EBA-LITE 3.0 MODEL AND METHODOLOGY

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EBA-LITE 3.0 MODEL AND METHODOLOGY

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EXECUTIVE SUMMARY

The EBA-Lite methodology is a key input in external sector assessments for over three-quarters of IMF member countries, representing a broad set of emerging and low-income economies. External sector assessments are a core mandate of the Fund and are included in each Article IV staff report. The External Balance Assessment (EBA) Methodology was introduced in 2012 for systemic economies. Subsequently, the EBA-Lite methodology was introduced in 2015 to extend the rigorous assessment of external sectors to the full membership beyond the more systemic economies, in line with the recommendations of the 2014 Triennial Surveillance Review. The EBA and EBA-Lite methodologies are refined periodically to incorporate the latest available data, feedback from key stakeholders, advances in the academic literature as well as lessons learned from conducting external sector assessments in practice. Staff conducted reviews of the EBA-Lite methodology in 2018 and 2022, and this paper provides a detailed description of the current model (referred to as EBA-Lite 3.0).

This paper describes the refinements in EBA-Lite 3.0. There were three over-arching objectives: first, to further enhance the robustness of econometric model estimates; second, to maintain high-level conceptual consistency with the EBA models; and third, to ensure that there continues to be appropriate adaptations vis-à-vis the EBA models to help explain the implications for current account balances given the diverse characteristics of emerging and developing economies. The main refinements to the EBA-Lite current account (CA) and real effective exchange rate (REER) econometric models include data updates, refinements to the construction of some explanatory variables and improvements in the models' robustness. The operational guidance for other EBA-Lite tools (specifically, the External Sustainability model and the commodity modules) has also been updated, building on experience and insights from the use of these models in Fund surveillance.

Approved By
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With thanks to Shiyao (Alex) Wang and Alejandra Zegarra for excellent research assistance and to Anna Konopatskaya and Emelie Stewart for excellent editorial assistance.

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INTRODUCTION

1. The Fund has made ongoing efforts to enhance external sector assessments since the launch of the External Balance Assessment (EBA) methodology and External Sector Report (ESR) in 2012. The EBA provides a multilaterally consistent assessment of the largest economies' external sector positions and policies. However, the EBA models do not cover a large fraction of IMF members and following the recommendations of the 2014 Triennial Surveillance Review, the EBA-Lite models were developed in 2015 to extend the EBA methodology to the rest of the membership. Staff conducted the first review of the EBA-Lite methodology in 2018 updating and refining the models and introducing new modules (see IMF 2019). The latest refinement to the EBA methodology was in 2022, with the refinements to the EBA-Lite methodology undertaken in parallel (see Allen and others (2023) for a description of the EBA models).

2. This paper aims to provide a detailed discussion of the latest version of the EBA-Lite methodology, referred to as EBA-Lite 3.0, focusing on the updated econometric models. The EBA-Lite 3.0 models are similar to the earlier versions and also are designed to be consistent with the EBA models. Therefore, there is overlap with previous EBA and EBA-Lite papers, but the EBA-Lite operational guidance contained in this paper supersedes the previous papers. This paper highlights the refinements in EBA-Lite 3.0. There were three over-arching objectives: to further enhance the robustness of estimates; to maintain high level conceptual consistency between the EBA and EBA-Lite models; and to ensure appropriate adaptations to help explain the diverse characteristics of emerging and developing economies where the EBA-Lite models are primarily deployed in the IMF's external sector assessments. The main refinements to the EBA-Lite current account (CA) and real effective exchange rate (REER) econometric models were data updates; refinements to the construction of some explanatory variables; and improvements in models' robustness, including through the use of Bayesian Model Averaging (BMA). Operational guidance on the External Sustainability (ES) approach and commodity modules have also been updated.

3. The EBA-Lite models are a key input in the IMF's external sector assessments. As discussed in the 2022 Surveillance Guidance Note, Article IV staff reports include an assessment of the member's external position, providing a clear bottom-line assessment, which draws from a range of perspectives. The external sector assessment (ESA) should assess and discuss recent developments in five key areas: (i) the position and trajectory of foreign assets and liabilities, (ii) current accounts, (iii) real exchange rates, (iv) capital flows and policy measures, and (v) foreign exchange intervention and reserve levels. The bottom-line assessment must be consistent with the numerical inputs from the EBA and EBA-Lite models, as well as analytically grounded judgment and country-specific insights. There is flexibility embedded in the EBA-Lite toolkit. Depending on the country circumstances staff can apply the most relevant approach. While the current account model is typically the preferred approach, staff's judgment is needed to determine the appropriate model for the country specific circumstances (see paragraph 70 for further discussion). Further, as discussed later, in some circumstances, the model results can be adjusted to capture other relevant country-specific factors that are not accounted for by the models. The chosen approach can also be

complemented with other approaches or indicators (for example, other measures of external competitiveness).

4. The paper is organized as follows: it opens with a discussion of the key features that impact the external sector of the economies where the EBA-Lite tools are used and how these features have shaped the model design. The paper then describes each of the EBA-Lite tools—the empirical current account and real effective exchange rate models, the external sustainability approach, and the commodity modules—highlighting the key features and discussing the current refinements.

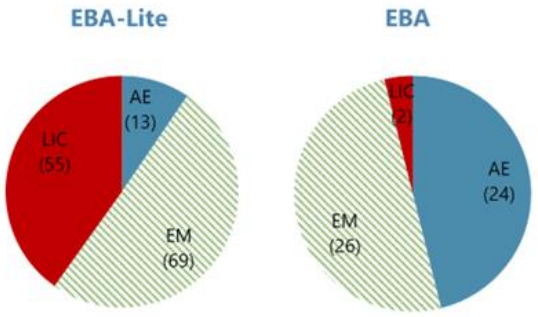
EBA-LITE ECONOMIES: KEY CHARACTERISTICS

5. The EBA-Lite methodology adapted the EBA methodology to take into account key factors that drive current account balances in emerging market and low-income economies. There are important differences across the EBA and the EBA-Lite economies in terms of macroeconomic fundamentals, including income levels, the nature of shocks, the role of remittances, the level of financial development, the large number of commodity-exporting economies, and a higher incidence of external indebtedness. Table 1 provides a list of the EBA and EBA-Lite countries. These differences inform both the empirical specification for the CA and REER models and the range of available tools. These include:

- **Income levels.** Ninety percent of EBA-Lite economies that use the framework are either low income or emerging market economies; this contrasts with the EBA economies which are predominately advanced economies or emerging markets (figure 1).

Figure 1. Income Levels

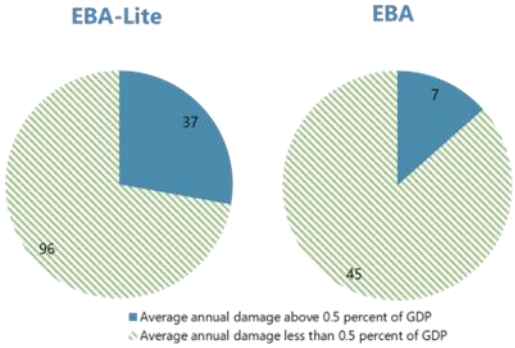
(Number of Economies)



Source: WEO Oct. 2021

Figure 2. Natural Disasters

(Number of Economies)



Source: EM-DAT database (2021)

- **Natural disasters.** The EBA-Lite economies tend to be more vulnerable to natural disasters. Nearly 30 percent of EBA-Lite economies experienced annual damages from natural disasters that, on average, accounted for more than 0.5 percent of GDP since 1995 (figure 2).[1]

- **Armed conflicts.** There is also a higher incidence of armed conflicts which can have sizeable impacts on external positions.

- **Remittances.** Remittances are an important source of external financing for many low-income countries and emerging markets. Although not included in the EBA models, the EBA-Lite models account for their role which improves the fit of the models.

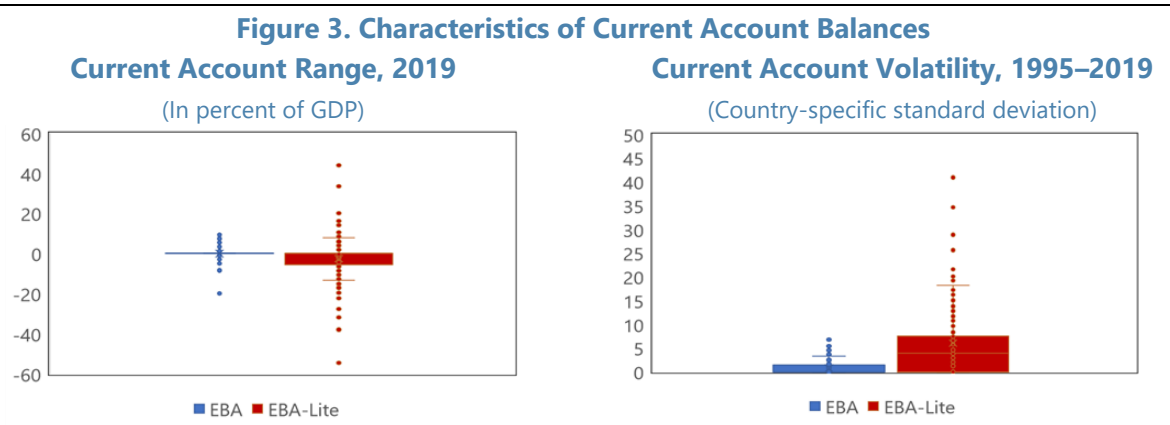
- **Financial development.** A higher share of EBA-Lite economies are less financially developed. The EBA models focus on the role of the credit cycle but since the level of financial development can also affect the current account, the EBA-Lite models consider both.

- **Exhaustible commodity exporters.** More than 20 percent of the EBA-Lite sample economies are fuel and non-fuel commodity exporters, motivating the inclusion of the commodity modules in the EBA-Lite toolkit.

- **External indebtedness.** Many more EBA-Lite economies have high levels of external indebtedness, including foreign-currency denominated debt. The EBA-Lite ES approach takes this into consideration, as discussed later.

- **Greater heterogeneity.** EBA-Lite economies exhibit a significantly wider range of current account balances compared with the EBA economies (figure 3). In 2019, of the EBA-Lite economies had a lower average and a larger variance of CA balance to GDP ratio. In addition, country-specific CA balance heterogeneity over time is larger for the EBA-Lite economies.

Figure 3. Characteristics of Current Account Balances



Source: WEO Oct. 2021
Note: The shaded box indicates the interquartile range (IQR). Outliers fall below Q1-1.5*IQR (lowest whisker) or above Q3+1.5*IQR (highest whisker).

[1] The natural disaster data is from EM-DAT, a global database with information on over 26,000 mass disasters since 1900. It is compiled from various sources, including UN agencies, non-governmental organizations, reinsurance companies, research institutes, and press agencies.

THE EBA-LITE CURRENT ACCOUNT MODEL

6. The EBA-Lite current account model is the anchor model for external sector assessments for the bulk of the membership where the EBA-Lite framework is used. This section describes the model specification and refinements introduced as well as those considered for EBA-Lite 3.0. The section then provides a comprehensive description of the model specification and describes how the model is used to compute current account norms and gaps.

A. Model Specification

7. As introduced by Phillips and others (2013), the current account (CA) panel regression model includes variables that economic theory suggests affect saving and investment behavior. The model is specified as:

$$CA_{it} = \alpha + C_{it}^{'}\beta + F_{it}^{'}\lambda + P_{it}^{'}\gamma + e_{it} \quad (1)$$

where CA_{it} is the current account balance in percent of GDP in country *i* in year *t*. Explanatory variables are grouped into three categories: cyclical factors and shocks ($C_{it}^{'}$), policy variables (P_{it}), macroeconomic and structural fundamentals (F_{it}). Section C provides more details on the included variables and the interpretation of the estimates. Data sources and technical definitions are provided in table 2. The included variables are as follows:

- Cyclical factors and shocks help explain short-term fluctuations in the current account. The EBA models include the output gap and commodity terms of trade as the cyclical factors. In addition, the EBA-Lite models include two additional variables that capture the impact of shocks related to natural disasters and conflicts.

- Policy variables are those that can be directly affected by policy actions and include the fiscal balance, the change in reserves/GDP (interacted with capital controls), public health spending, credit/GDP, and credit/GDP growth.

- The macroeconomic and structural fundamentals are generally slow-moving in the absence of significant structural reforms and include net foreign assets (NFA), output per worker, the share in FX world reserves, the migrant share, the oil and gas trade balance, demographics, and institutional quality.

- e_{it} is the zero mean, normally distributed regression residual, which is assumed to follow an AR(1) process.

Most variables are measured relative to the world average, that is, the GDP-weighted average of all countries in the EBA-Lite estimation sample. Country fixed effects are not included as they do not provide a direct economic explanation of current account balances and may merely capture persistent policy distortions. The EBA-Lite estimation sample includes all countries where the data

are available, including those that are in the EBA estimation sample.[2] The model is estimated using pooled Generalized Least Squares (GLS) with a panel-wide AR(1) correction.

B. EBA-Lite 3.0 Current Account Model Refinements

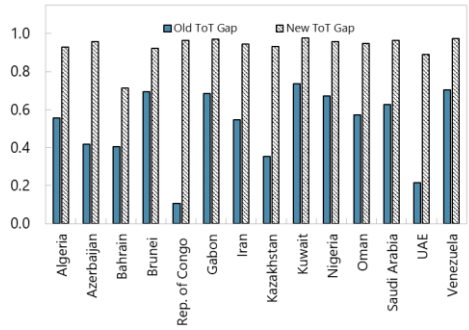
8. There were three main areas of refinements to the EBA-Lite CA model. The approach to the refinements was consistent with that for the EBA models. These were: (i) data updates; (ii) the refinement of variables included in the models; and (iii) a BMA procedure to exclude non-robust variables from the CA model.

Data Updates

9. The updated EBA-Lite CA model extends the sample period from 1995–2016 to 1995–2019. Data updates also include the latest vintages of the periodically revised variables (e.g., demographic variables from the 2019 revision of the UN World Population Prospects). The model is estimated with data available as of September 2021, except for the NFA variable that is obtained from the October 2021 revision of the External Wealth of Nations database (EWN).[3]

Figure 4. Selected Oil-Exporting Economies

Correlation of terms-of-trade and crude oil prices, 1995-2019



Source: Staff calculations

Refined Variables

10. In parallel with the refinements to the EBA model, the construction of some explanatory variables has been refined: (i) commodity terms-of-trade gap, (ii) the oil and gas trade balance, and (iii) the capital control index.

- **Commodity terms of trade gap.** In the EBA-Lite 2.0 CA model, the commodity terms of trade were measured as the ratio of a weighted-average price of 42 commodity export categories to the equivalent weighted-average price of commodity imports, in line with the approach for the EBA models. The index's off-trend component was identified by the Hodrick-Prescott filter, with the smoothing parameter similar to those typically used in the analyses of annual real business cycles. However, commodity prices tend to follow much longer "supercycles", which requires different filters and longer data series. Consequently, in line with the 2022 EBA model refinements, a new commodity terms-of-trade gap is constructed using a bottom-up approach

[2] Staff use the EBA models in external sector assessments for countries in the EBA estimation sample, and the EBA-Lite framework is used for assessments all other countries. See table 1 for a list of the countries that use the EBA and EBA-Lite models.

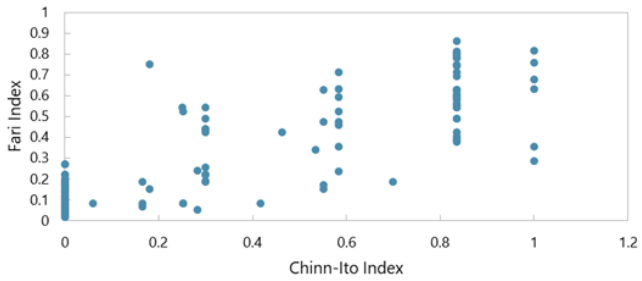
[3] Lane, Philip R. and Gian Maria Milesi-Ferretti, 2018, "The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis," IMF Economic Review 66, 189-222.

as follows. First, the analysis identifies "supercycles" in each individual commodity price series to obtain corresponding gaps (e.g., an oil or copper price gap)[4]. Second, it aggregates all commodity price gaps using country-specific trade weights to build country-specific terms-of-trade gaps. See Allen and others (2023) for a more detailed technical discussion on the construction and computation. The new approach provides a convenient and transparent way to construct the contribution of each commodity price gap to a country's overall commodity terms-of-trade gap. The refined terms-of-trade variable exhibits a higher correlation with individual commodity prices for many commodity exporters (figure 4). Although the estimated coefficient on the terms-of-trade variable is smaller in EBA-Lite 3.0, a one standard deviation change in the terms-of-trade series yields at least as large a cyclical adjustment in the EBA-Lite 3.0 model as a one standard deviation change in the EBA-Lite 2.0 model.

- **Oil and gas trade balance.** In the EBA and EBA-Lite models this variable is interacted with resource temporariness to help explain the impact of temporary export revenues on saving and the current account. The oil and gas trade balance is proxied by a 3-year moving average of the oil and gas net export (relative to GDP) to smooth out price fluctuations. Consistent with the revised EBA model, the net exports of oil and gas are now assessed as if their prices were at their long-term trend level. This helps to insulate the variable from off-trend price movement, enhancing its structural nature and contributing to stability of the estimated norm.

- **Capital controls.** Consistent with the revised EBA model, EBA-Lite 3.0 uses the Financial Account Restrictiveness Index (FARI), constructed by the Fund. This replaces the Chinn-Ito index that was previously used. Both indices are constructed using the IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) which includes data on restrictions on current and capital account transactions measures implemented in the financial sector, including prudential measures that may affect capital flows, and restrictions on current international payments and transfers and multiple currency practices subject to the IMF's jurisdiction in accordance with Article VIII of the IMF's Articles of Agreement.[5] The Chinn-Ito and FARI indexes are strongly correlated, for example with a correlation coefficient of 0.83 in 2019 (figure 5). However, the Chinn-Ito index uses the first principal component which means that the Chinn-Ito index for a given country in a

Figure 5. Comparison of Capital Control Indices, 2019



Source: The Chinn-Ito Index database (2021) and Baba and others. (forthcoming).
Note: 1 is more restrictive and zero less restrictive.

[4] The supercycles are identified using a two-step process using the Christano-Fitzgerald band-pass filter and the Butterworth high-pass filter.

[5] Baba and others (forthcoming) provide details on the construction of the FARI index.

given year may vary with the sample used for the principal component analysis. The FARI index will not suffer from this issue, facilitating the stability of the CA norm.

Model Selection and Bayesian Model Averaging Approach

11. Selection of explanatory variables for the current account models based on theoretical considerations is not sufficient to identify the 'true' current account model and therefore, the analysis applied a BMA approach. The BMA approach helps to select variables that are statistically robustly associated with the CA balance, yielding a more parsimonious model. The BMA approach involves analyzing all possible variable combinations and calculating the probability that a variable is included in the model, referred to as the posterior inclusion probability (PIP). Given the number of explanatory variables in the EBA-Lite 2.0 model, over 33 million rounds of estimations were performed to select the robust variables. A potential explanatory variable is considered robustly correlated with the dependent variable if the PIP is greater than 50 percent. The BMA results indicate that four variables that were included in EBA-Lite 2.0 can be excluded: life expectancy at age 45 (relative to world average); lagged NFA/GDP interacted with dummy for NFA/GDP >-60 percent; lagged demeaned VIX*capital openness; and lagged demeaned VIX*capital openness*share in world reserves.[6] Results from the BMA exercise are presented in table 1. Removing these variables had little impact on the overall fit of the model and on other coefficient estimates.

Other explored refinements to the CA model

12. In addition to those discussed above, other model variations were also explored. In the 2022 revision to the EBA model, the lagged change of the REER was introduced as an additional explanatory variable[7]. However, in the EBA-Lite model the estimated coefficient was very close to zero (and was not statistically significant) and was therefore not introduced. The EBA-Lite model includes private credit to GDP to capture the potential impact of financial deepening on the current account. As an alternative, the IMF's financial development index was explored as a substitute for private credit over GDP.[8] However, its inclusion did not improve the model fit and added operational complexity, so this model version was not selected.

[6] A similar BMA exercise was carried out to refine the EBA CA model. See tables 4 and 5 in Allen and others (2023). The EBA exercise similarly removed the lagged NFA/GDP interacted with dummy for NFA/GDP >-60 percent; the lagged demeaned VIX*capital openness; and the lagged demeaned VIX*capital openness*share in world reserves. In addition, the EBA BMA analysis indicated removal of reserve currency status and output per worker interacted with capital openness, both of which were retained in the EBA-Lite models as the BMA indicated that these were robust for the EBA-Lite estimation sample.

[7] The lagged change in the REER was introduced in the EBA model to capture the impact of short-term factors on a country's currency, such as market sentiment or risk-on/risk-off episodes, as in Coutinho and others (2022).

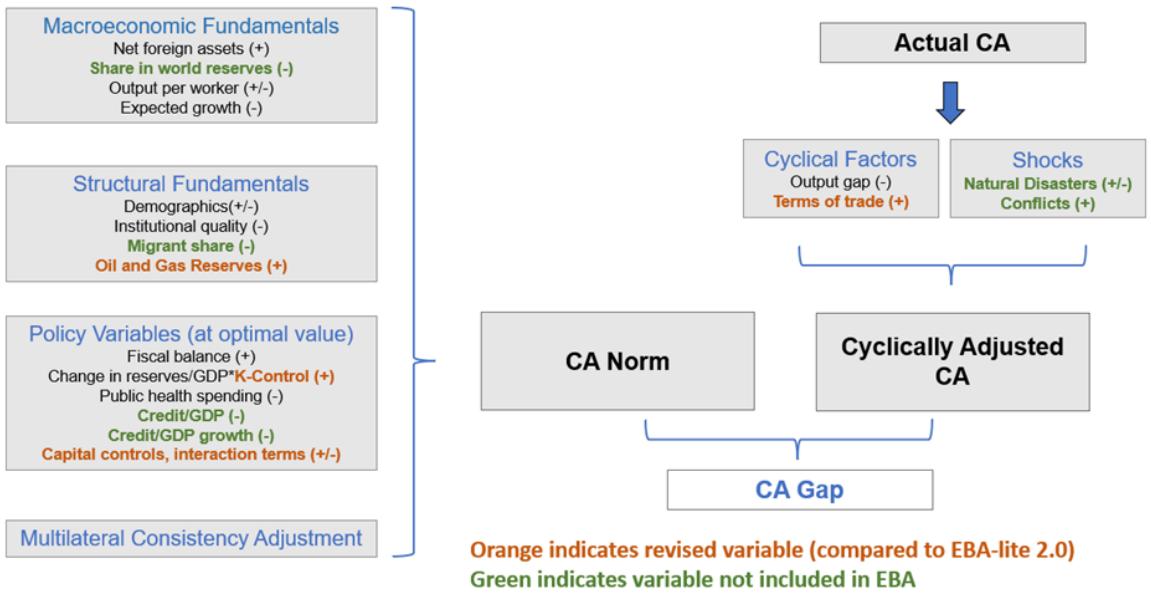
[8] See Sahay and others (2015), "Rethinking Financial Deepening: Stability and Growth in Emerging Markets", International Monetary Fund, (May), Washington (2015), IMF Staff Discussion Note 15/08.

C. Estimation Results and Interpretation

13. This section presents the estimation results and discusses the conceptual underpinning for the included regressors and the estimated impact on the current account. The results are presented in the Table 3. The second column of Table 3 reports the EBA-Lite 2.0 CA model estimates for comparison purposes. The third column shows the estimation results with updated data but before introducing any other changes to variable definitions or to the model specification. Most coefficient estimates are remarkably stable. The BMA probabilities are presented in the fourth column. The fifth and final column presents the new CA refined model that incorporates all the proposed refinements: new commodity terms-of-trade, new oil and gas trade balance, capital controls measured with FARI, and the model selection according to the BMA, as described in paragraph 11. Figure 6 provides a conceptual representation of the changes to the current account model and the differences from the EBA model.

14. Generally, estimated coefficients in the final model do not change much from the version with just updated data or the current model. The model fit is marginally improved compared to the EBA-Lite 2.0 model[9]. Two demographic variables (dependence ratio and population growth) have smaller coefficients than the current model. But the estimated impact of natural disasters (interacted with capital openness) is larger in the revised model.

Figure 6. Summary Representation of the EBA-Lite 3.0 CA Model



[9] In terms of model fit, the R-squared is marginally higher than that for the EBA model but the RMSE is higher, reflecting the higher prevalence of outliers in the sample. Comparing the fit of the EBA model with that in other studies, Allen and other (2023) note that the goodness of fit of the EBA model is generally in line with similar cross-country studies. The fit could be improved through either the inclusion of country fixed effects or the lagged current account balance. However, despite the potential for an improved fit, neither of these variables would provide an economic explanation for current account balances.

Cyclical Factors and Shocks

15. Output gap. A key driver of current account balances is the cyclical position of the domestic economy relative to the rest of the world. For example, a buoyant domestic economy (reflected in a positive output gap) will boost import demand and lower the current account balance. From a savings and investment perspective, a stronger cyclical position can be associated with lower savings and higher investment. This is captured in the model with the inclusion of the output gap relative to the world average to account for asynchronized business cycles. The estimated coefficient indicates that an increase in the relative output gap of 1 percent is associated with a reduction in the current account balance by about 0.13 percentage points of GDP.

16. Commodity terms-of-trade (interacted with trade openness). Changes in import and export prices, particularly for commodities, can have short-term impacts on the current account as a temporary improvement in the terms of trade increases income and therefore savings. As described in paragraph 10, the construction of the terms-of-trade gap was refined for the 2022 EBA and in EBA-Lite 3.0. The impact of fluctuations in the commodity terms-of-trade on the current account is expected to increase with an economy's trade openness, so the constructed commodity terms-of-trade gap is interacted with trade openness. The estimated coefficient indicates that for an economy with an openness degree of 50 percent, a 1 percent improvement in the term-of-trade is associated with an increase the current account balance by about 0.1 percentage points of GDP.

17. Natural Disasters. Given the prevalence of natural disasters in the EBA-Lite economies, the EBA-Lite CA model includes a dummy variable to capture the impact of a natural disaster on the current account balance.[10] Natural disasters, and the associated destruction of wealth, can negatively affect consumption while a lower present value of income may deter investment. At the same time, damage to physical capital can lead to increased investment in the aftermath of natural disasters. The impact on both saving and investment may also be affected by capital account openness: a high degree of openness facilitates countries borrowing to smooth out the shock to maintain consumption and alleviate imports compression. Therefore, the impact of natural disasters on the current account is an empirical question. The EBA-Lite CA model shows that in a country with a more closed capital account, a natural disaster is associated with higher CA balance. For example, comparing Solomon Islands (a FARI index of 0.78 in 2020) and Papua New Guinea (a FARI index of 0.14 in 2020), ceteris paribus, a natural disaster would reduce the current account of the latter but could increase the current account of the former.

18. Conflicts. The incidence of conflicts tends to be relatively higher among countries that use the EBA-Lite models than those the EBA economies. The EBA-Lite 2.0 models introduced a dummy

[10] The use of a dummy variable captures the near-term impact of a natural disaster. However, a specific natural disaster could have long-lasting impacts and in addition recurring natural disasters could increase precautionary savings. In cases where a natural disaster has impacts in subsequent years, staff could use an additional cyclical adjustor in their assessment (see the discussion on adjustors in paragraph 34). The EBA-Lite 2.0 refinement explored adding a lagged five-year moving average to capture the impact of recurring natural disasters on precautionary savings. However, it was not possible to precisely estimate the various impacts of natural disasters and the more parsimonious specification was selected.

variable with value one in every year where a conflict took place and zero otherwise.[11] The changes in saving and investment decisions brought on by conflicts can have sizable impacts on current accounts and exchange rates over short horizons. However, the direction of impact is a priori ambiguous. Imports may shrink from the decline in domestic demand and reduced access to borrowing, but exports could also fall as production facilities are destroyed. Furthermore, lower private capital inflows in times of conflict are at times offset by non-official flows, such as aid and official financing. The estimated coefficient indicates that the marginal impact of an armed conflict is to raise the current account by 0.7 percent of GDP.

Macroeconomic Fundamentals

19. Net foreign asset position (lagged). Larger net foreign asset positions tend to be associated with higher current account balances, primarily through the impact on the income account.[12] As in previous specifications, the lagged NFA-to-GDP ratio is included to account for the impact on the net income balance. The estimated coefficient is positive suggesting that higher NFA positions are associated with higher CA balances. At 0.026, the estimated coefficient is similar to EBA-Lite 2.0 but is lower than in the 2022 EBA model.

20. Domestic currency share in world FX reserves. The share of a country's domestic currency in the total stock of world reserves is included as a proxy for the so-called "exorbitant privilege" of reserve currency countries such as the U.S. in potentially financing their current accounts by issuing widely accepted money liabilities. The global demand for safe assets tends to increase consumption (lower savings) and increase investment, both of which weaken the reserve currency issuer's current accounts and, from a multilateral perspective, increase the current account balances elsewhere. This effect is captured by the inclusion of the share of a country's currency in world reserves, which is statistically significant. The estimated coefficient is negative and suggests that for every 10 percent of global reserves held in domestic currency, a country's current account deficit is lower by about 0.7 percent.

21. Output per worker (lagged). Richer countries are expected to export capital to poorer countries, where a lower level of capital implies a higher rate of return. This in turn should imply higher current account balances in richer economies and lower balances in relatively poorer economies. A country's GDP per working age population (in PPP terms) is compared with the

[11] Drawing from the UCDP/PRIO Dataset (Allanson and others, 2017), the EBA-Lite models include an indicator for armed conflicts. Conflicts are defined to include any of the following: (a) internal armed conflicts (between the government of a state and one or more internal opposition groups); (b) internationalized internal armed conflicts (between the government of a state and an internal opposition group, with intervention from other states on one or both sides); (c) inter-state armed conflicts; and (d) extra-systemic armed conflict (between a state and a non-state group outside its territory). The PRIO records the intensity of armed conflicts with two interval-censored observations: "minor" when annual conflict-related human fatalities are between 25 and 999, and "war" (i.e., large armed conflicts) when fatalities exceed 1,000 on an annual basis.

[12] From a theoretical perspective, there can also be a positive correlation between the NFA-to-GDP ratio and the current account balance. For example, Kumhof and Laxton (2007) show that in steady state, when an economy is on a balanced growth path, the CA-to-GDP ratio is a positive function of the NFA-to-GDP ratio, with a slope coefficient approximately equal to the nominal growth rate of GDP.

average of Germany, Japan, and the United States (the three economies with the highest output per worker). The results suggest that higher relative output per worker by one percent is associated with an increase of about 0.087 in the current account balance. This variable is also interacted with capital account openness and implies that the impact of productivity on the current account balance increases for more open economies.

22. Expected real GDP growth (5 years ahead). Expected future growth drives both saving and investment decisions. Higher expected future growth can induce consumption-smoothing households to reduce savings. Higher expected growth can also boost investment either due to an increase the expected return to capital and/or the increase in aggregate demand due to economic growth. Therefore, by lowering saving and increasing investment, higher expected growth will tend to reduce the current account balance. The estimated coefficient indicates that faster growing economies (with one percent relatively higher expected real GDP growth) is associated with a lower current account balance about by about 0.64 percentage points of GDP.

Structural Fundamentals

23. Demographics. The model includes several demographic variables that are designed to capture both the static and dynamic effects of an economy's demographics on saving decisions. The *static effect* captures the impact of the age composition on saving: countries with either younger or older populations tend to save less. Three variables are included to capture these effects: population growth (a proxy for the share of very young), the old age dependency ratio, and the share of prime-age savers as a proportion of the total working age population. The estimated signs are consistent with priors for negative coefficients on the population growth and old age dependency variables and the share of prime-age savers is associated with higher CA balances. There is also a *dynamic effect* on the current account: prime-age savers that live longer will need to save more. This is captured in the model by the life expectancy of a current prime-age savers and its interaction with the expected future old age dependency ratio. The signs of the estimated coefficients are as expected.

24. Institutional quality. Institutional quality is included in the model to reflect the impact on the ability of an economy to finance current account deficits. Institutional quality is proxied by the International Country Risk Guide (ICRG) which uses a wide range of institutional, social, bureaucratic, and political risk attributes considered to be relevant for saving and investment decisions. The estimated coefficient has the expected sign and indicates that higher institutional quality tends to lower the current account balance.

25. Migrant share. Remittances are a key driver of current account balances. To the extent that propensities to save and invest—and thus the aggregate saving-investment balance—are altered due to differences in source income, remittances can help explain cross-country variation in current account balances. As discussed in IMF (2019), there is considerable evidence that suggests that the marginal propensity to consume from remittance receipts is higher than that from other sources of income, reflecting among other factors that recipient households are typically liquidity constrained. This difference in the marginal propensity to consume can translate into a lower aggregate saving

rate and needs to be taken into consideration in assessing current account balances. However, since remittances are already a component in the current account, remittances data cannot be directly included as an explanatory variable.[13] Therefore, the EBA-Lite CA model includes outward migration as a share of the population, which is related to remittances, as a proxy. The model estimates suggest a negative and statistically significant impact of migrant shares on current account balances. The negative estimate implies that, on average, as outward migration rises, the marginal propensity to invest rises and/or the marginal propensity to save falls in the domestic economy. The estimated magnitude suggests that a 9 percentage point (or one standard deviation) increase in outward migration lowers the current account balance by about 1 percent of GDP.[14]

26. Oil and gas reserves. Exporters of exhaustible natural resources tend to save a higher share of their exports proceeds to generate wealth for future generations and, other things equal, the more temporary is the revenue stream the higher is the portion saved. The model includes a variable that combines the size of the oil and natural gas balance, in percent of GDP, with a measure of the degree of its temporariness based on the ratio of current extraction to proven reserves. As discussed in paragraph 10, exports of oil and gas are assessed as if prices are at the long-term trend level to insulate this variable from short-term price fluctuations and contribute to the stability of the estimated norm. The estimated coefficient has the expected sign and indicates that an increase in the oil and gas reserves increases the current account.

Policy Variables

27. A key distinguishing feature of the EBA and EBA-Lite models is the distinction between macroeconomic and structural variables and policy variables. The inclusion of policy variables in the model permits computation of a current account norm that is based on desirable policies and allows computation of the extent to which identified policy gaps—the difference between actual and desirable policies—contributes to deviations of the current account from its 'norm'. The next section discusses this computation in more detail.

28. Cyclically adjusted fiscal balance (instrumented). Other things equal, an increase in government spending (or a decline in revenue) increases domestic demand and can lower the current account balance (for a given level of output). However, to the extent that private agents change their consumption (and saving) decisions in response to changes in the fiscal policy stance, the impact on the current account could be partially offset. In response to a higher fiscal deficit

[13] An econometric implication of including current transfers in the CA model is that the model can no longer be interpreted as a saving-investment equation and, therefore, cannot provide an estimate of the CA norm. As discussed in IMF (2019), the equation would estimate the current account excluding aid and remittances, instead of the current account norm. Using the migrant share as an explanatory variable rather than remittances preserves the interpretation of the CA equation as an S-I identity.

[14] The overall external assessment could consider of country-specific details about the migrant population. In countries where inward remittances flow primarily to higher income households, higher remittances would not tend to lower the current account balance and use of a norm adjustor could be appropriate. Similarly, in countries with a high share of overseas population but low remittances, a norm adjustor could be used. Paragraph 34 includes more discussion on the use of norm adjustors in external sector assessments.

(lower public saving), consumers may decide to save more to offset higher expected future taxes. From an econometric perspective, estimating the impact of fiscal policy on current accounts is complicated as fiscal policy decisions are not exogenous as they often reflect economic developments. Therefore, the EBA and EBA-Lite models instrument the cyclically adjusted fiscal balance.[15] The estimated coefficient of 0.43 indicates that an increase in the fiscal balance of 1 percent (relative to the rest of the world) increases the current account balance. The coefficient estimate is similar to previous EBA-Lite specifications and, as might be expected, is marginally above the EBA coefficient of 0.4, consistent with a smaller offset by more liquidity constrained consumers.

29. Health spending (lagged). Health expenditure is included in the EBA and EBA-Lite models to proxy for the social safety net. This modelling choice reflects the availability of consistent data across countries over the estimation sample and the fact that health spending is highly and positively correlated with available measures of social safety nets, for example, data on spending and coverage in the World Bank's Aspire database (such as the average real per capita transfers from social protection and social insurance programs or the share of population participating). Generally, a more generous social safety net is expected to reduce precautionary savings. The estimated coefficient has the expected sign and indicates that countries where health expenditure is 1 percent of GDP higher tend to have lower current account balances by 0.57 percentage points of GDP.

30. Foreign exchange intervention interacted with capital controls (instrumented).[16] To the extent that foreign exchange intervention (FXI) can have an impact on the exchange rate, FXI can also impact the current account. The empirical and theoretical literature highlights that the impact can depend on the openness of the capital account, with larger impacts when capital mobility is low. The EBA and EBA-Lite models therefore include a proxy for FXI interacted with an index of capital controls. FXI is proxied by the change in reserves and the FARI index is used to measure capital account openness, as discussed above. The estimated coefficient has the expected sign and implies that an increase in FX purchases tends to improve the current account.

31. Credit variables. Both the EBA and the EBA-Lite models include credit variables to capture the impact of credit on current accounts, although the specifications differ. The EBA-Lite model includes two credit variables: the credit-to-GDP ratio and the change in the credit-to-GDP ratio to capture the impact of financial depth and cyclical credit conditions, respectively, on the current account. Greater financial depth relative to the rest of the world is associated with a lower current account balance as the increased availability of credit lowers savings. As previously discussed,

[15] The cyclically adjusted overall general government fiscal balance is based on WEO projections, FAD data, or, where these are unavailable, it is computed as the residual of a country-specific regression of the overall fiscal balance on the output gap. In the CA model, it is instrumented with lagged world real GDP growth, lagged world output gap, lagged world cyclically adjusted general government fiscal balance, lagged global risk aversion (proxied by lagged U.S. corporate credit spreads), GDP per capita, and a democracy ranking. The first stage regression also controls for the independent current account regressors.

[16] Foreign exchange intervention is instrumented with global reserves accumulation, US corporate spreads, M2, relative to GDP (all interacted with the capital controls index); the first stage regression also controls for the independent CA regressors.

replacing this variable with a broader measure of financial depth performed similarly in the models. A rapid change in the credit-to-GDP ratio can signal the presence of a credit boom which tend to be associated with wider current account deficits. The estimated coefficients have the expected sign and indicate that both greater financial depth and rapid credit growth tend to lower the current account.

D. Estimating CA Norms and Gaps

32. The estimated coefficients are used to compute the cyclically adjusted current account and the current account norm, with the difference between these yielding the current account gap. These are each defined as follows:

- The cyclically adjusted current account balance (CA_{it}^{Adj}) adjusts the current account for the short-term impact of the cyclical factors and shocks ($C_{it}^{'}$), namely, the relative output gap, the terms-of trade, and the EBA-Lite specific shocks (natural disasters and conflicts), where coefficient estimates are denoted with a hat:

$$CA_{it}^{Adj} = CA_{it} - C_{it}^{'}\hat{\beta} \tag{2}$$

- The current account norm is the level of the current account that is consistent with medium-term macroeconomic and structural fundamentals ($F_{it}^{'}$) and with medium-term desirable policies ($P*_{it}^{'}$), and is defined as follows:

$$CA_{it}^{Norm} = \hat{\alpha}F_{it}^{'}\hat{\lambda} + P*_{it}^{'}\hat{\gamma} \tag{3}$$

  where P* denotes desirable policy settings. Desirable policy settings are defined as staff's forward-looking, medium-term policy advice. Box 1 summarizes the operational guidance for the desirable policy settings in the EBA-Lite framework. The policy gap is defined as the difference between the actual and desired policy settings with the contribution of the policy gaps to the current account gap defined as $\left(P_{it}^{'} - P*_{it}^{'}\right)\hat{\gamma}$.

- The current account gap (CA_{it}^{gap}) is defined as the difference between the cyclically adjusted current account and the current account norm and is also equivalent to the sum of the model-identified policy gaps and the regression residual, as follows:

$$CA_{it}^{gap} = CA_{it}^{Adj} - CA_{it}^{Norm} = (P_{it}^{'} - P*_{it}^{'})\hat{\gamma} + e_{it} \tag{4}$$

- The residual may need to be interpreted in external sector assessments, based on country specifics factors. In many cases, the residual is interpreted as reflecting structural factors, not already captured in the model. See Allen and other (2023) for a discussion on measuring the effects of structural policies in the EBA context, which could also be applicable for EBA-Lite countries. In a small number of cases a persistently large residual suggests a need to explore whether country-specific structural factors not well captured by the model would meet the criteria for a norm adjustor (see paragraph 34).

Multilateral Consistency

33. A key feature of the EBA and the EBA-Lite framework is the multilateral consistency of the external sector assessments. Excess deficits should sum to excess surpluses, that is, the estimated EBA-Lite current account gaps should sum to zero. In practice, however, the estimated CA gaps do not sum to zero, in part because there is a statistical discrepancy at the global level, that is, global current accounts do not sum to zero. In addition, not all variables in the regression are expressed as deviations from the world average and therefore their aggregate contribution does not sum to zero. As a result, the gaps need a small adjustment to ensure multilateral consistency, and this is attributed to the CA norm, as shown in figure 6.

Box 1. Setting Desirable Levels (P*) for the EBA-Lite Policy Variables

This box provides general guidance on setting the desirable policy levels (P) for each of the EBA-Lite policy variables, as needed to estimate the current account norms. The P* settings for fiscal policy, health spending and credit are aimed at meeting medium-term domestic policy objectives and do not target a specific level of the current account.*

Fiscal policy. The desirable fiscal policy corresponds to the cyclically adjusted general government fiscal balance that country teams recommend over the medium term (in five years). Depending on country specifics, teams could set the desirable level based on, for instance, the debt-stabilizing primary balance, the debt-stabilizing primary balance consistent with existing or recommended fiscal rules, a measure of long-term adjustment needs to consider increased fiscal costs from aging, and/or the need for higher spending on social sectors, climate change, etc. The fiscal policy P* should be revisited as the medium-term fiscal policy advice is updated.

Public health expenditure. Public health expenditure serves as a proxy for the strength of the social safety net. Benchmark regressions, developed for EBA-Lite 2.0 provide guidance to teams on the desirable policy setting (see IMF 2019). Cross-country variation in public health expenditures reflects not only the *need* for health expenditure (based on the demographic structure and epidemiological profile) but also reflects *affordability* (that is, the government's fiscal capacity and other demands on resources). The benchmark regressions regress public health expenditure-to-GDP ratio on GDP per capita (PPP-based), the current old-age dependency ratio, income inequality, and fiscal revenue. An alternative specification includes fiscal revenue as percent of GDP to capture the potential impact that fiscal capacity could have on health expenditures. In general, as a medium-term policy objective, this P* setting is not expected to change from year to year.

Private credit. The desirable level of private credit-to-GDP should be consistent with its role in the EBA-Lite model as an indicator of financial depth. A benchmark regression can provide some guidance, but country specifics should also be considered. The benchmark regression links the credit-to-GDP ratio to measures of financial development and structure, GDP per capita, public debt, inflation, and other variables (see IMF 2019). The P* for desirable change in private credit (defined as the change in private credit in ratio to GDP in the previous year, see table 2) should be set to achieve the desirable level for the credit-to-GDP.

Foreign exchange intervention. FXI is proxied by the change in reserves, relative to GDP. The desirable level of FXI (P*) is a medium-term concept and countries are expected to hold an adequate level of reserves in the medium-term with no need for further accumulation. This implies that the ratio of the change in reserves relative to GDP should be zero in the medium term. In exceptional circumstances, where countries are not expected to reach adequate reserves over the medium term, the P* for FXI could be set equal to the annualized change needed to close the difference between the medium-term baseline and an adequate level.

Box 1. Setting Desirable Levels (P*) for the EBA-Lite Policy Variables (concluded)

Capital controls. The benchmark level considered desirable for the medium term is either the country's current level or the contemporaneous cross-country average level of the controls index, whichever is smaller (i.e., the least restrictive).

Real short-term interest rates (included in the REER equation only). If the current monetary policy stance is judged by teams to be inconsistent with domestic inflation and output stabilization needs, the EBA-Lite methodology allows for such a monetary policy gap to be identified and contribute to the overall REER gap. The desirable short-term interest rate is the monetary policy stance appropriate for domestic output and inflation objectives; and where the current policy settings are appropriate, this will be equal to the actual value.

Adjustors

34. The EBA-Lite models cannot capture all country-specific temporary or structural factors that can drive current account balances and therefore careful and transparent adjustments to the model results are sometimes made in the Fund's external sector assessments. An internal review process helps ensure that adjustors are well-justified, grounded in economic theory, appropriately computed, evenhandedly applied, and, when relevant, multilaterally consistent.[17] In general, the model results should not be adjusted to offset the impact on current accounts arising from policy decisions, although such policies and their impact on external balances are discussed in the external sector assessment. A key challenge can be appropriate calibration. Adjustments can be made to either the cyclically adjusted current account or to the norm:

- Although the output gap, terms of trade, and the EBA-Lite specific shocks in the CA model can capture, at least partially, many macroeconomic developments and shocks, these cannot cover every important current account development. In these cases, adjustments can be made to the cyclically adjusted current account to capture temporary shocks that are not fully accounted for in the model. The calibration of the adjustor should consider only the temporary portion of the shock (in some cases, shocks could also have permanent or long-lasting impacts) and should be based on an estimate of the net impact on the CA balance (e.g., a shock to tourism in a small country could also reduce imports). Examples of additional cyclical adjustors used in external sector assessments include accounting for large one-off import-intensive projects in small economies, prolonged yet transitory effects of large natural disasters, and one-off temporary shocks to remittances or transfers. Use of any such additional cyclical adjustors should be temporary (typically one or two years) and should generally decrease in size if used for more than one year.

[17] The EBA and EBA-Lite models should not be re-estimated on sub-samples for use in the Fund's external sector assessments for a variety of reasons. Splitting into sub-samples based on specific country characterizations undermines multilateral consistency, a key goal of the EBA approach. Further, such an approach implicitly assumes that this specific group is not misaligned relative to the rest of the world which is unlikely to be the case.

- Broad-based developments that the model does not cover, like the Covid-19 pandemic, can require temporary use of mandatory adjustors to ensure evenhandedness and multilateral consistency. The Covid adjustors aimed to account for the transitory net impact of the pandemic on key current account components such as tourism, shocks to commodity volumes, shift in medical goods trade, and a shift in consumer preferences towards good from services (see online annex 1.1 to the 2021 External Sector Report).

- Adjustments to the norm are made where there are relevant country specific structural factors that can impact the current account from a cross-country perspective but that are not included in the model (for reasons other than statistical insignificance). The norm could also be adjusted to reflect over-riding external sustainability concerns. In general, norm adjustors, once introduced, should be maintained for subsequent external sector assessments. For example, in the EBA-Lite context, a large migrant share with very low remittances (because family groups tend to migrate) could justify an adjustment to the estimated norm.

E. Real Effective Exchange Rate (REER) Gap and Elasticities

35. The CA gap is converted to a REER gap using the relevant elasticity, which is approximated by the response of trade balances to the REER.[18] The semi-elasticity (η^{TB}) of trade balance-to-GDP ratio (*TB*) with respect to REER is expressed as:

$$\eta^{TB} = \frac{\Delta(TB/GDP)}{\Delta\, REER/REER} \tag{5}$$

The corresponding *REER* gap in percentage terms can be derived as:

$$REER^{gap} = \frac{CA_{it}^{gap}}{\eta^{TB}} \tag{6}$$

where CA_{it}^{gap} is the estimated *CA* gap (in percent of GDP) from the EBA-Lite CA regression.

36. The semi-elasticity of the trade balance-to-GDP ratio with respect to the REER (η^{TB}) is estimated as the weighted average of the import and export elasticities:

[18] The 2022 EBA refinements introduced estimates of the semi-elasticity of the income balance, which is added to the semi-elasticity for the trade balance. In most cases, for the EBA countries the estimated income balance elasticities were close to zero, indicating that the response of the income balance to changes in the REER is expected to be modest and that the external sector adjustment is mainly driven by the medium-term effects of the REER on the trade balance. Behar and Hassan (2022) found that the estimated income semi-elasticities are small for most countries, so the income balance is generally not a significant channel through which the exchange rate stabilizes the current account, and trade-based semi-elasticities are, with some important exceptions, good proxies for current account semi-elasticities used in external sector assessments. Given the low estimates, the income elasticities were not added to the EBA-Lite framework. However, staff can use alternative well-justified estimates of the semi-elasticity, if appropriate.

$$\eta^{TB} = \eta^X s^X - \eta^M s^M \quad (7)$$

where η^X and η^M are the elasticities of exports and imports with respect to the REER, and s^X and s^M are the nominal shares of exports and imports with respect to GDP (as discussed in Cubeddu and others (2019)). The semi-elasticities of the nominal trade balance-to-GDP ratio are obtained, for each country, by using the common panel-estimated values of η^X and η^M and the country-specific export and import shares. In practice, a moving average with an eleven-year window is used to smooth cyclical fluctuations in these shares.[19] Values for η^X and η^M are estimated at the panel level using data for all EBA-Lite estimation sample countries.

37. Specifically, dynamic export (X) and import (M) equations are estimated using an unbalanced panel covering EBA-Lite countries with quarterly data between 1980 and 2019. Exports and imports are expressed in nominal USD The following reduced-form equations are estimated:

$$\ln(X_{it}) = \sum_{j=1}^{n} \delta_j^X \ln\left(X_{it-j}\right) + \sum_{j=0}^{n} \beta_j^X \ln\left(REER_{it-j}\right) + \gamma^X \ln(RGDP^{TP}{}_{it}) + \varepsilon_{it} \quad (8)$$

$$\ln(M_{it}) = \sum_{j=1}^{n} \delta_j^M \ln\left(M_{it-j}\right) + \sum_{j=0}^{n} \beta_j^M \ln\left(REER_{it-j}\right) + \gamma^M \ln(RGDP_{it}) + \varepsilon_{it} \quad (9)$$

where both specifications include time and country fixed effects. Equation (8) relates exports to real exchange rates and world demand (proxied by trading partners' real GDP). Similarly, imports are assumed to be a function of real exchange rates and domestic demand (proxied by domestic real GDP) in equation (9). Using estimates from the panel regression, long-run export and import elasticities are obtained as follows:

$$\eta^X = \frac{\sum_{j=0}^{n} \beta_j^X}{1-\sum_{j=1}^{n} \delta_j^X} \text{ and } \eta^M = \frac{\sum_{j=0}^{n} \beta_j^M}{1-\sum_{j=1}^{n} \delta_j^M} \quad (10)$$

The resulting estimates for the EBA-Lite estimation sample are an elasticity of 0.25 for imports and an elasticity of -0.46 for exports. This compares with the EBA-Lite 2.0 elasticities of 0.29 for imports and -0.44 for exports.

THE EBA-LITE REER MODEL

38. The Real Effective Exchange Rate (REER) model focuses on the country-specific determinants of movements in REER indices, with many of the same explanatory variables as the current account model. REER indices are typically normalized to 100 in the base year, and as such, the model does *not* aim at understanding differences in relative price *levels* across countries. Estimation requires the use of country fixed effects, which implies that the model residuals of each country average to zero over the sample period. The inclusion of the fixed effect in the REER is an

[19] That is, the elasticity in year N is estimated with averages for the exports and imports to GDP ratios between years N-5 to N+5.

important feature and can complicate the interpretation of the coefficient estimates and the model results. See the discussion on the REER model caveats below.

A. Model Specification

39. The EBA-Lite REER model specification is similar to the EBA REER index model. Many of the same determinants that are used in the CA model are also included, although some indicators vary across the two models, reflecting differences in economic and statistical significance. As for the CA models, variables are grouped into three categories: policy variables, non-policy fundamentals, and cyclical factors and shocks. The variables are listed in Figure 7 and their interpretation and economic significance are discussed below.

B. EBA-Lite 3.0 REER Model Refinements

40. The main refinements to the EBA-Lite REER model entailed data updates and refinement of selected model variables, and improvements in the robustness of the model.

Data Updates and Refined Variables

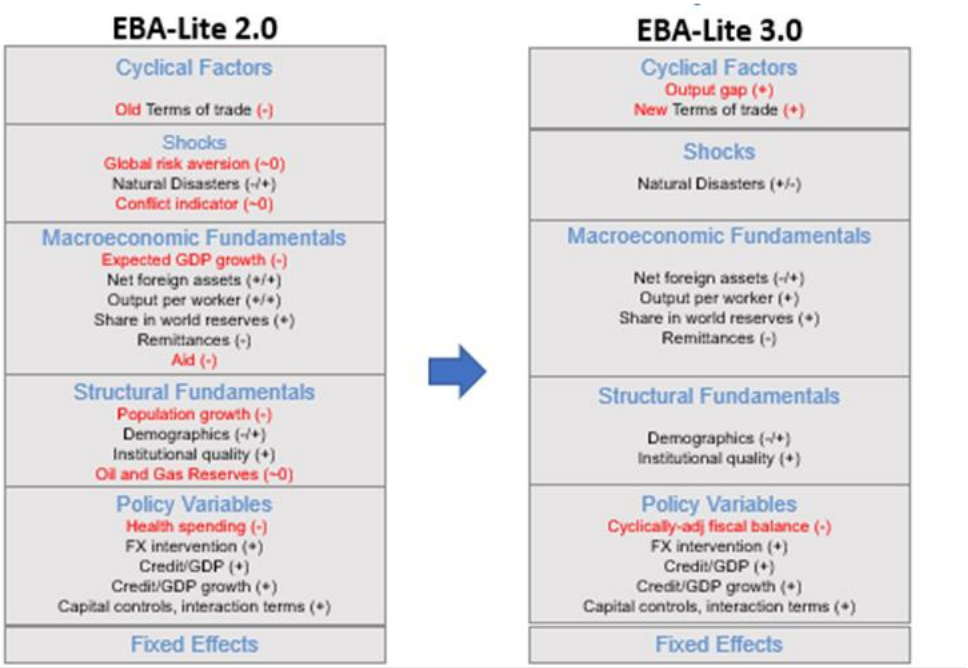
41. The updated EBA-Lite REER model extends the sample period from 1995–2016 to 1995–2019, using the updated database deployed for the CA model. In parallel with the current account model, the construction of some explanatory variables has been refined. The terms-of-trade gap is consistent with the one used in the refined CA model and the FARI index is used as the measure of capital controls.

Model Selection

42. Refinements focused on improving the robustness of the model (e.g., the deletion of insignificant variables) and on more closely aligning it with the EBA REER model:

- The insignificant variables dropped from the refined REER equation include global risk aversion variables; output per worker, interacted with capital openness; oil and gas reserves; conflict dummy variable; and aid. These variables were also dropped from the refined CA model.
- Medium-term growth and population growth variables were also removed as these did not have the expected sign. Their deletion had little impact on the overall fit of the model and on other coefficient estimates (except for some fixed effect coefficient estimates).
- Among the cyclical factors, the EBA-Lite 3.0 specification adds the output gap variable, to be consistent with the EBA REER Index model.
- In terms of policy variables, a cyclically adjusted fiscal balance is now included as it is an economically and statistically significant determinant driving change in competitiveness dynamics. Health spending was insignificant and has been dropped from the regression.

Figure 7. Update of the REER Model 1/



1/ +/- indicates the signs of the estimated coefficients, including on interactions terms.

C. Estimation Results and Interpretation

43. Overall, the EBA-Lite 3.0 REER model is now better aligned with the EBA model. Figure 7 summarizes the comparison between the EBA-Lite 2.0 and 3.0 specifications and the estimation results are presented in table 4.

Cyclical Factors and Shocks

44. Output gap. The cyclical position of the domestic economy relative to the rest of the world influences the real effective exchange rates in line with the impact on current account balances. The EBA-Lite 3.0 specification includes the output gap (relative to the world average), which is statistically significant and indicates that an increase in the relative output gap of 1 percent is associated with a real appreciation of about 0.4 percent.

45. Commodity terms-of-trade (interacted with trade openness). The REER model uses the refined terms-of-trade variable, as described in paragraph 10. The estimated coefficient is positive and indicates that a more favorable commodity terms-of-trade is associated with a more appreciated exchange rate.

46. Natural Disasters. In a similar manner to the current account model, the EBA-Lite REER model includes a dummy variable to capture the impact of a natural disaster on the REER as well as an interaction term with capital account openness. The estimates indicate that a natural disaster

tends to appreciate the real effective exchange rate but for economies with more open capital accounts this impact is mitigated, consistent with the results from the CA model.

Macroeconomic Fundamentals

47. Net foreign asset position (lagged). The relationship between NFA and the REER is more ambiguous than that for the current account. The positive relationship between the CA and the REER, discussed earlier, might suggest that economies with larger negative NFA positions would tend to have more appreciated REER. However, countries with negative NFA positions could also be expected to run current account surpluses so as to improve the NFA. This would be consistent with a more depreciated REER and a positive coefficient. The EBA-Lite 3.0 specification includes the lagged NFA and also includes an interaction term with a high-debt dummy variable (with NFA below -60 percent). The estimated coefficient on the lagged NFA is not statistically significant but that on the interaction term is positive and statistically significant and is in line with this latter interpretation.

48. Own currency share in world FX reserves. As in the CA model, the share of a country's own currency in the total stock of world reserves is included in the model specification. Countries with reserve currency status are expected to have a more appreciated real exchange rate. The estimated coefficient is positive, as expected.

49. Output per worker (lagged). This variable partially captures the Balassa-Samuelson effect, where richer countries are expected to have higher non-tradeable prices and more appreciated real exchange rates. The results suggest that an increase in relative output per worker is associated with higher real exchange rate.

50. Remittances. Unlike the CA model where migrant share is included as a proxy for remittances (to preserve the interpretation of the CA model as a S-I identity), remittances relative to GDP is included in the REER model. While the CA model provides a cross-country perspective on the impact on the CA, the REER model estimates indicate that an increase in remittances tends to depreciate the REER.

Structural Fundamentals

51. Demographics. The model includes several demographic variables that are designed to capture the impact of demographic factors on an economy's external sector: these are the dependency ratio, life expectancy, and the interaction of life expectancy with the dependency ratio. The results indicate that economies with higher savings needs related to demographics tend to have more depreciated REERs.

52. Institutional quality. Institutional quality is included to reflect that weaker institutions likely reduce capital inflows, lead to a more depreciated REER as well as a higher CA balance. The estimated coefficient has the expected sign, although it is not statistically significant, and the estimated impact is smaller than in the EBA-Lite 2.0 model.

Policy Variables

53. Fiscal policy (instrumented). As discussed earlier, a higher fiscal balance is associated with a higher current account balance and with a more appreciated REER. As in the CA model, the REER model uses the instrumented cyclically adjusted fiscal balance. This variable was not included in the EBA-Lite 2.0 models but is included in EBA-Lite 3.0 as it was found to be statistically significant. The estimates indicate that a 1 percentage point increase in the cyclically adjusted fiscal balance relative to GDP is associated with a REER appreciation of 0.2 percent.

54. Foreign exchange intervention interacted with capital controls (instrumented). Like the CA model, FXI is interacted with capital account openness to reflect that the effectiveness of FXI can depend on the openness of the capital account, with larger impacts when the capital mobility is low. The estimated coefficient has the expected sign and implies that an increase in FX purchases tends to depreciate the REER.

55. Monetary policy interacted with capital controls. The REER model includes short-term interest rate adjusted for inflation to proxy for the effect of monetary policy on the exchange rate. The results indicate that higher real interest rates tend to appreciate the real exchange rate, but the strength of the link depends on the degree of openness of the capital account. An increase in the relative real short term interest rate by 1 percentage point is associated with 1 percent appreciation in countries with open capital accounts.

56. Credit variables. The EBA-Lite REER model also includes the same two credit variables that were used in the EBA-Lite the CA model: the credit-to-GDP ratio and the change in the credit-to-GDP ratio. The estimated coefficients have the expected sign and indicate that greater financial depth and strong credit growth tends to appreciate the real exchange rate.

D. REER Model Caveats

57. There are caveats to the REER models, which suggests that preference should usually be given to the use of the CA models in external sector assessments. Conceptually, the CA model focuses on the main variable of interest in assessments of external imbalances from a flow perspective, with the REER model providing insights on only one channel for external adjustment. As discussed above, since REER indices are normalized to 100 in the base year, the REER model includes country fixed effects which averages the model residuals of each country to zero over the sample period. This inclusion complicates the interpretation of the model results on several fronts. The REER model assesses the current value of the REER against its own history, unlike the CA model which compares the current account relative to the desirable policies and fundamentals of peers and providing a cross-country perspective of the drivers of current account balances. Therefore, potential inconsistencies between the REER and the CA model results are likely to arise due to the different questions these models are designed to address. For example, in a simplified case with prolonged external sector imbalances and where the REER is little changed relative to the historical average, the REER model can suggest that there is no REER gap, whereas the CA model would appropriately flag the imbalance and is the preferred approach to guide policy advice. With the

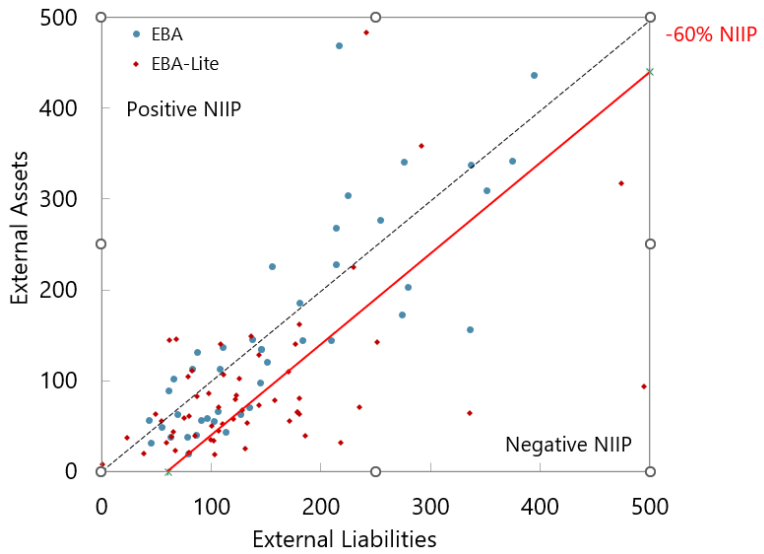
inclusion of the fixed effect, the REER model is also less robust to structural breaks. An additional caveat is that the overall fit of the REER models tends to be poorer, reinforcing the preference for the use of the CA model over the REER model in external sector assessments.

EXTERNAL SUSTAINABILITY ASSESSMENT APPROACH

58. Nearly a quarter of economies that use the EBA-Lite framework have NFAs (or net international investment position (NIIP)) below -60 percent of GDP, a benchmark frequently used to indicate higher external vulnerabilities. Countries with high net external borrowing are exposed to the risk of sudden changes in global financial conditions, including higher roll-over risks and increases in borrowing costs. The number of EBA-Lite countries with concerns about external imbalances has risen recently, reflecting the post-pandemic increase in debt-to-GDP ratios amid, global financial tightening.

Figure 8. External Assets and Liabilities, 2021

(in percent of GDP)



Source: WEO April 2022.

59. The External Sustainability (ES) Approach provides a tool to assess the adjustment needed to reduce external sustainability risks. In some circumstances, especially where external sustainability considerations are an overriding concern, this approach should anchor the overall assessment. The EBA ES models the sustainability of a country's external position by comparing the CA/GDP expected to prevail in the medium-term to the CA/GDP that would stabilize the external stock position (NFA/GDP) at a specified benchmark level. The ES approach differs from the other approaches along two key dimensions: the CA gaps are not attributed to specific polices and, whereas the CA and REER models focus on the current gaps, the ES approach provides a more forward-looking perspective.

60. The EBA-Lite 2.0 framework expanded the ES approach based on the CGER models and the EBA framework. In the expanded model, based on Blanchard and Das (2017), both trade and financial factors play a role in external adjustment. This approach offers a deterministic approach as well as a probabilistic module, as a complementary tool. The approach defines net external liabilities as sustainable if they are less than or equal to the present value of net exports plus the rate of return differential between external assets and external liabilities times the gross asset position. When net liabilities do not satisfy the intertemporal constraint, that is, when the

former is larger than the latter, real exchange rate depreciation, as one of the possible external adjustment measures, is needed to ensure external sustainability.[20] In this scenario, the framework provides an estimate of the real exchange rate depreciation that is required to maintain NFA at its current level, in the medium-term.

61. The EBA-Lite 2.0 framework addressed four key simplifications in the previous ES approach. The approach also takes into account the valuation effects of exchange rate changes, linking these to the foreign currency denomination of assets and liabilities. For example, in countries with more FX-denominated liabilities than FX-denominated assets, disregarding the downward NFA revaluation from a depreciation could result in incorrectly assessing the NFA to be sustainable. Second, the ES approach does not generally consider return differentials except for a few countries. Third, the ES approach requires that debt at a point in the future be stabilized at its level today, rather than comparing discounted debt in the future to its level today. Fourth, the ES approach takes account of just the medium-term CA projection, rather than the entire stream of projected CAs.

62. However, stabilizing NFA at its current level, in the medium-term, does not guarantee optimality or stability of the external position. In the baseline scenario of the deterministic ES approach, NFA is projected to remain at its current level in the medium-term. Although this benchmark has little normative content, it allows the ES to provide perspective on whether the projected medium-term CA/GDP, at current REERs, is likely to lead to increase debtor or creditor positions relative to their current level. However, for some countries NFA might be at very large and negative levels, implying that the economy is already exposed to high levels of external risks. For these cases, the real exchange rate adjustments recommended in the baseline scenario, while necessary, are unlikely to be sufficient for restoring external sustainability. Further, in cases, where a large negative NFA is projected to improve—even if very gradually—the stabilizing the NFA at the current level is not very informative. Therefore, in such cases, an alternative benchmark may be needed. However, there is little empirical or theoretical guidance on appropriate benchmarks for NFA; therefore, any alternative benchmarks need to be carefully justified and should be consistent with staff's policy advice on debt reduction and/or reserve accumulation over the medium-term.

EBA-LITE COMMODITY MODULES

63. Commodity exporters have distinct external sector dynamics that may benefit from alternative approaches, that are more tailored to these countries' specific characteristics and can complement the results from standard approaches in EBA-Lite. Exhaustible resources can generate potentially very large income streams. Given their exhaustible nature, such income streams are, by definition, temporary and countries may benefit from smoothing their domestic absorption. Saving commodity export proceeds may arise from inter-temporal smoothing concerns—reflecting

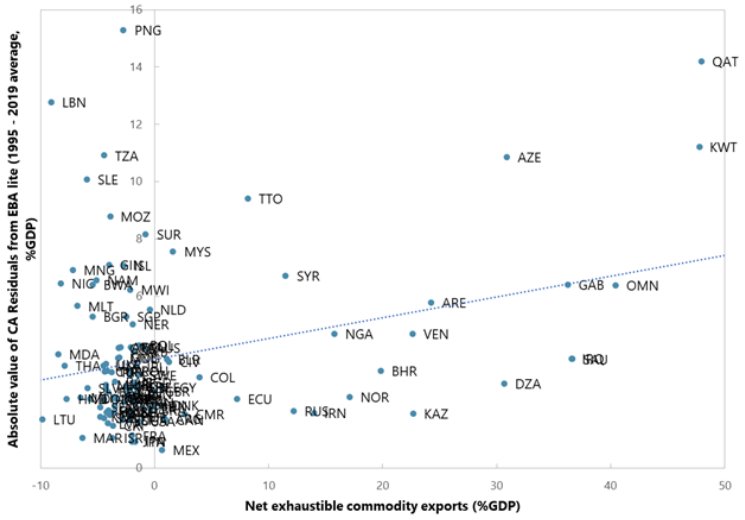
[20] If former is smaller than or equal to the latter, the current NFA can be maintained in the medium-term without any further real exchange rate adjustments.

that the resource revenue is non-renewable—as well as precautionary motives, reflecting the high volatility of commodity prices.

64. Considerations for exporters of exhaustible resources are not well captured by current account regression approaches. The regression-based models consider natural resources as a fundamental variable, limiting interaction with fiscal policy and with stocks of above-ground wealth. Given the tight connection between the determination of external and fiscal balances for exporters of exhaustible resources, understanding the role of fiscal policy in driving current account gaps is also important. The models also do not account for investment needs, which are hard to capture in a single variable. Reflecting these factors, the fit of the EBA-Lite current account model is relatively poor for commodity exporters, with the model residuals generally increasing with commodity exports.

65. In light of these limitations and the significant incidence of large exporters among EBA-Lite users, the 2018 review introduced two new complementary models, tailored to commodity exporters. One approach focused on savings dynamics and the other on investment dynamics (see IMF 2019). The consumption allocation model provides current account norms for smoothing inter-generational consumption of assets. The investment needs model is particularly useful for countries with low capital to assess the returns to investment of their resource wealth. These are discussed in turn below.

Figure 9. Commodity Exports and EBA-Lite Model Residuals



Source: WEO 2022 and authors' calculations.

E. Consumption Allocation Model

66. Consumption allocation rules that distribute resource wealth across periods can be used to derive current account gaps. The motive to save exhaustible resources may arise from inter-temporal smoothing concerns, reflecting that the resource revenue is non-renewable. For instance, the idea that each individual in each generation is allocated the same real resources out of the country's wealth—based on the permanent income hypothesis—suggests a constant real per capita annuity could be the preferred normative measure for external sector assessments. To smooth inter-temporal consumption, countries can consume an annuity out of their resource wealth, defined as the sum of below-the-ground wealth (the present value of exports of exhaustible

commodities) plus above-ground external wealth (net international investment position); see Bems and de Carvalho Filho (2009). The consumption allocation model's constant real per capita annuity yields a norm for consumption, from which a saving norm is readily derived and applied to the current account. This approach often suggests current account norms that are higher relative to those from the EBA-Lite CA regression model. The consumption allocation model is tractable and most useful in middle- and high-income countries. In some LICs, immediate investment or development needs overwhelm longer-term savings considerations, so the consumption allocation model may not be appropriate.

F. Investment Module

67. Models that account for investment needs can lead to lower CA norms in resource-rich developing countries relative to the consumption allocation model. By holding investment fixed, the consumption allocation rules described above implicitly assume additional savings is invested abroad. However, in low-income countries where capital is scarce, returns to investing resource wealth domestically may be higher than returns to saving externally, leading the consumption allocation rule to overstate savings-investment norms. Araujo and others (2016) propose a small open economy model that explicitly incorporates the role of investment and credit constraints. One of the model's main features is separate public and private investment efficiency parameters, which could be used to illustrate how external misalignments could change if investment efficiency is improved, thus motivating specific policies beyond those that affect just the external sector.

68. The investment-needs model is better suited for countries that have large investment needs and lack market access but have reasonably high investment efficiency. The model depends on the calibration of investment efficiency, which in turn depends on the institutional frameworks to effectively implement investments. This can be low in many resource-rich developing countries; see Pritchett (2000) and IMF (2012).[21] Lower investment efficiency will lead to lower levels of optimal investment, and therefore to higher CA norms.

69. Implementation of the investment needs approach presents challenges, as the results are sensitive to parameterization. To focus on the key question of investment efficiency and to simplify model implementation, in EBA-Lite 3.0 all parameters, other than those related to the efficiency of private investment and of public investment have been fixed at empirically supported values, reducing the number of free parameters terms. to. The selection of the investment efficiency parameters could be guided by a country's Public Investment Management Assessment (PIMA), where available, or the empirical results in Gupta and others (2014) or Pritchett (2020). Assessments

[21] Araujo and others (2016) consider two types of investment frictions. *Investment inefficiencies* mean that one dollar invested translates into less than one dollar of productive capital, while *absorptive capacity constraints* imply that adjusting capital stocks is costly. In their calibration, introducing investment frictions can lead to current account norms over 5 percentage points higher than in the absence of such frictions (see Figure 5 in Araujo and others). It is worth noting that, while absorptive capacity considerations would typically lead to gradual investment strategies (see e.g., Berg and others (2013) and literature cited therein), investment inefficiencies lower optimal investment across all periods.

should be transparent about the underlying assumptions for the investment parameters and their justification, and teams should avoid making small changes from year to year.

FINAL REMARKS

70. The EBA-Lite framework provides flexibility to tailor external sector assessments to country-specific characteristics. In general, staff will need to identify their preferred approach for the assessment based on country characteristics, and the model choice is expected to not change from year to year. Importantly, numerical results from different models should not be averaged. Teams can also use other indicators to support their assessments, as discussed in the surveillance guidance note. Where data availability is very limited and the application of the EBA-Lite tools difficult, staff's assessment may need to rely on more descriptive and qualitative discussions.

71. For most EBA-Lite economies, the current account model remains the main workhorse approach. This reflects the better empirical fit of the model and its ease of interpretation and insights into the policies that may be driving imbalances. Staff also has experience in calibrating appropriate adjustors to the current account model to fit country specific circumstances. As described in paragraph 57, there are several caveats with the REER model that reinforce the preference for the CA empirical approach. Where external sustainability is an overriding concern, the assessment should also be informed by directly using the ES approach (based the current level of the NFA or an alternative benchmark as discussed in paragraph 62) or in other cases, the application of an external sustainability adjustor to the current account models. The commodity modules provide an additional perspective for commodity exporters, although the investment module is sensitive to the parameter choices and staff continues to draw lessons from its application.

72. Work to improve the EBA-Lite methodology is part of an ongoing process to strengthen the Fund's external sector assessment framework for the full membership. Looking ahead, work will continue to refine the models on several fronts, including improving the empirical robustness of the models and exploring new variables, such as the impact of climate change on current account balances, and other adaptations to improve the country-specific tailoring of the framework in an evenhanded way while maintaining multilateral consistency.

Table 1. Countries in ESR, EBA, and EBA-Lite							
Afghanistan			EBA-Lite	Lesotho			EBA-Lite
Albania			EBA-Lite	Liberia			EBA-Lite
Algeria			EBA-Lite	Libya			EBA-Lite
Andorra			EBA-Lite	Lithuania			EBA-Lite
Angola			EBA-Lite	Luxembourg			EBA-Lite
Antigua and Barbuda			EBA-Lite	Macao SAR			EBA-Lite
Argentina	ESR	EBA		Madagascar			EBA-Lite
Armenia			EBA-Lite	Malawi			EBA-Lite
Aruba			EBA-Lite	Malaysia	ESR	EBA	
Australia	ESR	EBA		Maldives			EBA-Lite
Austria		EBA		Mali			EBA-Lite
Azerbaijan			EBA-Lite	Malta			EBA-Lite
Bahamas The			EBA-Lite	Marshall Islands			EBA-Lite
Bahrain			EBA-Lite	Mauritania			EBA-Lite
Bangladesh		EBA		Mauritius			EBA-Lite
Barbados			EBA-Lite	Mexico	ESR	EBA	
Belarus			EBA-Lite	Micronesia Fed. States of			EBA-Lite
Belgium	ESR	EBA		Moldova			EBA-Lite
Belize			EBA-Lite	Mongolia			EBA-Lite
Benin			EBA-Lite	Montenegro Rep. of			EBA-Lite
Bhutan			EBA-Lite	Morocco		EBA	
Bolivia			EBA-Lite	Mozambique			EBA-Lite
Bosnia and Herzegovina			EBA-Lite	Myanmar			EBA-Lite
Botswana			EBA-Lite	Namibia			EBA-Lite
Brazil	ESR	EBA		Nauru			EBA-Lite
Brunei Darussalam			EBA-Lite	Nepal			EBA-Lite
Bulgaria			EBA-Lite	Netherlands	ESR	EBA	
Burkina Faso			EBA-Lite	New Zealand		EBA	
Burundi			EBA-Lite	Nicaragua			EBA-Lite
Cambodia			EBA-Lite	Niger			EBA-Lite
Cameroon			EBA-Lite	Nigeria			EBA-Lite
Canada	ESR	EBA		North Macedonia			EBA-Lite
Cabo Verde			EBA-Lite	Norway		EBA	

Table 1. Countries in ESR, EBA, and EBA-Lite (continued)							
Central African Republic			EBA-Lite	Oman			EBA-Lite
Chad			EBA-Lite	Pakistan		EBA	
Chile		EBA		Palau			EBA-Lite
China	ESR	EBA		Panama			EBA-Lite
Colombia		EBA		Papua New Guinea			EBA-Lite
Comoros			EBA-Lite	Paraguay			EBA-Lite
Congo, Democratic Republic of the			EBA-Lite	Peru		EBA	
Congo, Republic of			EBA-Lite	Philippines		EBA	
Costa Rice		EBA		Poland	ESR	EBA	
Côte d'Ivoire			EBA-Lite	Portugal		EBA	
Croatia			EBA-Lite	Puerto Rico			EBA-Lite
Cyprus			EBA-Lite	Qatar			EBA-Lite
Czech Republic		EBA		Romania		EBA	
Denmark		EBA		Russia	ESR	EBA	
Djibouti			EBA-Lite	Rwanda			EBA-Lite
Dominica			EBA-Lite	Samoa			EBA-Lite
Dominican Republic			EBA-Lite	San Marino			EBA-Lite
Ecuador			EBA-Lite	São Tomé and Príncipe			EBA-Lite
Egypt		EBA		Saudi Arabia	ESR		EBA-Lite
El Salvador			EBA-Lite	Senegal			EBA-Lite
Equatorial Guinea			EBA-Lite	Serbia			EBA-Lite
Eritrea			EBA-Lite	Seychelles			EBA-Lite
Estonia			EBA-Lite	Sierra Leone			EBA-Lite
Eswatini			EBA-Lite	Singapore	ESR		EBA-Lite
Ethiopia			EBA-Lite	Slovak Republic			EBA-Lite
Fiji			EBA-Lite	Slovenia			EBA-Lite
Finland		EBA		Solomon Islands			EBA-Lite
France	ESR	EBA		Somalia			EBA-Lite
Gabon			EBA-Lite	South Africa	ESR	EBA	
Gambia The			EBA-Lite	South Sudan			EBA-Lite
Georgia			EBA-Lite	Spain	ESR	EBA	
Germany	ESR	EBA		Sri Lanka		EBA	
Ghana			EBA-Lite	St. Kitts and Nevis			EBA-Lite

Table 1. Countries in ESR, EBA, and EBA-Lite (concluded)							
Greece		EBA		St. Lucia			EBA-Lite
Grenada			EBA-Lite	St. Vincent and the Grenadines			EBA-Lite
Guatemala		EBA		Sudan			EBA-Lite
Guinea			EBA-Lite	Suriname			EBA-Lite
Guinea-Bissau			EBA-Lite	Sweden	ESR	EBA	
Guyana			EBA-Lite	Switzerland	ESR	EBA	
Haiti			EBA-Lite	Syria			EBA-Lite
Honduras			EBA-Lite	Tajikistan			EBA-Lite
Hong Kong SAR	ESR		EBA-Lite	Tanzania			EBA-Lite
Hungary		EBA		Thailand	ESR	EBA	
Iceland			EBA-Lite	Timor-Leste Dem. Rep of			EBA-Lite
India	ESR	EBA		Togo			EBA-Lite
Indonesia	ESR	EBA		Tonga			EBA-Lite
Iran			EBA-Lite	Trinidad and Tobago			EBA-Lite
Iraq			EBA-Lite	Tunisia		EBA	
Ireland		EBA		Türkiye	ESR	EBA	
Israel		EBA		Turkmenistan			EBA-Lite
Italy	ESR	EBA		Tuvalu			EBA-Lite
Jamaica			EBA-Lite	Uganda			EBA-Lite
Japan	ESR	EBA		Ukraine			EBA-Lite
Jordan			EBA-Lite	United Arab Emirates			EBA-Lite
Kazakhstan			EBA-Lite	United Kingdom	ESR	EBA	
Kenya			EBA-Lite	United States	ESR	EBA	
Kiribati			EBA-Lite	Uruguay		EBA	
Korea	ESR	EBA		Uzbekistan			EBA-Lite
Kosovo			EBA-Lite	Vanuatu			EBA-Lite
Kuwait			EBA-Lite	Venezuela			EBA-Lite
Kyrgyz Republic			EBA-Lite	Vietnam		EBA	
Lao P.D.R.			EBA-Lite	Yemen			EBA-Lite
Latvia			EBA-Lite	Zambia			EBA-Lite
Lebanon			EBA-Lite	Zimbabwe			EBA-Lite

Note: This table indicates which models are used in external sector assessments for each country. All EBA countries are also included in the EBA-Lite estimation sample.

Table 2. EBA-Lite Data Definitions and Sources		
	Variables	**Sources**
Current Account Model		
	Current account, as percent of GDP	World Economic Outlook
	Output gap: the percentage difference between actual and potential GDP in percent of GDP. WEO data is used when available; for missing data, HP filtered estimates based on WEO actual and projected data are used.	World Economic Outlook
	Commodity terms of trade gap, Interacted with Trade Openness. The country-specific weighted aggregation of price gaps to 42 commodities. See paragraph 10 for additional details.	World Economic Outlook and World Integrated Trade Solutions (the UN Comtrade Engine)
	Natural disaster dummy, equal to one when the reported damage in percent of GDP is greater than zero; zero otherwise.	Emergency Events Database (EM-DAT)
	Armed conflict dummy, equal to one each year an armed conflict took place; zero otherwise.	UCDP/PRIO Armed Conflict Dataset
	Net Foreign Assets (NFA)/Net International Investment Position (NIIP) to GDP ratio. NFA data are an updated and extended version of the Lane and Milesi-Ferretti (2007) EWN database with broader country and time coverage than International Financial Statistics (IFS) data.	External Wealth of Nations (EWN), Lane and Milesi-Ferretti
	Share in world reserves. Share of a country's own currency in total stock of world reserves.	Official Foreign Exchange Reserves
	Output per worker, relative to top 3 economies. Ratio of GDP (in PPP terms) to working age population relative to the average of Germany, Japan, and US, demeaned.	World Economic Outlook and UN World Population Prospects
	Expected real GDP Growth (5 Years Ahead). The WEO 5-year ahead forecast for real GDP growth	World Economic Outlook
	Old-age dependency ratio. Ratio of the population over 65 divided by the population between 30 and 64 years.	UN, World Population Prospects
	Share of prime-age savers. Current share of prime savers (ages 45-65) as a proportion of the working age population (ages 30-64).	UN, World Population Prospects
	Life expectancy (interacted with future old-age dependency ratio. Life expectancy of a current prime-age saver.	UN, World Population Prospects
	Population growth. Annual growth rate of the population.	UN, World Population Prospects

Table 2. EBA-Lite Data Definitions and Sources (concluded)		
	Variables	**Sources**
Current Account Model		
	Institutional quality. The ICRG 12 Institutional Index includes 12 sub-indicators from the International Country Risk Guide (ICRG) database: government stability; internal conflict; external conflict; military in politics; law and order; corruption; religious tensions; and democratic accountability. The values are normalized between 0 and 1, with higher values indicating less risk.	PRS Group, International Country Risk Guide
	Migrant share. The number of outward migrants in ratio to the domestic population.	UN, World Population Prospects
	Oil and natural gas trade balance, interacted with resource temporariness. Exports minus imports of oil and gas in percent of GDP; enters only when this balance is positive. Defined as the net oil and gap external balance (three-year moving average, in percent of GDP) multiplied by temporariness, measure as the role of current oil extraction to proven reserves, relative to the same ratio for Norway in 2010.	World Integrated Trade Solutions; and British Petroleum Statistical Review of World Energy
	Cyclically adjusted fiscal balance, relative to GDP. For most countries and years, the cyclically adjusted overall general government fiscal balance is based on WEO data. If unavailable, computed as a residual of a country-specific regression with the output gap.	World Economic Outlook
	Change in foreign reserves, interacted with capital control index. The change in the central bank foreign exchange reserves (including off-balance sheet changes) during the year, relative to nominal GDP in US dollars.	IMF Balance of Payments and Fiscal Analysis of Resource Industries Index
	Public health expenditure (lagged). Total government expenditures (including through external borrow and grants) on health schemes, in percent of GDP.	World Development Indicators
	Private sector credit to GDP (demeaned for each country by its historical average).	World Development Indicators
	Private credit (growth rate). The change in private credit between year t and year t-1, normalized by year t nominal GDP.	World Development Indicators
REER Model (additional variables)		
	Remittances to GDP. Current transfers in the secondary income account of the balance of payments, relative to GDP.	International Financial Statistics and World Development Indicators
	Real interest rate, interacted with capital openness. The difference between the nominal short-term interest rate and the annual inflation rate.	International Financial Statistics, World Economic Outlook and Haver Database

Table 3. Estimation Results: EBA-Lite Current Account Model

Variables 1/ 2/	EBA-Lite 2.0 (1995-2016)	EBA-Lite 2.0 (1995-2019)	EBA-Lite 2.0 (1995-2019, updated definitions)	BMA PIP	EBA-Lite 3.0 (1995-2019)
Cyclical and Temporary Factors					
Output gap	-0.182***	-0.154***	-0.139***		-0.134***
Commodity ToTgap*Trade Openness 3/	0.403***	0.332***	0.207***		0.195***
Disaster dummy =1 if $ damage >0%	-0.013***	-0.009***	-0.019***		-0.019***
Disaster dummy * K-Control	0.029***	0.023***	0.052***		0.051***
Conflict dummy	0.008***	0.010***	0.006**		0.007**
Macroeconomic Fundamentals					
L.(NFA/GDP)	0.023***	0.030***	0.030***	[1.00]	0.026***
Share in world reserves	-0.072***	-0.076***	-0.059***	[1.00]	-0.065***
L.Output per worker-relative to top 3 economies	0.104***	0.081***	0.087***	[1.00]	0.087***
L.Output per worker-relative to top 3 economies * K openne:	-0.032***	-0.026***	-0.040***	[0.98]	-0.038***
GDP growth-forecast in 5 years	-0.800***	-0.706***	-0.622***	[1.00]	-0.640***
Structural Fundamentals					
Dependency ratio	-0.118***	-0.058**	-0.043*	[0.51]	-0.044*
Prime saver share	0.127***	0.136***	0.097**	[0.75]	0.107***
Life Expectancy at age 45 * Future dependency ratio	0.002***	0.001***	0.002***	[0.54]	0.002***
Population growth	-0.813***	-0.459***	-0.406***	[0.96]	-0.405***
ICRG 12 Institutional Index (0-1)	-0.034**	-0.024*	-0.040***	[0.03]	-0.039**
Percentage of Overseas population stock out of national pop	-0.001***	-0.001***	-0.001***	[1.00]	-0.001***
Oil and Natural Gas Trade Balance * resource temporariness	0.073***	0.093***	0.299***	[1.00]	0.297***
Policy Variables					
Cyclically adjusted fiscal balance	0.441***	0.384***	0.421***		0.429***
Change in reserves/GDP*K-Control 3/	0.856***	0.725***	0.690***		0.789***
Lagged Public Health Expenditure/GDP	-0.810***	-0.631***	-0.554***		-0.569***
Demeaned private credit/GDP	-0.030***	-0.007	-0.009		-0.010*
(Change in Private credit)/GDP	-0.077***	-0.056***	-0.053***		-0.055***
Constant	0.002	0.003	0.004**		0.003
Observations	2,097	2,556	2,369		2,375
Number of economies	130	126	122		122
R-squared IV		0.583	0.611		0.601
R-squared fit	0.57	0.574	0.615		0.597
Root MSE	0.07	0.069	0.066		0.067

1/ All variables are relative to the world average; estimation sample period is in parentheses
2/ *** p-value<0.01; ** p-value<0.05; * p-value<0.1
3/ Re-defined variable for EBA-lite 3.0 specification

Table 4. Estimation Results: EBA-Lite Real Effective Exchange Rate Model

Variables 1/ 2/	EBA-Lite 2.0 (sample, 1995-2016)	EBA-Lite 2.0 (sample, 1995-2019)	EBA-Lite 3.0 (sample, 1995-2019)
Cyclical and Temporary Factors			
Output gap			0.379***
Commodity terms of trade, interacted with trade openness 3/	-0.043***	0.191	0.079
Natural disaster indicator	-0.005	-0.016	0.010
Natural disaster indicator, interacted with capital controls 3/	0.034	0.077***	-0.005
Conflict indicator	-0.009	0.021	
Macroeconomic Fudamentals			
Net foreign asset (NFA) position	0.057***	0.008	-0.006
NFA, interacted with high debt dummy	0.029	0.051***	0.042***
Share of reserves	0.674***	0.561***	0.198*
Global risk aversion, interacted with capital openness 3/	-0.001	-0.192	
Global risk aversion, interacted with capital openness and share of reserves 3/	0	-0.071	
Relative output per worker	0.288***	0.293***	0.118**
Relative output per worker, interacted with trade openness	0.08	-0.125***	
Expected GDP growth	-0.545*	-0.447*	
Remittances	-1.237***	-1.361***	-1.159***
Aid	-0.192	-8.339	
Structural Fundamentals			
Old-age dependency ratio (OAD)	-1.484***	-1.112***	-0.651***
Life expectancy	-0.045***	-0.036***	-0.017**
Life expectancy, interacted with OAD	0.003	0.001	0.006*
Share of prime-aged savers	0.533	0.489*	
Population growth	-1.925***	-2.060***	
ICRG 12 index	0.069	0.227**	0.029
Oil and gas reserves 3/	0.018	-0.338	
Policy Variables			
Cyclically adjusted fiscal balance			-0.212**
FXI, interacted with capital controls 3/	0.247	0.258	0.213
Health spending	-0.142	-0.560	
Demeaned private credit level	0.135***	0.084***	0.061***
Change in private credit	0.276***	0.221***	0.207***
Real interest rate, interacted with captial controls 3/	0.52***	0.670***	1.035***
Observations	1512	2,275	2,098
Number of economies	126	121	116
R-squared	0.490	0.411	0.411
Root MSE		0.126	0.127

1/ All variables are relative to the world average
2/ *** p-value<0.01; ** p-value<0.05; * p-value<0.1
3/ Re-defined variable for EBA-lite 3.0 specification

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