METHODOLOGICAL NOTE ON EBA-LITE

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**International Monetary Fund
Washington, D.C.**

METHODOLOGICAL NOTE ON EBA-LITE

EXECUTIVE SUMMARY

The Fund has taken important steps to enhance its external sector assessments since the launch of the External Balance Assessment (EBA) methodology and the External Sector Report (ESR) in 2012, which provides a multilaterally consistent assessment of the largest economies' external sector positions and policies. With scope for strengthening external sector assessments of non-EBA countries, the 2014 Triennial Surveillance Review (TSR) called for the application of EBA's conceptual innovations to a broader set of countries. Following the 2014 TSR, the Managing Director's Action Plan proposed developing EBA-lite to extend the EBA methodology to a broader group of countries where adequate data is available. In the fall of 2014, the launch of the EBA-lite methodology for current account assessments provided the first extension of EBA approach for non-EBA countries. In summer 2015, the real exchange rate index model and the external sustainability approach were added to the EBA-lite framework.

This note serves as a reference for the EBA-lite methodology. It provides: (i) motivations for developing EBA-lite and guidance for its use; (ii) technical explanations of all three EBA-lite approaches; and (iii) suggestions on how to articulate staff assessments of the external sector informed by model results.

CONTENTS

Glossary

CA	Current Account
CGER	Consultative Group on Exchange Rate
BOP	Balance of Payments
EBA	External Balance Assessment
ES	External Sustainability
ESR	External Sector Report
FX	Foreign Exchange
GMM	Generalized Method of Moments
NFA	Net Foreign Asset
REER	Real Effective Exchange Rate
RMSE	Root Mean Squared Error
ROC	Receiver Operating Characteristic
SE	Standard Error
TSR	Triennial Surveillance Review
WEO	World Economic Outlook

INTRODUCTION

1.   The Fund has taken important steps to enhance its external sector assessments in both bilateral and multilateral surveillance in recent years. The External Balance Assessment (EBA) methodology was developed by the IMF's Research Department (RES) to replace the Consultative Group on Exchange Rate (CGER) methods (Lee et al., 2008). The key innovations of EBA methods relative to CGER were introducing a distinction between positive analysis and normative evaluation as well as incorporating a richer set of policy variables and fundamentals in external sector assessments. Drawing on EBA results, the External Sector Report (ESR, IMF 2015b) provides a multilaterally consistent analysis of external positions of the 28 largest economies and the euro area, comprising more than 85 percent of global GDP. The assessments are comprehensive, going beyond the exchange rate and current account, and include the assessment of external balance sheets, capital flows, and reserve adequacy.

2.   The EBA methodology and ESR were significant steps forward, but there remained scope for strengthening external sector assessments of non-EBA countries. The External Assessments in Special Cases (IMF 2014a) noted that countries not covered by the EBA exercise (about 140 countries) generally relied on older approaches, such as CGER or modified CGER methodologies. To make Fund surveillance more risk-based and better reflect global interconnections, the 2014 Triennial Surveillance Review (TSR, IMF 2014b) called for the application of EBA's conceptual innovations to a broader set of countries, to gradually replace CGER and conduct comprehensive assessments of external positions using a broader set of indicators than just the exchange rate. Following the 2014 TSR, the Managing Director's Action Plan (IMF 2014c) proposed developing EBA-lite to extend the EBA methodology to a broader group of countries where adequate data is available and replace CGER-like methodologies.

3.   The launch of the EBA-lite methodology for current account assessments in the fall of 2014 built on EBA and provided the first extension of such approach for non-EBA countries. The updated Guidance Note for Surveillance Under Article IV Consultations (IMF 2015a) supported this new methodology. The Article IV Guidance Note encourages all non-EBA countries to use EBA-lite where it is appropriate as it can help identify domestic (and foreign) policy contributions to external imbalances and it also represents a common methodological basis. In summer 2015, the real exchange rate index model and the external sustainability approach were added to the EBA-lite framework. Staff will continue to update and refine EBA-lite as improvements to EBA are rolled out.

4.   This note serves as a reference for the EBA-lite methodology. It provides: (i) motivations for developing EBA-lite and guidance for its use; (ii) technical explanations of all three EBA-lite approaches; and (iii) suggestions on how to articulate staff assessments of the external sector informed by model results.

FROM CGER-BASED TO EBA-BASED METHODS

5.   The EBA methodology was introduced in 2012 as a successor to the former CGER exercise. Both EBA and CGER methodologies include two regression-based models of current account and real exchange rate and one external sustainability approach. Compared to CGER, EBA makes a distinction between positive analysis of current account and real exchange rate and normative assessments, and emphasizes the roles of policies and policy distortions. EBA models include a broader set of fundamentals to have a better positive (descriptive) understanding of current account and real exchange rate; and differentiate policy variables from non-policy fundamentals to explicitly include policy gaps in normative assessments.

Why do we need EBA-Lite?

6.   Despite significant improvements introduced by the EBA methodology, a large number of countries are not covered and alternative approaches are outdated (Figure 1). Those countries without data limitations generally use CGER or modified CGER methodologies for external assessments. However, there are important reasons for a new approach for non-EBA countries:

- First, when modified CGER methodologies are used, country documents generally do not include detailed explanations or discussions about the modifications, which makes cross-country comparison difficult.

Figure 1. Country Coverage[1]

1/ Includes 188 IMF members, Hong Kong SAR, and euro area. EBA covers 49 economies plus euro area.

- Second, using CGER or modified CGER methodologies is not in line with EBA's improvements, such as the broader set of fundamentals and policy gap contributions. Moreover, using directly EBA's specification and coefficients may not be appropriate for non-EBA countries, as policies and other fundamentals could have different effects on current accounts and real exchange rates in countries outside of the EBA sample.

- Third, the CGER exercise was discontinued by RES and CGER coefficients were not updated. Therefore, external assessments directly using CGER would rely on "old" coefficients. The CGER-toolkit, a CGER-based analysis for non-CGER countries developed by the Strategy, Policy, and Review Department (SPR), was also discontinued in April 2015.
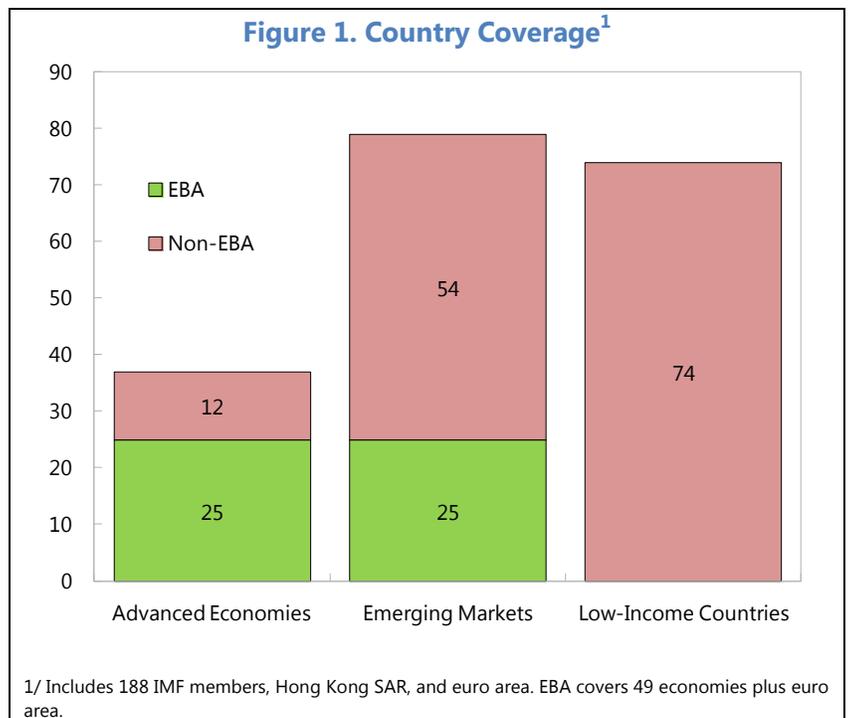
7. EBA-lite extends the EBA methodology to a larger group of countries, adapting the set of fundamentals. Similar to EBA, EBA-lite emphasizes the need to identify and discuss the contribution of policies to external imbalances, and the need of staff's judgment to interpret model residuals. The EBA-lite sample includes a broader set of emerging markets and low-income countries (about 150 countries including EBA countries, see Annex I). The key policy variables remain the fiscal balance and foreign exchange (FX) intervention. The main differences of EBA-lite compared with EBA are the exclusion of public health spending (data limitations) and inclusion of aid and remittances. Aid and remittances are important external financing sources for many emerging markets and low-income countries, but are not well explained by the fundamentals in existing EBA models. Including aid and remittances in EBA-lite models significantly improves the fit. The main contribution of EBA-lite methodology is ensuring cross-country consistency and facilitating cross-country comparison. The ESR exercise ensures the multilateral consistency on external sector assessments and covers more than 85 percent of world GDP; therefore, EBA-lite focuses on the cross-consistency of assessments for the remaining countries with sufficient data.

When and how to use EBA-lite?

8. Building on EBA's conceptual innovations, EBA-lite superseded the discontinued CGER-based methodologies. The Article IV Guidance Note encourages all non-EBA countries to use EBA-lite, but also allows countries with special circumstances (such as financial centers and countries dependent on large aid/remittance inflows, commodity exports, or tourism) to use other relevant methods and information.[1] Compared with the CGER-based methodologies, EBA-lite includes a large set of fundamentals from EBA models and improves model fit, especially for many emerging markets. When EBA-lite models do not provide good fit for some countries, country teams could consider adjustments (see Section B of Staff Assessment) or other quantitative approaches.[2] For countries not in the EBA-lite sample due to missing data, country teams can try to fill the data gaps or use other quantitative indicators, such as the path of the REER, purchasing power parity estimates, export and import trade shares, or structural competitiveness indicators. Countries with serious data limitations could also use qualitative information, as suggested in the Article IV Guidance Note.

9. Excel-based templates have been developed for the three EBA-lite approaches to facilitate the use of EBA-lite. These templates will be updated following WEO updates. The templates provide charts and tables to facilitate the analysis of current account, real exchange rate, and external balance sheets. All model results only provide inputs for external sector assessments,

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[1] The Article IV Guidance Note requires using and reporting EBA results for countries in the ESR (except Hong Kong SAR, Saudi Arabia, and Singapore which are non-EBA countries) and strongly recommends using and reporting EBA results for countries in the EBA but not ESR. However, if other methods (such as EBA-lite) are deemed more suitable for a particular non-ESR EBA country, country teams can base their assessment on these results in consultation with RES and SPR.

[2] See IMF (2014a) for alternative methods for countries in special circumstances.

and team's judgment remains the key of the bottom line assessments (see Section C of Staff Assessment). The next section will explain the details of the three EBA-lite approaches.

THE EBA-LITE METHODOLOGY

10.   **The EBA-lite methodology, at this stage, includes three approaches: current account model, real exchange rate model, and external sustainability approach**. The current account and real exchange rate models are based on two panel regressions of current account and real exchange rate respectively. They provide estimated current account and exchange rate "norms," which are values consistent with fundamentals and desirable policies.[3] External gaps are assessed by the difference between the actual current account and real exchange rate and their corresponding norms. The external sustainability approach calculates a current account norm that would stabilize the net foreign asset (NFA) position at some benchmark level. Country teams generally use the latest NFA observation as the benchmark level. EBA-lite provides more tools to analyze whether the current NFA level is sustainable and help country teams find a sustainable benchmark level.

11.   **Following the EBA methodology, the two regression-based approaches in EBA-lite have important conceptual differences with the CGER-based methodologies (Table 1)**.

- **Time frame for evaluation**. The CGER-based methodology evaluated current account and real exchange rate gaps for the medium term; the regression models were estimated using 4-year averages to eliminate cyclical factors. EBA-lite assesses the current account and real exchange rate gaps for the current year; the models use annual data and control for cyclicality.

- **Fundamentals**. EBA-lite separates fundamentals into policy variables, non-policy fundamentals, and cyclical variables, while the CGER-based methodology did not make such differentiation.

- **Norms and gaps**. Under EBA-lite, the norms are evaluated at desirable/appropriate policy levels and current levels of non-policy fundamentals. The external gaps include policy gaps, exchange rate misalignment, and possible structural gaps.[4] However, the norms in the CGER-based methodology were calculated using medium-term values (i.e. both policy and non-policy fundamentals were assumed at their desirable levels) and therefore the external gaps only included exchange rate gaps.[5]

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[3] The real exchange rate "norm" in EBA-lite should not be viewed as the equilibrium real exchange rate as perceived under the CGER methodology.

[4] In some cases, structural gaps not captured by the models are left in the residuals (see Section B of Staff Assessment).

[5] Although not defined in the CGER methodology, the "desirable" levels, referring to medium-term values, are used to clarify the differences between EBA-lite and CGER-based methodologies.

	EBA-lite	**CGER-based**
Country coverage	about 150 economies (including EBA countries)	about 150 economies (including CGER countries)
Data	annual data	4-year averages
Right-hand-side variables	cyclical factors, policy variables, and non-policy fundamentals; a broader set of fundamentals	fundamentals (not differentiating policy and non-policy variables)
Norms	fitted values using current fundamentals and desirable policy levels	fitted values using medium-term fundamentals
External gaps	including policy gaps, exchange rate misalignment, and (possibly) structural gaps	including exchange rate misalignment

Table 1. EBA-lite vs. CGER-based Methodologies
Current account and real exchange rate models

12. **The current account and real exchange rate models consist of both a positive analysis and a normative evaluation**. The positive analysis focuses on regression models, seeking good understanding of current account and real exchange rate developments through the estimation of panel regressions. The normative evaluation draws on country team's judgment on the appropriate or "desirable" policy levels and then estimates the contributions of "policy gaps" (the differences between the actual and desirable policy levels) to current account and real exchange rate gaps. Country team's judgment goes beyond the normative evaluation and plays an important role at different stages of external assessments, including evaluating model fit, comparing quantitative results from different models, and forming the bottom line assessments. This section focuses on the positive analysis of the current account and real exchange rate models and leaves the normative evaluation to the next section, which will also discuss the role of staff's judgment in other stages of external assessments.

A. The Current Account Model

The framework

13. **The current account (CA) panel regression model (Equation 1) includes variables affecting saving and investment behavior**.

$$CA = CA\left(P, X_f, X_c\right) \tag{1}$$

where
CA = current account balance in percent of GDP;
P = policy variables, which include fiscal balance, FX intervention, private credit, and capital controls;
X_f = non-policy fundamentals, which include NFA, productivity, oil and gas exports, demographic indicators, real GDP growth forecast, country risk, financial center, aid, and remittances; and
X_c = cyclical factors, which include output gap and terms of trade.

- **Variables** are grouped into three categories: policy variables, non-policy fundamentals, and cyclical factors. Policy variables can be directly affected by policy actions; non-policy fundamentals are generally slow-moving in the absence of significant structural reforms; and cyclical factors capture the cyclical component in the current account.

- **The dataset includes 150 economies** (35 advanced countries, 70 emerging markets, and 45 low-income countries) and covers the period from 1995 to 2013. The description of data sources and variable construction can be found in the EBA-lite template for current account model.

- **The model is estimated** using two-stage GMM, correcting autocorrelation and heteroskedasticity in standard errors. **Instrumental variables** are used to address the endogeneity of fiscal balance and change in reserves. **No country fixed effects** are included in the model.

- **The estimation results** are generally consistent with economic theory, and most coefficients are statistically significant. Annex II shows the estimated coefficients and explains the economic intuition behind each independent variable. Two policy variables—fiscal balance and change in reserves—show the largest contributions to the fitted values of CA balances for many countries. In addition, the

Table 2. Summary Statistics of CA Models			
	CGER-based	**EBA-lite**	**EBA**
Country	147	150	49
Sample SE	0.10	0.09	0.05
R-squared	0.36	0.45	0.53
RMSE	0.08	0.07	0.03

  coefficients of these two policy variables are larger than those in the EBA model, which is consistent with the economic theory that for countries with less developed/liberalized capital markets, the correlation between fiscal and CA balances is larger and FX intervention has stronger impact on the CA balance. Compared with CGER-based methodologies, the EBA-lite current account model improves the regression fit. The R-squared is improved from 0.36 in the CGER-based model to 0.45 in the EBA-lite CA model (Table 2). For many countries, the improvement of the regression fit is contributed by a larger coefficient on fiscal balance and the inclusion of change in reserves.

- **Larger standard errors**. The standard error (SE) of the CA in the EBA-lite sample is about two times of the SE in the EBA sample. If a country's CA balance shows larger SE than what can be explained by the model, these larger uncertainties should be considered when assessing the CA gap. The next section will discuss how to address uncertainties when evaluating model results.

Differences from EBA model

14.   Explanatory variables in the EBA-lite CA model are similar but not identical to those in the EBA CA model.

Excluded variables

- **Reserve currency status** is used in the EBA CA model as a proxy for the so-called "exorbitant privilege" of reserve currency countries. This variable does not have a significant effect on CA balance in the much broader EBA-lite sample.

- **Global capital market condition**, proxied by the VIX/VXO index, does not show significant impact on CA balance in the EBA-lite model. Similar to the reserve currency status, the global capital market condition indicator neither has a significant coefficient nor improves the regression fit.

- **Public health spending**, one of the policy variables in the EBA model, is not included in the EBA-lite model due principally to data limitations. The data on public health spending is only available up to 2010 with long delays on data updates. Although this variable is significant, it does not have a large contribution to the fitted values for most of the non-EBA countries. Other coefficients do not change significantly with the inclusion or exclusion of public health spending in the model.

Additional variables

- **Aid and remittances**, not in the original EBA model, are included in the EBA-lite CA model. The EBA CA model does not include indicators of external financing, with external financing flows expected to be captured by the fundamentals already in the model (such as productivity, growth potential, and country risk). For many emerging markets and low-income countries, aid and remittances are two important external financing sources but are difficult to capture by existing fundamentals. Including aid and remittance significantly improves the model fit.

B.   The Real Effective Exchange Rate Index Model

The framework

15.   The panel regression model for the real effective exchange rate (REER) index (Equation 2) includes variables that would affect the REER directly or indirectly, through changes to the CA balance.

$$IREER = IREER(P, X_f) \qquad\qquad (2)$$

where
$IREER$ = logarithm of the real effective exchange rate index from the INS database;
P = policy variables, which include FX intervention, short-term real interest rate, private credit, and capital controls;

X_f = non-policy fundamentals, which include NFA, productivity, financial home bias, terms of trade, trade openness, output gap, aid, and remittances.

- **Variables** include policy and non-policy fundamentals. The variables from the CA model are included if they are statistically significant. The short-term interest rate is included to proxy for the effect of monetary policy on the exchange rate. Additional non-policy fundamentals include a financial home bias indicator and terms of trade. REER data are normalized to 100 in 2010, therefore REER are not comparable across countries and country fixed effects are needed.

- **The dataset includes 141 economies** (35 advanced countries, 63 emerging markets, and 43 low-income countries) and covers the period from 1995 to 2013. The description of data sources and variable construction can be found in the EBA-lite template for REER index model.

- **The model is estimated** using two-stage GMM, correcting autocorrelation and heteroskedasticity in standard errors, and **including country fixed effects**. The fixed effects may mute some sustained distortions in REER, but the model can still provide an indication of whether distortions are increasing or decreasing over time for a particular country. **Instrumental variables** are used to address the endogeneity of change in reserves.

- **The estimation results** are generally consistent with economic theory but coefficients on some fundamentals in the CA model (such as demographic indicators) are not statistically significant in the fixed effects regression. Annex III shows the regression results and discusses the economic intuitions behind each explanatory variable. Change in reserves remains the most important policy variable in the model. Fiscal policy does not show a statistically significant impact on REER, which might be due to the inclusion of country fixed effects and the correlation between fiscal policy and other independent variables in the model.[6] Since both EBA-lite and CGER-based methodologies include country fixed effects, the EBA-lite model only improves the regression fit slightly (Table 3). However, the new policy variable, change in reserves, contributes to some improvement of model fit for many countries. Compared with EBA, the EBA-lite model has a larger sample SE, and confidence intervals should be considered when interpreting the results.

Table 3. Summary Statistics of REER Index Models

	CGER-based	EBA-lite	EBA
Country	163	141	40
Sample SE	0.26	0.18	0.13
R-squared	0.46	0.54	0.61
RMSE	0.19	0.12	0.08

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[6] Government spending shows significant impact on REER in the CGER-based model but not in the EBA-lite model. The EBA-lite REER index model includes more fundamentals (including policy variables) than the CGER-based model.

Differences from EBA model

16.   Similar to the EBA-lite CA model, the REER index model includes aid and remittances and drops some variables from the EBA model that are not statistically significant. The coefficients on currency's share in world reserves and global financial conditions, proxied by the VIX/VXO index, remain insignificant. Public health spending, medium-term GDP growth forecast, and population growth no longer have significant impact on REER and are dropped from the model. NFA in the EBA-lite sample shows more variations than that in the EBA sample and has a significant coefficient even with fixed effects. As noted by the EBA paper (Phillips et al., 2013), including both short-term interest rate and output gap could complicate interpretation of results since interest rate adjustments tend to be linked to the output gap. In practice, the output gap is included as it affects other coefficients and is significant, which may reflect weak correlation between monetary policy and output gap in many non-EBA countries.

C.   The External Sustainability Approach

17.   The EBA-lite external sustainability (ES) approach extends the CGER/EBA ES approach with more tools on sustainability analysis.[7] The existing ES approach compares projected medium-term CA with the CA level that stabilizes the external position (i.e., NFA) at a specified benchmark level. However, this approach does not identify a sustainable or optimal level of NFA, nor does it suggest the required adjustment to bring the external position to the optimal level. In practice, many country teams tend to use the actual NFA as the benchmark level. When a country has very high net external liabilities, such external position may not be consistent with external sustainability. On the other hand, the CA norm may be too high when countries have positive net external assets. The new ES approach provides tools to analyze external balance sheets and suggests adjustment paths to bring the external position to a more sustainable level when high external imbalance poses challenges to external sustainability.

Sustainability of external balance position

18.   External sustainability should be the first question for country teams to address in external assessments. For countries with major concerns about external sustainability, the need for future adjustment should be a key issue in the external assessment. For other countries, it would be useful to establish upfront that sustainability currently is not a major concern, so that the overall assessment can be more focused on other possible distortions influencing the current account and real exchange rate.

19.   Whether an external position and its short-term trend require further current account adjustments relies on more detailed analysis of external balance sheets. The ESR individual economy assessments (ESR country pages, IMF 2015c) are best practice on how external positions

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[7] The EBA uses the same ES approach as CGER.

should be assessed and discussed. ESR country pages include discussions on recent trends in NFA (including both gross and net positions), its projected medium-term path as implied by the team's CA projections; and its composition by instrument and by sector. The EBA-lite template for the ES approach includes pre-generated charts on NFA trends and decompositions.[8]

20.   High external imbalances can raise concerns about external sustainability, but there is no consensus on the NFA threshold. Catão and Milesi-Ferretti (2014) study whether the level and composition of NFA explain external crises, including external defaults and debt rescheduling events as well as events associated with large IMF financial support. They employ the receiver operating characteristic (ROC) analysis to identify thresholds beyond which a further buildup of external liabilities would sharply raise the risk of external crises. The new ES approach provides "predicted" crisis probabilities based on two Probit models estimated by this paper and compares them with the estimated thresholds to indicate whether the current external position might be associated with high risk of external crises. When the ES approach results show high risk for external sustainability, country teams can use this methodology to assess what level/composition of the external position can help reduce risks.

Adjustment to sustainable external position

21.   When the current NFA position indicates a high risk on external sustainability, a current account correction would be needed to bring the external position to a sustainable level. The EBA-lite template for the ES approach provides four different scenarios (the template includes calculation details for each scenario). Figure 2 presents a generic example of a projected NFA deterioration under the baseline scenario (under WEO CA projections) and four alternative scenarios of CA adjustments to stabilize or reduce the external liabilities.

Figure 2. NFA Actual and Projected – An Example
(in percent of GDP)
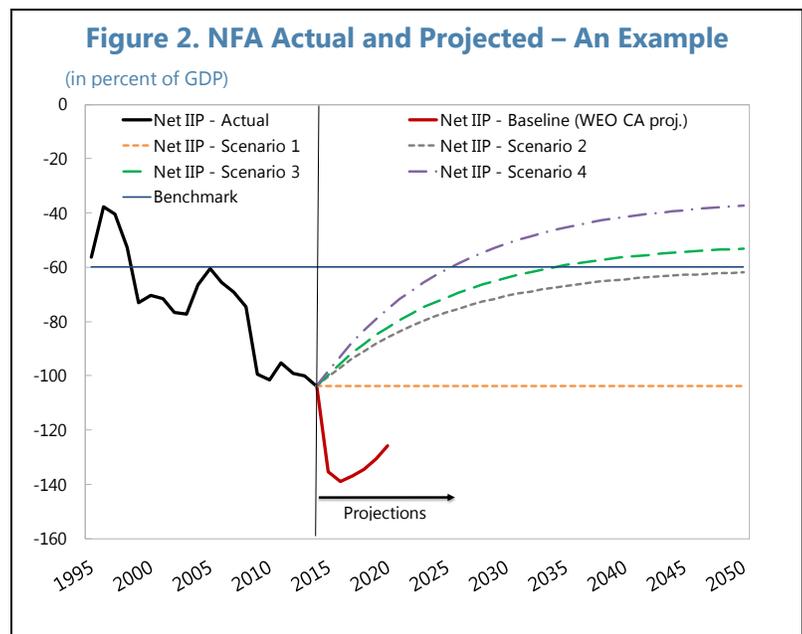
- **Scenario 1: stabilize NFA at the latest level**. When the current account balance is equal to this CA norm, the external position will remain at its current level. This scenario would be appropriate when external sustainability is not an issue for the country.

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[8] The EBA-lite template for the ES approach uses the updated and extended "External Wealth of Nations" dataset constructed by Lane and Milesi-Ferretti (2007).

- **Scenario 2: stabilize NFA at a lower level**. When the current external position raises significant risks, a more sustainable NFA target would be needed. Under this scenario, it may take a long time for the external position to reach a sustainable level, even when the CA balance reaches this norm immediately.

- **Scenario 3: stabilize NFA at a target level within a chosen horizon**. This scenario allows a simultaneous analysis of both the target NFA level and the number of years needed to reach the target. Compared with the previous scenario, this scenario requires a higher CA norm for the external position to reach the target level within a shorter period of time.

- **Scenario 4: project NFA path for other CA norms**. This scenario helps assess the NFA path for the CA under other norms (e.g., EBA-lite CA model).

STAFF ASSESSMENT

22.   Staff judgment is essential to move from positive analysis to normative evaluation and staff assessment. The Article IV guidance note explicitly states that the external sector assessment should draw on all pertinent information and quantitative estimates could help inform the assessment but a mechanical application should be avoided. Provided that ES is not an overriding consideration, this section discusses the three steps involved, from quantitative results to staff's bottom line assessment: (i) how to calculate the current account and exchange rate norms, i.e. the levels of CA and REER that are in line with fundamentals and desirable policy settings; (ii) how to adjust the standard model results to accommodate country-specific factors while ensuring cross-country comparability, transparency, and evenhandedness; and (iii) how to bring all the information together to reach a bottom line assessment. The last part of this section restates the guidelines on external sector assessments in the Article IV Guidance Note.

A. Normative Assessment

23.   The normative assessment centers on whether the current account and the real exchange rate deviate from their norms and the extent to which policy distortions contribute to such gaps. This section illustrates key assessment definitions for the current account (Figure 3), with those for the assessment of the real effective exchange rate being analogous.

- **The CA norm** is the level of current account that is in line with fundamentals and desirable policy levels (Equation 3).

$$CA\,norm = \hat{\alpha} + \hat{\beta} \cdot X_c + \hat{\gamma} \cdot X_f + \hat{\delta} \cdot P^* \qquad (3)$$

   where P^* are the desirable values for policy variables, X_c and X_f are current levels of cyclical variables and non-policy fundamentals, and all Greek letters with hats are estimated coefficients.

- **The CA gap** is defined as the difference between actual current account and its norm. The gap is also equal to the sum of the regression residual and the contribution of policy gaps (Equation 4).

This formula explicitly describes how policy gaps contribute to CA gap. The residual in the CA gap represents other distortions that affect the external sector, including exchange rate misalignment and infrastructure gaps. The policy gaps include both domestic policy gaps and world policy gaps as policy variables are constructed as differences between domestic policy levels and their world averages (Equation 5).

$$
\begin{aligned}
CA\ gap &= CA - CA\ norm \\
&= \hat{\alpha} + \hat{\beta} \cdot X_c + \hat{\gamma} \cdot X_f + \hat{\delta} \cdot P + residual - CA\ norm \\
&= residual + \hat{\delta} \cdot (P - P^*) \\
&= residual + contribution\ of\ policy\ gaps
\end{aligned}
\tag{4}
$$

$$
\begin{aligned}
P - P^* &= (P_{dom} - P_{wld}) - (P^*_{dom} - P^*_{wld}) \\
&= (P_{dom} - P^*_{dom}) - (P_{wld} - P^*_{wld}) \\
&= domestic\ policy\ gaps - world\ policy\ gaps
\end{aligned}
\tag{5}
$$

24.   Desirable policies are the country team's judgment based on general guidelines. These guidelines are consistent with those in the EBA paper, tailored to specific considerations for non-EBA countries. There are five policy variables in the CA and REER index models: cyclically-adjusted fiscal balance (fiscal policy), change in reserves (FX intervention), private credit (financial policy), short-term interest rate (monetary policy), and capital controls.

Figure 3. CA Actual, Fitted, and Norm – An Example
(in percent of GDP)

- **Cyclically-adjusted fiscal balance**. The desirable level should be staff's recommended medium-term fiscal balance, when the economy is in full employment.[9]

- **Change in reserves**. The desirable value should be zero when reserves are at or above the adequate levels. This P* could also be positive when teams recommend further reserve accumulation, including for countries with Fund-supported programs.

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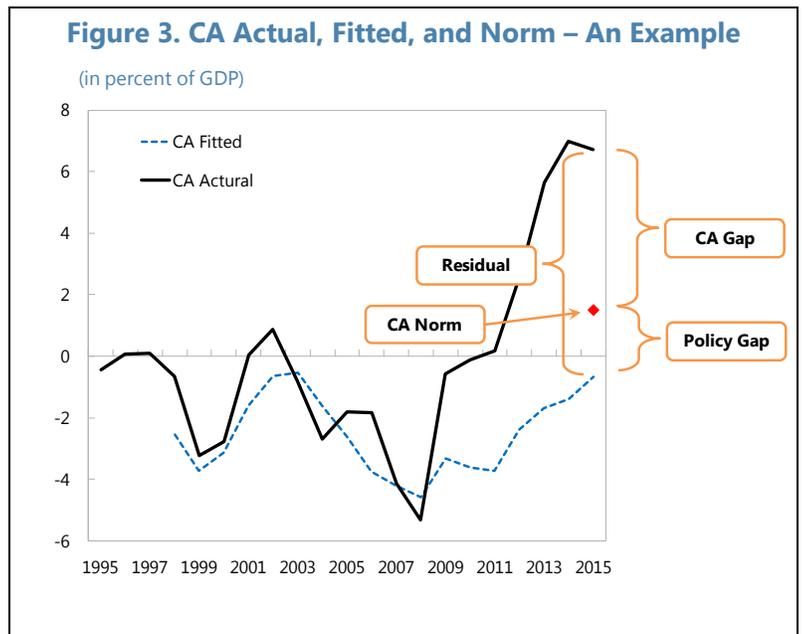
[9] To determine the fiscal gap when a cyclically-adjusted fiscal balance is not available, staff can try to estimate it using a simple regression analysis of the fiscal balance and the output gap. However, this approach may be difficult when output gap estimates are not reliable. In these cases country teams can use alternative adjustments to the fiscal balance to control for cyclical considerations. The EBA-lite CA model results remain robust when the cyclically-adjusted fiscal balance is replaced with the actual fiscal balance for all low-income countries in the sample.

- **Private credit**. Staff can specify a desirable value lower than the current level if they see a case of financial excess, which can be driven by inappropriate financial policies. On the other hand, staff can specify a higher desirable value when they see scope for policies to advance financial deepening and credit growth. Country teams could use FinStats as an additional tool to assess developments of private credit over time and relative to other countries.

- **Short-term interest rate**. The desirable value should be consistent with the country's inflation and output stabilization needs in the near term.

- **Capital controls**. The desirable value could be the cross-country average level of the control index, or a country's current level, whichever is smaller.[10] However, if a country is not ready for further capital account liberalization in the near future, the desirable value could be its current level which may be higher than the cross-country average.

B. Adjustments to Model Results

25.   In some cases the two EBA-lite models may not capture well country-specific circumstances, which would require adjustment of model results in four areas: (i) uncertainties; (ii) additional temporary factors; (iii) different effects of explanatory independent variables; and (iv) missing fundamentals. This section explains how standard model results could be adjusted based on the CA model. Adjustment to the REER index model results should be applied similarly.

- **Uncertainties**. To assess the extent to which a country's CA movements can be captured by the model, country teams can compare the SE of the CA both for the whole sample and for the selected country, the SE of country residuals, and the model's RMSE. Staff should evaluate whether the country has significantly higher CA volatility than the whole sample, and whether this high volatility can be explained by variables in the model or is in the residuals.[11] When a country has high CA volatility that cannot be explained by the model, teams could consider whether a wider range for the CA gap is appropriate.[12]

- **Temporary factors**. The EBA-lite model includes two variables to capture temporary components of the CA (the output gap and temporary terms of trade changes), but in some instances these may not capture other temporary phenomena or the estimated coefficients may be too small for some countries. For example, the contraction in investment/imports during and after crises/deep recessions is generally much larger than what can be explained by linear specifications for the output gaps. Country teams can try to estimate the size of temporary factors and adjust the CA gap accordingly.

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[10] The latest cross-country average level of the control index can be found in the EBA-lite templates for CA model and REER index model.

[11] The standard errors associated with estimated coefficients are included in the EBA-lite templates.

[12] The range of CA gaps for ESR countries is generally between 1 and 2 percent of GDP, but can be as wide as 6 percent of GDP for some financial centers and commodity exporters.

- **Different effects from explanatory variables**. The estimated coefficient for each independent variable represents the average impact on the CA for the broad country sample (conditional on all other variables). However, in some instances variables may have different impact for some specific set of countries. For example, the model finds a small negative effect of remittances on the CA because remittances would be expected to boost domestic demand for most countries. However, in some countries higher remittances could be associated with higher CA balances if households save a significant portion of the additional remittances. Country teams should assess how explanatory variables contribute to CA fitted values and whether these are consistent with countries' specific conditions.

- **Missing fundamentals**. The model includes CA fundamentals for which there are reliable data for a broad group of countries. However, there may be some other important CA fundamentals for some countries that are not included in the model. This could be due to either data limitations or lack of empirical evidence in a large group of countries. For example, a surge in imports largely financed by FDI related to newly identified natural resources may not be captured by the model. Adjustments for cyclical factors or missing fundamentals could be made, with explicit reference to the adjustment and clear explanation provided.

26.   Although ad-hoc adjustments to gaps can be made under the EBA-lite framework, changes to the EBA-lite regressions would require clear justification. Under the CGER-based framework, some country teams modified regression specifications by selecting specific country groups or sample periods, or adding/dropping explanatory variables. Country reports sometimes lacked explanation of such modifications which raised questions about accuracy, transparency and evenhandedness. To avoid such instances and allow country-specific adjustments, best practice would be to report standard and adjusted model results, explaining clearly the basis for such changes.[13] This approach would facilitate better understanding of CA dynamics and contributions from policies and fundamentals. Table 4 presents a useful template to clearly report EBA-lite results in such instances.

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[13] When country teams use their own estimated elasticities of current account to real exchange rate, they should also include a brief discussion of the methodology used.

Table 4. Reporting EBA-lite CA Model Results

Standard		Adjusted	
Actual CA	[a]	Actual CA	[a]
Cyclically adjusted CA	[b]=[a]-x	Cyclically adjusted CA (removing all temporary factors)	[b]=[a]-x-y
CA norm	[c]	CA norm	[c]
Cyclically adjusted CA norm	[d]=[c]-x	Cyclically adjusted CA norm (including all adjustments to the norm)	[d]=[c]-x-z
CA gap	[e]=[a]-[c] =[b]-[d]	CA gap	[e] = [b]-[d]
o/w Policy gap	[f]	o/w policy gap	[f]
Elasticity	[g]	Elasticity	[g]
REER gap	[h]=[e]/[g]	REER gap	[h]=[e]/[g]

x – contribution of output gap and terms of trade from the model
y – additional temporary factors
z – different effects from existing independent variables or missing fundamentals

27.   The thresholds suggested in the ES approach should also be assessed with due consideration of country-specific circumstances. The estimated thresholds are based on models capturing external crises in countries with market access. For countries without market access and with external liabilities largely on concessional terms, the risk of capital account stress/crises would be lower even when net external liabilities are higher than the thresholds.

C.   Staff Bottom Line Assessment

28.   The three EBA-lite approaches provide complementary perspectives for external sector assessments. Staff's bottom line assessment should draw from the three approaches with due consideration of country-specific circumstances. In general, the ES approach should be examined first and if large NFA imbalances pose a threat to external sustainability, external assessments should pay special consideration to the CA positions that would be needed to bring the NFA to a more sustainable level. If the ES approach does not raise concerns about external sustainability, external assessments can focus on the distortions that contribute to CA and REER gaps based on the EBA-lite models. When the CA and REER index models point to different conclusions, the CA model is often, but not always, more informative and reliable than the REER index model. As discussed in the EBA paper, the CA model takes full advantage of cross-country information. However, the CA model has limitations to analyze countries that are heavily dependent on exports of commodities and tourism income, and small financial centers. For such cases, external assessments may put more emphasis on the REER index model or other relevant models and indicators. The REER index model cannot provide meaningful comparison across countries, and has limitations when applied to countries with large structural changes or with short data spans. When reporting staff external assessments, CA and REER gaps should be consistent based on underlying elasticities.[14] Country teams can provide

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[14] A CA gap could be converted to a REER gap using the relevant elasticity, which can be approximated by the response of trade balances to the REER. EBA-lite uses the elasticities estimated by CGER (i.e., export and import

(continued)

ranges for the CA and REER gaps to accommodate uncertainties in quantitative assessments, but should avoid averaging results from three approaches and instead use broad ranges covering all three results when the three approaches do not provide consistent results.

29.   **External assessments in special cases could be complemented with other quantitative methodologies or indicators**. IMF (2014a) found that in most instances, adjustments to standard methodologies were done for countries with concentrated sources of external income (i.e., commodity exports, tourism, financial services, aid flows, and remittances), and these modifications were generally based on specific analytical methods. The development of EBA-lite methodologies can help adapt methodologies for countries with special circumstances. When non-standard methodologies are used, clear explanation of such customization should be provided. For countries with serious data limitations, the external assessment may necessitate relying on other quantitative indicators and qualitative information.

30.   **Staff's judgment remains essential to form bottom line external assessments**. The bottom line assessment should draw on all pertinent information, evaluate strengths and limitations of various quantitative models, and consider country-specific factors. External sector assessments need to be informed by country-specific factors which are generally difficult to incorporate into empirical models with large cross-country data sets, although various empirical studies do provide useful and complementary information. Issues such as data reliability and structural changes create further challenges for model results. It is therefore key to avoid a mechanistic approach to external assessments.

D.   Coverage of the External Sector Assessment

31.   **The Article IV Guidance Note requires that external sector assessments go beyond the exchange rate and exchange rate policy to cover five key areas of the external sector**:
(i) external balance sheets, (ii) current accounts, (iii) real exchange rates, (iv) capital flows and policy measures, and (v) foreign exchange intervention and reserve levels. In some cases, even if the current account and real exchange rate do not raise concerns, developments in the other key areas of the external sector (external balance sheets, capital flows, and reserves) could affect domestic and balance of payments (BOP) stability. When countries do not have detailed data on external balance sheets, the status and development of external debt could be discussed briefly. In addition, explicit reference to data shortcomings should be made. Any changes in policy measures on capital flows should be discussed. Other competitiveness or structural issues that are important for the external sector should also be discussed. For some emerging markets, it would also be important to indicate whether BOP instability could generate regional or global instability.

32.   **Drawing from a broad range of perspectives, staff should provide a clear bottom line assessment of the external position and related policy recommendations**. The bottom line

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volume elasticities of -0.71 and 0.92 respectively), but allows the use of different elasticities based on recent developments and country-specific circumstances. Such adjustments should be clearly explained.

assessment should be included in the staff appraisal. If the bottom line assessment differs significantly from quantitative results, staff should indicate this clearly in the staff report and explain the basis for their assessment and the nature of the difference. Policy recommendations should be consistent with the analysis in other areas (e.g., fiscal and monetary policy). Ideally, the bottom line assessment and policy recommendations could be summarized at the beginning of the external sector assessment (box or annex).

33. **ESR country pages provide a good framework for conducting external assessments**. Although such format is not required, it serves as an effective communication device for presenting staff assessments and supporting information. For the ESR, the overall external assessments are conducted following a standard classification of external positions (Table 5); for those cases individual country pages also discuss key policy recommendations associated with the external assessment. For EBA-lite countries, the assessment of external positions could follow the ESR guidance, with due consideration for country-specific uncertainties.

Table 5. ESR Classification of the Overall Assessments

CA gap	REER gap (using elasticity at -0.2)	Description in overall assessment
> 4%	< -20%	… substantially stronger…
[2%, 4%]	[-20%, -10%]	… stronger …
[1%, 2%]	[-10%, -5%]	… moderately stronger …
[-1%, 1%]	[-5%, 5%]	The **external position** is **broadly consistent** with fundamentals and desirable policy settings.
[-2%, -1%]	[5%, 10%]	… moderately weaker …
[-4%, -2%]	[10%, 20%]	… weaker …
< -4%	>20%	… substantially weaker …

Annex I. Countries in ESR, EBA, and EBA-lite

Afghanistan				Congo, Republic of			EBA-lite
Albania			EBA-lite	Costa Rica		EBA[1]	EBA-lite
Algeria			EBA-lite	Côte d'Ivoire			EBA-lite
Angola			EBA-lite	Croatia			EBA-lite
Antigua and Barbuda			EBA-lite	Cyprus			EBA-lite
Argentina		EBA[1]	EBA-lite[2]	Czech Republic		EBA	EBA-lite
Armenia			EBA-lite	Denmark		EBA	EBA-lite
Australia	ESR	EBA	EBA-lite	Djibouti			
Austria		EBA	EBA-lite	Dominica			
Azerbaijan			EBA-lite	Dominican Republic			EBA-lite
Bahamas				Ecuador			EBA-lite
Bahrain			EBA-lite	Egypt		EBA[1]	EBA-lite
Bangladesh			EBA-lite	El Salvador			EBA-lite[2]
Barbados			EBA-lite	Equatorial Guinea			EBA-lite[3]
Belarus			EBA-lite	Eritrea			
Belgium	ESR	EBA	EBA-lite	Estonia			EBA-lite
Belize			EBA-lite	Ethiopia			EBA-lite
Benin			EBA-lite[3]	Euro Area	ESR		
Bhutan				Fiji			EBA-lite
Bolivia			EBA-lite	Finland		EBA	EBA-lite
Bosnia and Herzegovina			EBA-lite[2]	France	ESR	EBA	EBA-lite
Botswana			EBA-lite	Gabon			EBA-lite
Brazil	ESR	EBA	EBA-lite	Gambia			EBA-lite
Brunei Darussalam				Georgia			EBA-lite
Bulgaria			EBA-lite	Germany	ESR	EBA	EBA-lite
Burkina Faso			EBA-lite	Ghana			EBA-lite
Burundi			EBA-lite[3]	Greece		EBA	EBA-lite
Cambodia				Grenada			EBA-lite
Cameroon			EBA-lite	Guatemala		EBA[1]	EBA-lite[2]
Canada	ESR	EBA	EBA-lite	Guinea			EBA-lite
Cape Verde			EBA-lite	Guinea-Bissau			EBA-lite
Central African Republic				Guyana			EBA-lite
Chad				Haiti			EBA-lite[2]
Chile		EBA	EBA-lite	Honduras			EBA-lite
China	ESR	EBA	EBA-lite	Hong Kong SAR	ESR		EBA-lite
Colombia		EBA	EBA-lite	Hungary		EBA	EBA-lite
Comoros				Iceland			EBA-lite
Congo, Democratic Republic of the			EBA-lite[2]	India	ESR	EBA	EBA-lite

Country	ESR	EBA	EBA-lite	Country	ESR	EBA	EBA-lite
Indonesia	ESR	EBA	EBA-lite	Mozambique			EBA-lite
Iran				Myanmar			EBA-lite
Iraq				Namibia			EBA-lite
Ireland		EBA	EBA-lite	Nepal			EBA-lite[3]
Israel		EBA[1]	EBA-lite	Netherlands	ESR	EBA	EBA-lite
Italy	ESR	EBA	EBA-lite	New Zealand		EBA	EBA-lite
Jamaica			EBA-lite[2]	Nicaragua			EBA-lite[2]
Japan	ESR	EBA	EBA-lite	Niger			EBA-lite
Jordan			EBA-lite	Nigeria			EBA-lite
Kazakhstan			EBA-lite	Norway		EBA	EBA-lite
Kenya			EBA-lite	Oman			EBA-lite
Kiribati				Pakistan		EBA	EBA-lite
Korea	ESR	EBA	EBA-lite	Palau			
Kosovo				Panama			EBA-lite[2]
Kuwait			EBA-lite	Papua New Guinea			EBA-lite
Kyrgyz Republic			EBA-lite[2]	Paraguay			EBA-lite
Lao, People's Democratic Republic			EBA-lite[3]	Peru		EBA	EBA-lite
Latvia			EBA-lite	Philippines		EBA	EBA-lite
Lebanon			EBA-lite	Poland	ESR	EBA	EBA-lite
Lesotho			EBA-lite[3]	Portugal		EBA	EBA-lite
Liberia			EBA-lite[2]	Qatar			EBA-lite
Libya			EBA-lite	Romania			EBA-lite
Lithuania			EBA-lite	Russian Federation	ESR	EBA	EBA-lite
Luxembourg			EBA-lite	Rwanda			EBA-lite
Macedonia			EBA-lite	Samoa			
Madagascar			EBA-lite[2]	San Marino			
Malawi			EBA-lite	São Tomé and Príncipe			EBA-lite[3]
Malaysia	ESR	EBA	EBA-lite	Saudi Arabia	ESR		EBA-lite
Maldives			EBA-lite[3]	Senegal			EBA-lite
Mali			EBA-lite	Serbia			EBA-lite
Malta			EBA-lite	Seychelles			EBA-lite
Marshall Islands				Sierra Leone			EBA-lite[2]
Mauritania				Singapore	ESR		EBA-lite
Mauritius			EBA-lite	Slovak Republic			EBA-lite
Mexico	ESR	EBA	EBA-lite	Slovenia			EBA-lite
Micronesia				Solomon Islands			EBA-lite[2]
Moldova			EBA-lite	Somalia			
Mongolia			EBA-lite	South Africa	ESR	EBA	EBA-lite
Montenegro				South Sudan			
Morocco		EBA[1]	EBA-lite	Spain	ESR	EBA	EBA-lite

Sri Lanka		EBA[1]	EBA-lite	Tunisia		EBA[1]	EBA-lite
St. Kitts and Nevis				Turkey	ESR	EBA	EBA-lite
St. Lucia			EBA-lite	Turkmenistan			EBA-lite[2]
St. Vincent and the Grenadines			EBA-lite	Tuvalu			
Sudan			EBA-lite[2]	Uganda			EBA-lite
Suriname			EBA-lite[2]	Ukraine			EBA-lite
Swaziland			EBA-lite	United Arab Emirates			EBA-lite
Sweden	ESR	EBA	EBA-lite	United Kingdom	ESR	EBA	EBA-lite
Switzerland	ESR	EBA	EBA-lite	United States	ESR	EBA	EBA-lite
Syrian Arab Republic			EBA-lite	Uruguay		EBA[1]	EBA-lite
Tajikistan			EBA-lite	Uzbekistan			
Tanzania			EBA-lite	Vanuatu			EBA-lite[3]
Thailand	ESR	EBA	EBA-lite	Venezuela			EBA-lite
Timor-Leste				Vietnam			
Togo			EBA-lite	Yemen			EBA-lite
Tonga			EBA-lite[2]	Zambia			EBA-lite
Trinidad and Tobago			EBA-lite	Zimbabwe			

[1] Countries are included in the EBA CA model but not in the REER index model.
[2] Countries are included in the EBA-lite CA model but not in the REER index model.
[3] Countries are included in the EBA-lite REER index model but not in the CA model.

Annex II. The EBA-lite CA Model

The EBA-lite CA template provides details of data sources for all variables as well as how they are constructed. This section shows the regression results (Table A1) and explains the economic intuition of the results.

Table A1. EBA-lite CA Model	
	Coefficient
Policy variables	
Cyclically Adjusted Fiscal Balance-instrumented #	0.527***
(Change in Reserves)/GDP* K controls-instrumented #	0.598***
Demeaned Private Credit/GDP #	-0.052***
Non-policy fundamentals	
L.NFA/Y	0.009***
L.Output per worker-relative to top 3 economies	0.103***
L.Relative output per worker*K openness	-0.034**
Oil and Natural Gas Trade Balance*resource temporariness #	0.031
Dependency Ratio #	-0.270***
Population Growth #	-0.496**
Dependency Ratio # * rel. Aging Speed	0.148***
Aging Speed # * rel. Dependency Ratio	0.161***
GDP Growth-forecast in 5 years #	-0.080
Safer Institutional/Political Environment (index) #	-0.048***
Dummy=1 if country is a financial center	0.041***
Aid/GDP #	-0.257***
Remittance/GDP #	-0.094***
Cyclical factors	
Output Gap #	-0.134**
Commodity ToTgap*Trade Openness	0.178***
Constant	-0.035***

* significant at 10%; ** significant at 5%; and *** significant at 1%.
"L." denotes one year lag.
Variables denoted with # are constructed related to a (GDP-weighted) country sample average, in each year.

Policy variables

Fiscal balance. The cyclically-adjusted fiscal balance (relative to its world average) is used and instrumented.[1] Empirical research finds that Ricardian Equivalence generally does not hold. When governments change their saving or investment, private sectors would not be able to fully absorb the changes, for example, due to liquidity constrains. Therefore, national saving and investment

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[1] The world averages are the GDP-weighted country sample averages.

would change as well as CA balance. In addition, countries with less developed capital markets would face stronger constrains, so the correlation between fiscal balance and CA would be stronger. Consistent with prediction, the model predicts that an increase in the relative fiscal balance by one percentage point would lead to about one-half percentage point of GDP increase in CA.

FX intervention. The change in reserves interacted with capital controls (relative to its world average) is used and instrumented. If capital accounts are not fully liberalized, a central bank's reserve accumulation through FX intervention would lead to exchange rate depreciation and improving CA. The model estimates that a two percentage point of GDP increase in reserves for a country with capital control index valued at 0.5 would lead to about 0.6 percentage point of GDP increase in CA.

Private credit. The deviation of private credit to GDP ratio from its country-specific mean (relative to its world average) is used. Excessive credit could boost domestic demand, worsen the CA, and appreciate the real exchange rate. However, measuring excessive credit is not easy. The model follows the EBA approach by using the deviation of a country's private credit to GDP ratio from its own historical average. This way of measuring financial excessiveness may not be appropriate for some emerging markets or low-income countries as their private credit would increase with financial deepening. Replacing this series with de-trended private credit to GDP ratio would give similar results; therefore, the model keeps the same specification as the EBA model. Other specifications will be explored during future EBA-lite updates. The estimated coefficient indicates that a 10 percentage point increase in relative private credit to GDP ratio would be associated with about 0.5 percentage point weakening in CA.

Capital controls. Based on empirical models, the degree of capital controls or openness does not directly affect a country's CA, but it has impact on how other policies and fundamentals would affect the current account. For example, with perfect capital mobility FX intervention would not have direct impact on the CA. But with a closed capital account (capital control index valued at 1), a one percentage point of GDP increase of relative reserve accumulation would lead to about 0.6 percentage point of GDP increase in CA. Another variable that is interacted with capital controls/openness is the productivity index, which will be discussed in the non-policy fundamentals section.

Non-policy fundamentals

NFA. The lagged NFA to GDP ratio is used. In theory, a country's NFA position would affect its CA in two ways. First, countries with higher NFA positions will receive higher income returns and higher CA balances. This channel predicts a positive correlation between NFA and CA. Second, countries with higher NFA positions can also afford to run larger current account deficits, and countries with higher net foreign liability (NFL) positions need to maintain higher CA balances to be able to repay their liabilities. This channel suggests a negative correlation between NFA and CA. The model finds a small positive coefficient on the lagged NFA position. The estimated result indicates a 10 percentage point of GDP increase in NFA would be associated with about 0.1 percentage point of GDP increase in CA balance.

The EBA CA model also allows for nonlinear effect of NFA on CA balance. It includes a second variable for NFA when its level is lower than negative 60 percent of GDP. This variable is to capture the transitional effect (part of the second channel), indicating that countries need to improve CA balances when their liabilities are too "high".[2] However, this channel is not significant in the EBA-lite sample. This could imply that there is no consensus among a broader group of countries that when a NFL position is higher than 60 percent of GDP it posts threat to external sustainability; therefore, countries need to maintain higher CA balances. This second variable of NFA is not included in the EBA-lite model.

Productivity. The lagged country's relative productivity level and its interaction with capital account openness are used. Countries with high productivity would lend to countries with low productivity for high returns; therefore, high productivity countries tend to have high CA balances. The level of capital account openness would affect whether capital can flow into low productivity countries. However, even with closed capital accounts, the positive correlation between productivity and CA may still exist given that high productivity in tradable sectors would be associated with high trade balances as well as high CA balances. If high productivity growth (from tradable sectors) leads to exchange rate appreciation, CA balances will be reduced. The model finds that an increase of the relative productivity level by 10 percentage points with an open capital account (capital control index valued at 0) would lead to about 0.7 percentage point of GDP increase in CA balance. With a closed capital account, the same increase in relative productivity would lead to about one percentage point of GDP increase in CA balance. This result indicates that countries with more liberalized capital accounts usually also have more flexible exchange rates, and therefore the Balassa-Samuelson effect dominates.

Oil and gas exports. The interaction of oil and gas trade surplus with resource temporariness is used. This variable estimates what portion of oil and gas income could be saved by an exporting country. The variable not only captures the surplus from oil and gas trade but also takes into consideration of the stage where a country is using their non-renewable natural resources (i.e., resource temporariness, measured by the ratio of production to proven reserve). The model finds that around two percent of oil and gas trade surplus is saved when a country's resource temporariness ratio is at 0.5.

Demographics. Population growth, old age dependency ratio, and aging speed are used. In theory, countries with higher shares of dependent population generally have lower savings and CA balances. Therefore, both higher population growth rates capturing larger shares of young population and higher dependence ratios capturing larger shares of old population are linked with lower CA balances. An "aging speed", a proxy for future old age dependency ratio, also affects national savings through interactions with current dependency ratio according to an overlapping

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[2] EBA model chooses a benchmark of 60 percent of GDP according to the work of Catão and Milesi-Ferretti (2014) in the context of analyzing crises probabilities.

generation (OLG) model (Diamond 1965). Two interaction terms are included in the model. First, a positive coefficient on the interaction of dependency ratio with relative aging speed suggests that given the same dependency ratio a country with higher aging speeding implies longer life expectancy and so higher savings. Second, a positive coefficient on the interaction of aging speed with relative dependency ratio indicates that given the increase in aging speed a higher level of dependency ratio would further increase national savings.

The model estimates that a one percentage point increase in dependency ratio or population growth (relative to its respective world average) would be associated with a lower CA balance by about 0.3 percentage point of GDP or 0.5 percentage point of GDP respectively. For an aging speed at about two times of world average, a one percentage point increase in dependency ratio (relative to its world average) would be associated with a higher CA balance by about 0.3 percentage point of GDP. For a dependency ratio at about two times of world average, a one percentage point increase in aging speed (relative to its world average) would be associated with a higher CA balance by about 0.3 percentage point of GDP.

Growth forecast. The medium-term real GDP growth projection is used. Countries with higher projected economic growth tend to receive more capital inflows on domestic investment and therefore, lower CA balances. The model estimates that an increase in medium-term growth projection by one percentage point would lead to a reduction in CA of 0.1 percentage point of GDP.

Country risk. The average of five indicators from International Country Risk Guide (ICRG) dataset is used. The five indicators are socioeconomic conditions, investment profile, corruption, religious tensions, and democratic accountability. Countries with higher averages of these indicators are assessed to have lower risks, so would have higher capital inflows and CA deficits. The model confirms this correlation, and estimates that a reduction of this risk indicator (relative to its world average) by one percentage point would be associated with a lower CA balance by 0.05 percentage point of GDP.

Financial center. Economies serving as hubs for international financial flows tend to have much higher CA surpluses. Ideally, macroeconomic fundamentals should be used to explain the higher CA balances in financial centers. However, empirical research in this area is still limited. To avoid potential bias in other coefficients, the financial center dummy is used here. An economy is defined as a financial center if it has relatively large FDI outflows and related income inflows.[3] Seven financial centers (Belgium, Hong Kong SAR, Netherlands, Singapore, Sweden, Switzerland, and United Kingdom) are currently included in our dataset. The model shows that a financial center, on average, has a CA balance about four percent of GDP higher than other countries. With more financial centers included in the dataset, the model finds a higher coefficient than that in the EBA model. This is mostly contributed by the inclusion of Hong Kong SAR and Singapore in our sample.

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[3] See IMF 2014a.

Aid. Aid as one kind of external financing could boost domestic demand, push up domestic prices, induce real appreciation of exchange rate, and lower CA balance. However, depending on the types of aid, it may improve relative productivity of tradable sectors (or non-tradable sectors), cause real appreciation (or depreciation), and reduce (or improve) CA balance. The aid flow used in our dataset includes both grants and concessional loans. The model finds a negative coefficient on aid (relative to its world average)—one percentage point of GDP increase in aid is associated with 0.3 percentage point of GDP reduction in CA balance.

Remittance. Similar to aid, remittance is another important external financing for many emerging markets and low-income countries. Countries with higher remittances can run larger trade deficits, and empirical literature generally finds net negative effects on CA balances. This model also finds a small negative coefficient on remittance (relative to its world average)—one percentage point of GDP increase in remittances is associated with 0.1 percentage point of GDP drop in CA balance.

Cyclical factors

Output gap. The output gap (relative to its world average) is used to capture the cyclical part in CA balance. A more positive output gap is typically associated with higher investment, stronger domestic demand, and lower CA balance. The model finds that an increase of relative output gap by one percentage point is associated with a lower CA balance by 0.1 percentage point of GDP.

Terms of trade. The detrended terms of trade of goods interacted with trade openness is also used to capture the cyclical component in CA balance. The model estimates that an increase in the terms of trade relative to its trend by one percentage point is associated with an increase in CA balance by 0.2 percentage point of GDP.

Annex III. The EBA-lite REER Index Model

The EBA-lite REER index model template provides details of data sources of all variables as well as how they are constructed. This section shows the regression results (Table A2) and explains the economic intuition behind each independent variable.

Table A2. EBA-lite REER Index Model	
	Coefficient
Policy variables	
Change in reserves/GDP X K Controls # (instrumented)	-1.169***
Real interest rate X K openness #	0.697***
Demeaned private credit/GDP #	0.101***
Non-policy fundamentals	
L.Output per worker-relative to top 3 economies	0.610***
L.Relative output per worker*K openness	-0.054
L.Financial home bias #	0.121***
Log Terms of Trade Goods - WEO	0.106***
L.Trade openness	-0.403***
L.NFA/GDP	0.030***
Output Gap #	0.200**
Aid/GDP #	-0.412***
Remittance/GDP #	0.156
* significant at 10%; ** significant at 5%; and *** significant at 1%.	
"L." denotes one year lag.	
Variables denoted with # are constructed related to a trading partner weighted average, in each year.	

Policy variables

FX intervention. The change in reserves interacted with capital controls (relative to its trading partner weighted average) is used and instrumented. In a country with capital controls, the central bank's reserve accumulation through FX intervention would lead to exchange rate depreciation. The model estimates that a two percentage point of GDP increase in reserves for a country with capital control index valued at 0.5 would lead to a depreciation of the REER by about 1.2 percent.

Interest rate. The short-term real interest rate interacted with capital account openness (relative to its trading partner weighted average) is used to capture the impact of monetary policy on the REER. A higher domestic interest rate would have higher capital inflows and more appreciated real exchange rates. Such impact would be affected by capital account openness in both source and receiving countries. The model estimates that a one percentage point increase in the relative real short-term interest rate would be associated with about 0.7 percent appreciation of the REER in countries with open capital accounts.

Private credit. The deviation of private credit to GDP ratio from its country-specific mean (relative to its trading partner weighted average) is used. Excessive credit would boost domestic demand, worsen the CA, and appreciate the real exchange rate. However, measuring excessive credit is not easy. We follow the EBA approach by using the deviation of a country's private credit to GDP ratio from its own historical average. This way of measuring financial excessiveness may not be appropriate for some emerging markets or low-income countries as their private credit would increase with financial deepening. Replacing this series with de-trended private credit to GDP ratio would give similar result; therefore, we keep the same specification as the EBA model. We will explore other specifications during future EBA-lite updates. The estimated coefficient indicates that a 10 percentage point increase in relative private credit to GDP ratio would be associated with about one percent appreciation of the REER.

Capital controls. Based on empirical models, the degree of capital controls or openness does not directly affect a country's CA or REER, but it has impact on how other policies and fundamentals would affect the current account and real exchange rate. For example, with perfect capital mobility FX intervention would not have direct impact on the real exchange rate. But with a close capital account, a one percentage point of GDP increase of relative reserve accumulation would lead to about 1.2 percent depreciation of the REER. Another variable that is interacted with capital controls/openness is the productivity index, which will be discussed in the non-policy fundamentals section.

Non-policy fundamentals

Productivity. The lagged country's relative productivity level and its interaction with capital account openness are used. According to the Balassa-Samuelson effect, countries with higher productivity (usually led by tradable sectors) would have more appreciated real exchange rates. On the other side, countries with lower productivity would attract more investment flows seeking higher returns; therefore, lower productivity countries tend to have higher capital inflows and more appreciated exchange rates. The level of capital account openness would affect whether capital can flow into low productivity countries. The model finds that an increase of the relative productivity level by 10 percentage points with an open capital account would lead to about 5 percent appreciation. But with a closed capital account, the same increase in relative productivity would lead to about 6 percent appreciation of the REER.

Financial home bias. The lagged share of domestic debt owned by residents is used. A greater preference for holding domestic assets tends to appreciate the REER. The model finds that a 10 percentage point increase in the relative financial home bias indicator would be associated with 1.2 percent appreciation of the REER.

Terms of trade. The logarithm of the terms of trade of goods is used. Countries with improving terms of trade would also have appreciating currencies. The model estimates that a 10 percent increase in the terms of trade would be associated with an appreciation of the real exchange rate by about 1 percent.

Trade openness. The average exports and imports to GDP ratio (relative to its trading partner weighted average) is used. This measure is a proxy of trade liberalization. Trade liberalization tends to lower domestic prices of tradable goods and depreciate local currencies. The model shows that an increase in relative trade openness by one percentage point of GDP would lead to about 0.4 percent depreciation of the REER.

NFA. The lagged NFA to GDP is used. The NFA indicator in EBA-lite CA model is kept in the REER index model. The estimated result shows that a 10 percentage point of GDP increase in NFA would be associated with about 0.3 percent appreciation of the REER.

Output gap. The output gap (relative to its trading partner weighted average) is used. A more positive output gap is typically associated with higher investment, stronger domestic demand, and a more appreciated currency. The model finds that an increase of relative output gap by one percentage point is associated with 0.2 percent appreciation of the REER.

Aid. Aid as one kind of external financing could boost domestic demand, push up domestic prices, and induce real appreciation of exchange rate. However, depending on the types of aid, it may improve relative productivity of tradable sectors (or non-tradable sectors), cause real appreciation (or depreciation). The aid flow using in our dataset includes both grants and concessional loans. The model finds a negative coefficient on aid. One percentage point of GDP increase in aid is associated with 0.4 percent depreciation of the REER.

Remittance. Similar to aid, remittance is another important external financing for many emerging markets and low-income countries. The model finds that one percentage point of GDP increase in inward remittance is associated with about 0.2 percent appreciation of the REER.

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