflows, the debt burden is less onerous. Consistently negative CA funded through foreign debt poses concern even for the countries with reserves currencies. It is an even bigger risk for developing countries with limited cross-border equity. A sovereign saddled with foreign debt with limited foreign assets to counterbalance it might find it difficult to refinance its own debt	Ordinal approach, full sample. Measured as an average of three years, % of GDP. Source: WB, IMF and national statistical offices Sample period: since 1996

10	Import cover (reserves to imports in months)	Import cover is defined as the ratio of international reserves to monthly imports of goods, expressed in months	This measures the number of months a country's international reserves are sufficient to cover imports if there is a sudden cut-off of foreign currency inflows. It is less important for the countries with free-floating currency regimes. However, it is a meaningful indicator for emerging market countries, which are in the process of switching to free floating regimes. The higher the indicator, the more comfortable investors are regarding the country's ability to withstand external shocks	Ordinal approach, full sample. An adjustment for countries with reserve currencies that get the highest score. Source: IMF, WB and national statistical offices Sample period: since 1996
11	External debt, % GDP	The outstanding debt of residents to non-residents expressed in USD as a percentage of GDP. These liabilities can be denominated in local and foreign currencies and include only debt instruments. To avoid double counting, this indicator excludes general government external debt	This indicator shows a country's susceptibility to host external/internal shocks.	Ordinal approach, full sample. Source: WB, IMF and national statistical offices Sample period: since 1996
12	Local currency, volatility*	Standard deviation of an exchange rate of the national currency per USD over a 10-year moving time window	The higher the local currency volatility, the more disruption it can bring to the local economy with adverse consequences for sovereign creditworthiness	Cardinal approach, full sample. The range is capped: the upper threshold is lower than 0.1 (the highest score), the lower threshold is higher than 0.4 (the lowest score). Source: IMF, WB and national statistical offices Sample period: since 1996
13	Diversification index	The more a country's merchandise exports and imports structure deviates from that of the global indicators, the less diversified its economy is	The diversification index helps to assess the extent to which the structure of merchandise exports of a particular country deviates from that of the world. The closer to the world structure, the more diversified a country's are. Other things being equal, the index signals strong resilience to external shocks.	Ordinal approach, full sample. Measured as the absolute deviation of the trade structure of a country from world structure. Source: UNCTAD Sample period: since 1996

14	Political stability, index	This is a complex index comprising two indices out of the World Governance Indicators (WGI) compiled by the World Bank: Voice and Accountability and Political Stability and Absence of Violence. The voice and Accountability index measures the extent to which a country's citizens are able to participate in selecting their government, as well as the freedom of expression, freedom of association, and a free media. The Political Stability and Absence of Violence index measures the likelihood of political instability and/or politically motivated violence, including terrorism	This is an indicator, which increases the likelihood of signaling coming crises by providing relative evaluation of a country's institutional strength in terms of political stability and freedom of speech	Cardinal approach, full sample. Measured as an average of the most recent WGI indicators. Source: WB Sample period: since 2000
15	Government benevolence and effectiveness, index	This is a complex index comprising four indices out of the World Governance Indicators (WGI) compiled by the World Bank: Control of Corruption, Rule of Law, Regulatory Quality, and Governance effectiveness. Control of Corruption measures the extent to which public power is exercised for private gain, including both petty and major forms of corruption, as well as 'capture' of the state by elites and private interests. Rule of Law measures the extent to which agents have confidence in and abide by the rules of society, in particular the quality of contract enforcement, property rights, police, and the courts, as well as the likelihood of crime and violence. Regulatory Quality measures a government's ability to formulate and implement sound policies and regulations that permit and promote private sector development	This is an indicator, which increases the likelihood of signaling coming crises by providing a relative evaluation of a country's institutional strength in regard to corruption, property rights, quality of public services, and a government's ability to facilitate private sector development	Cardinal approach, full sample. Measured as an average of the most recent WGI indicators. Source: WB Sample period: since 2000

		Government effectiveness captures perceptions of the quality of public services, the quality of civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.		
16	Human Capital Index (HCI)	ACRA's index comprising three indicators, which capture the quality of a country's human capital. These indicators are include the education sub-index of the Human development index (UN)+, adult mortality rate, and life expectancy at birth	This is a forward-looking indicator. Its current level signals whether or not a country is improving its human capital, a driver of long-term economic growth	Cardinal approach, current year sample. Measured as the sum of exponents of the indicators in the index. Source: UN Sample period: the latest available data

Appendix 2. Modifiers

№	Modifiers	Description	Rationale	Indicators
Macroeconomic position	Potential economic growth	Assesses medium- to long-term economic potential and its realization: whether a country grows above or below its potential	Economic potential is a key factor in assessing a country's ability to service its debt, especially in the long run	Economic potential indicator compiled by IMF, EU, and expert judgements
	Sustainability of economic growth	Assesses macroeconomic imbalances arising from a lack of competiveness, overreliance on credit-fuel growth, diversification in the economy/exports, low level of investments, lack of innovation and adaptability, worsening demographics, product market regulations and the ability to create jobs (labor market flexibility, inadequate quality of the labor force), as well as from income and wealth inequality and hurdles to social mobility	Sustainable economic growth allows a country to weather adverse economic conditions better than the peers and recover more quickly	Product/service/trade partner concentration, surveys on competiveness, Economic Freedom and Doing Business indices, credit-to-GDP gap, level of savings/investments in the economy, R&D spending, income and wealth distribution indicators, demographics and labor force indicators and forecasts (overall structural and youth unemployment, participation rate, informal employment, percentage of jobs at risk of automation)
	Efficacy of structural, economic, and monetary policies	Assesses the credibility and flexibility of structural, economic, and monetary policies, a country's ability to coordinate them (an important factor for countries in a union), the effectiveness of the policies in achieving targets regarding monetary policy, facilitating expansion or/and achieving economic potential regarding structural and economic policies, quality of social safety net, ability to provide adequate and timely responses to crises	An effective and coordinated set of policies could, to a degree, alleviate a country's structural imbalances, whereas the opposite could amplify them	Expert judgements on a central bank's policies and its independence, ability to set adequate, relevant, and timely priorities for and implement structural and economic policies, a sovereign's track record of managing past crises, implementation of institutional changes hedging systemic imbalances that triggered former crises, its current capacity to deal with future crises
Public finance	Contingent liabilities and the risk of them materializing on the sovereign's balance sheet	Analyzes the nature and extend of contingent liabilities (guarantees, banking sector vulnerabilities, financial strength of state-owned companies, international commitments, future pension commitments) and the tools at a sovereign's disposal to minimize their materialization (relevant regulations and their effectiveness, etc.), as well as the sovereign's history of bail-outs	Underestimated contingent liabilities could heavily distort the picture of a sovereign's liabilities and hurt its capacity to honor them without adverse consequences to creditworthiness	Eurostat data on the composition and nature of contingent liabilities, expert judgement based on national statistics and other sources

	Fiscal policy framework and fiscal flexibility	Assesses rigidity in budget expenses and revenue diversification, the efficiency of fiscal rules aimed at reducing revenue volatilities and expenditure overshooting and/or managing budget balances over a business cycle	Efficient fiscal policy response could mitigate structural imbalances on revenue and expenditure sides and manage the debt burden over a business cycle with positive implications for a sovereign's capacity to service its debt	Expert judgements
	Market access and sources of funding	Assesses the composition of public debt by maturity, interest rate, and currency structure. Analyzes the track record of market access both locally and internally at a sustainable rate and duration, depth of the local debt market and access sources from multilaterals, including concessional funding. Examines the presence of a large sovereign's deposits/wealth sources and liquidity, access to a safety net in a union	Longer debt with lower cost reduces rollover risk, whereas persistent market access both internally and externally ensures uninterrupted refinancing. Solid stock of liquid sovereign assets allows a sovereign remain current on its obligations in the case of prohibitively high funding costs or market closure	Expert judgements
	Debt sustainability	Projected peaks in the debt service schedule and debt trajectory taking into account the cost of debt, contingencies, market access, and alternative sources of funding under difference scenarios	Highlights challenges that the sovereign faces in the medium/longer –term and its resiliency to them	Expert judgement
External position	Balance of payment vulnerabilities	Examines reasons for persistent current account (CA) deficits, the volatility of exports (commodity dependencies) and import dependencies (remittances, part of international value chain), compositions of capital inflows (FDIs vs portfolio investments), and capital flight issues, if any	Balance of payment vulnerabilities could put pressure on the local currency with adverse consequences for all economic agents servicing their FX debt, including the sovereign	Expert judgement
	External debt sustainability	Assesses imbalances in the maturity and currency structure of the economy's external debt, its level, trends, and available sources of funding, including international reserves	Pressure on the local currency could be added by high levels and imbalances in external debt, undermining foreign investor confidence and resulting in a decline of capital inflows	Net international investment position, liquidity ratio, and other indicators on external and FX debt provided by the databases of international organizations, as well as expert judgement
	Stability of currency regime	Examines the sustainability of the currency regime, especially if a country has a currency board or pegs its currency to one of the reserve currencies	An unsustainable currency regime undermines confidence in the local currency with serious consequences for the banking sector and therefore for the sovereign	IMF annual publication on currency regimes and expert judgement

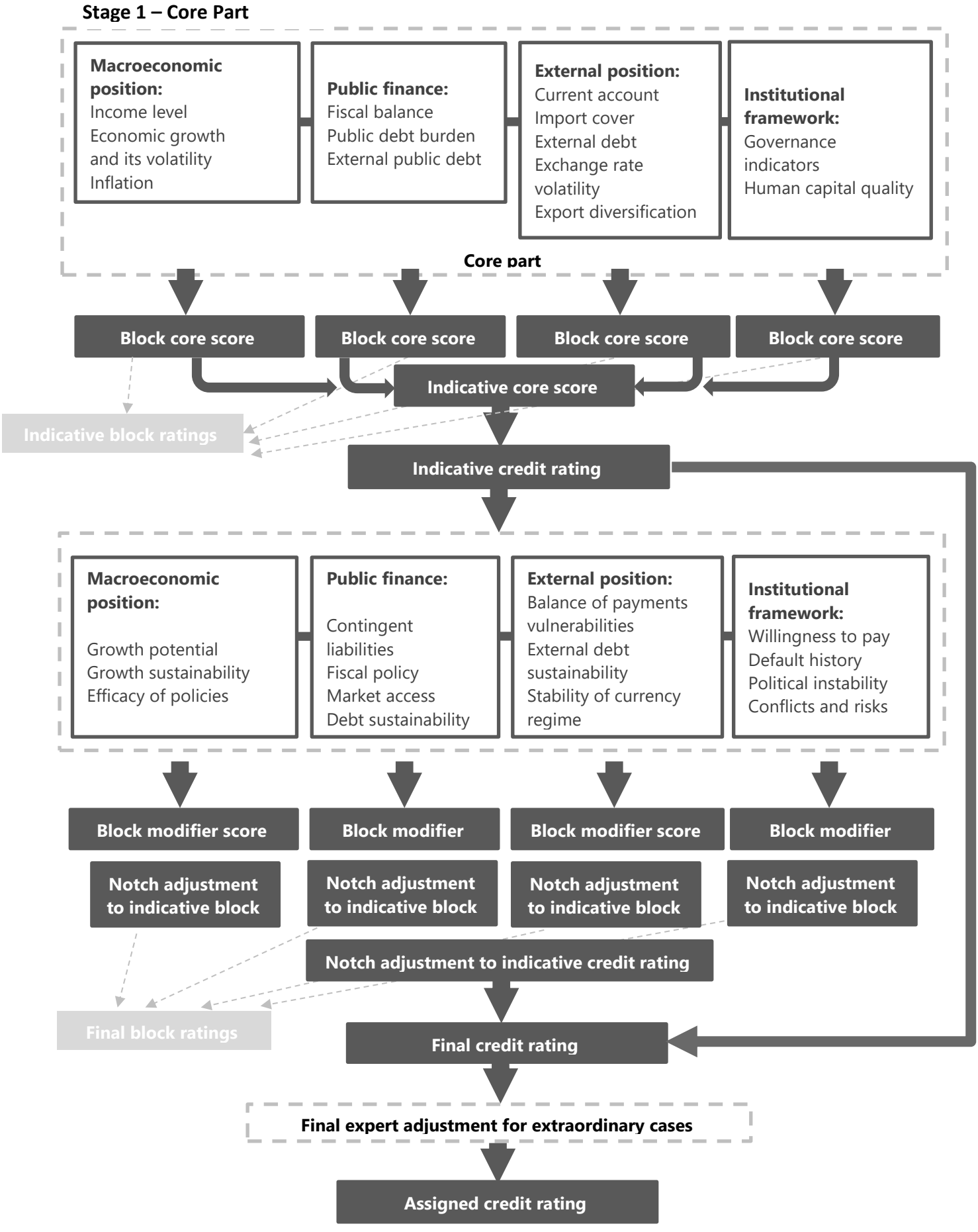
Institutional sector	Willingness to pay	Evaluates a sovereign's commitment to honor its debt fully and timely when making challenging political or investment choices, taking into account its default history	Willingness to pay can be a decisive factor in a sovereign's default; even when the capacity to pay is present, there a direct correlation between past and future defaults	Expert judgement using recent default history
	Political instability and recent political decisions	Assesses the impact of major political events on sovereign creditworthiness	Elevated political risk (increased sentiment towards populist parties, risk of fundamental regime change, civil conflict) could undermine sovereign creditworthiness.	Expert judgement
	Involvement in geopolitical conflicts, exposure to geo-political risks	Assesses geopolitical and security risks through a country's potential or current involvement in conflict with neighbors, exposure (potential or current) to geo-political risks, including sanctions and the ability of the government to localize the conflict and/or minimize the risk of sanctions to the economy	The threat of conflicts or exposure to geopolitical risks could lead to weakened business confidence, decreased capital inflows, and reduced economic activity	Expert judgement

Appendix 3. Modifier scores

Modifiers / Scores	Macroeconomic position			Public finance			
	Potential economic growth	*Sustainability of economic growth*	*Efficacy of structural, economic, and monetary policies*	*Contingent liabilities and the risk of them materializing on the sovereign's balance sheet*	*Fiscal policy framework and fiscal flexibility*	*Market access and sources of funding*	*Debt sustainability*
+2	Strong	Stable economic growth, no meaningful imbalances	Exceptionally good policies and implementation, highly effective	Practically all accounted for, risk of materializing extremely low	Extremely strong framework, extremely strong fiscal flexibility	Very strong	Very strong
+1	Good	Solid stable growth, imbalances under control	Good policies and implementation, effective	Largely all accounted for, risk of materializing low	Strong framework, strong fiscal flexibility	Strong	Strong
0	Average	Average stability, marginal imbalances	Average policies and implementation, moderately effective	Manageable, risk of materializing exists	Adequate framework, average fiscal flexibility	Average	Average
-1	Weak	Weak stability, strong imbalances	Poor policies and implementation, not effective	Accountability is doubtful and/or risk of materializing is strong	Weak framework, limited fiscal flexibility	Weak	Weak
-2	Very weak	Very weak stability, dominant imbalances	Inadequate policies and ineffective implementation, no desirable effect	Accountability is very weak and/or risk of materializing is very strong	Inadequate framework, very limited fiscal flexibility	Very weak	Very weak

Modifiers / Scores	External position			Institutional framework			
	Balance of payment vulnerabilities	*External debt sustainability*	*Stability of currency regime*	*Willingness to pay*	*History of defaults*	*Political instability and recent political decisions*	*Involvement in geopolitical conflicts, exposure to geo-political risks*
+2	Almost non-existent	Debt very sustainable, no imbalances				Very strong	
+1	Present but manageable	Debt fairly sustainable, imbalances manageable				Strong	
0	Average	Debt fairly sustainable, imbalances largely unproblematic	Average	Average	Average	Average	Average
-1	Strong	Debt sustainability issues, imbalances problematic	Weak	Weak	Weak	Weak environment	Moderate exposure
-2	Very strong	Unsustainable debt	Very weak	Very weak	Very weak	Very weak environment	High exposure

Appendix 4. Sovereign rating model



Appendix 5. Literature

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