Online Annexes

Online Annex 1.1. EBA Methodology 2022 Refinements[1]

The External Balance Assessment (EBA) methodology has provided the framework for conducting External Sector Assessments (ESA) by Fund staff since its introduction in 2012. The EBA framework built on the IMF's earlier Consultative Group on Exchange Rates (CGER) models, modifying them to introduce the definition of current account (CA) and real effective exchange rate (REER) benchmark (norm) levels based on *desirable* policy settings, and to include model-based cyclical adjustments. IMF staff updated the EBA models in 2015 and in 2018 to incorporate the latest data, advances in the related literature, and feedback from stakeholders (see Cubeddu and others 2019; IMF 2015a; and Phillips and others 2013).

This annex describes the 2022 refinements to the EBA CA and REER models that are used to conduct the external sector assessments in the *External Sector Report,* including updates of the set of complementary tools that can be used to inform staff judgment. It also provides new estimates of the country-specific semi-elasticities between the CA and the REER, that incorporate the response of both the trade balance and the income balance to REER movements. The basic principles of the EBA methodology remain unchanged, including the estimation of CA and REER norms and gaps and using the CA model as the main input for arriving at the overall external sector assessment (see Cubeddu and others 2019 for a description).

EBA CA Model Refinements

Data Updates and Refined Variables

The first element of the CA model refinements is updating the data. Data updates include the extension of all series by three additional years to include annual data for 1986-2019, as well as data revisions and the inclusion of the latest vintages of the variables that are periodically revised (for instance, demographic variables are recalculated using the 2019 revision of the UN World Population Prospects). The EBA country sample is also updated to add three more economies, Bangladesh, Romania and Vietnam, increasing the panel size from 49 to 52 economies. The three additional economies are among the world's largest 50 according to 2019 nominal GDP but were not previously included. The EBA country sample continues to exclude economies that are either financial centers or large oil exporters, owing to their outlier status. The model is estimated with data available as of October 2021. Online Annex Table 1.1.1 lists the data sources for all variables.

Data refinements also include improvements in the construction of some variables in the model and the modification of the cyclical and short-term factors.

Terms-of-Trade Gap. In the previous EBA CA model (Cubeddu and others, 2019), commodity terms-of-trade are measured as the ratio of a geometric weighted-average price of main commodity export categories to the equivalent geometric weighted-average price of commodity imports. The previous model included the deviations of this terms-of-trade index from its trend, estimated using the Hodrick-Prescott (HP) filter, to capture the temporary component. The smoothing parameter was the same as typically used in the business cycle literature at the annual frequency ($\lambda = 100$). The resulting terms-of-trade gap was interacted with trade openness.

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The refined commodity terms-of-trade gap improves upon the previous measure in two ways. First, the refined terms-of-trade gap is built bottom-up from individual commodity price gaps. Rather than detrending an aggregate index, band-pass filtering techniques are applied to *individual* commodity price series to obtain the corresponding gaps for each of the 42 categories considered (for instance, an oil price gap, a copper price gap, and so on). This has benefits in terms of transparency, as it is possible to identify the contributions of each commodity price gap to a country's overall commodity terms-of-trade gap. Second, these gaps are calculated using filtering techniques that allow for both short-term and longer "supercycles", characteristic of commodity prices. Recent studies suggest that commodity price fluctuations follow "supercycles" with much longer durations than standard business cycles (see, for example, Erten and Ocampo 2013; Jacks 2013; Stuermer 2018; Jacks and Stuermer 2020). Estimating these commodity price "supercycles" requires using band-pass filters instead of the HP filter and the availability of longer annual time series to be able to properly identify low-frequency cycles. The terms-of-trade gap is obtained by aggregating all individual commodity price gaps using country-specific trade weights. Online Annex Box 1.1.1 provides further details on the construction of the refined terms-of-trade gap.

Oil and Gas Reserves. To measure the stock of an economy's temporary oil and gas resources, the previous EBA CA model included a variable that combines the size of the oil and natural gas balance, in percent of GDP, and a measure of its degree of temporariness based on the ratio of current extraction to proven reserves. The size of the oil and natural gas balance is proxied by a 5-year moving average of the oil and gas net export balance (as percent of GDP) to smooth out price fluctuations in a way that is consistent with the existing terms-of-trade gap variable (at business cycle frequencies with a cycle length of about 5 years).

The revised construction process of the commodity terms-of-trade gap is used to revise the oil and gas reserves variable. In the refined variable, net exports of oil and gas are assessed as if their prices were at their long-term trend level, consistent with a zero estimated price gap component with the "supercycle" methodology.[2] This helps to further insulate the oil and gas reserves variable from short and medium-term price fluctuations, thus enhancing its structural nature and contributing to norm stability. Online Annex Box 1.1.2 provides further details on the approach.

Capital Controls. The refined EBA CA model uses the Financial Account Restriction Index (FARI) constructed by Fund staff in the Monetary and Capital Markets (MCM) department instead of the Quinn index used in previous EBA versions. Both indexes are constructed based on information in the IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) questionnaire responses. The FARI is calculated as the percentage of authorities' affirmative answers to the AREAER categories related to regulations on capital account transactions, while the Quinn index also includes judgement on the importance of each measure. An implication is that, for some economies for which the Quinn index allocates a score of zero implying a fully open capital account, the FARI can indicate the presence of some capital restrictions, even if they are relatively modest. The two indexes are strongly correlated for the economies for which both are available. Online Annex Figure 1.1.1 compares the two indexes for the most recent year for which both are available (2018). Moreover, the FARI is available for the entire IMF membership, which facilitates its use for the larger sample of economies now included in the EBA. Several published IMF studies and Board papers have already used the FARI or its earlier version (examples include Nier and others, 2020; Cecchetti and others, 2021; and IMF, 2012a, 2012b, 2015b, 2016). Baba and others (2022, forthcoming) provide details on its construction.

Cyclical and Short-term Factors. The EBA framework controls for the influence of temporary and cyclical factors so that the analysis can strip them out when comparing CA balances with their medium-term benchmark (norm) levels. The refined version of the CA model continues to control for the output gap, which indicates the state of the business cycle, and for the refined commodity terms-of-trade gap. It adds a third short-term factor: the lagged annual change in the real effective exchange rate (REER). Including the lagged REER change as an additional control, as in Coutinho, Turrini and Zeugner (2022), allows the CA analysis to strip out from the medium-term CA gap assessment the influence of movements in the REER that reflect short-term factors rather

[2] See Online Annex Box 1.1.1 for an example of how to estimate the long-term trend level for oil prices.

than the medium-term fundamentals and policies also included in the CA equation. Since the EBA CA model already controls for medium-term factors, the estimated coefficient on the REER term indicates the CA relation with movements in the REER holding such other factors constant.

Model Estimation and Selection

The second element of the 2022 CA model refinements is ensuring that the model specification is robust. The EBA current account regression takes the following form:

$$CA_{it} = \beta X_{it} + \varepsilon_{it} \qquad (1)$$

where CA_{it} denotes the CA balance-to-GDP ratio in country i and year t, and X_{it} denotes a matrix of cyclical and short-term factors, medium-term macroeconomic and structural fundamentals, and policy variables. As in Cubeddu and others (2019), the variables in the model are measured relative to the GDP-weighted world average. This implies that a certain regressor, for instance fiscal policy, will have an impact on the CA as long as it is more expansionary or contractionary than in the rest of the world. The CA model is estimated using a pooled generalized least squares (GLS) method with a panel-wide AR(1) correction due to the autocorrelation of the dependent variable. As in Cubeddu and others (2019), to address endogeneity concerns, the structural fiscal balance and change in foreign exchange reserves are instrumented.[3]

Although the potential inclusion of CA determinants in the model is anchored on theoretical considerations, theory is not sufficiently explicit regarding which variables are robustly associated with the CA balance and should be included in the "true" equation (see Sala-i-Martin and others, 2004, for a related discussion in the context of growth regressions). To select which variables are robustly associated with the CA balance, the analysis uses Bayesian Model Averaging (BMA). The BMA approach involves analyzing all possible combinations of variables considered based on theoretical considerations and calculates the probability that a variable belongs in the model (the posterior inclusion probability, PIP). A potential explanatory variable is considered to be robustly correlated with the dependent variable if the PIP is greater than 50 percent.[4] The exercise thus simplifies the current account regression equation, excluding non-robust and non-significant variables, while remaining anchored on theoretical considerations.

Online Annex Table 1.1.2 presents the estimation results. For ease of comparison, column (1) reports a replication of the previous CA model estimates, as presented in Cubeddu and others (2019). Column (2) shows the estimation results after only updating the data to include 1986-2019 and before introducing any other changes to variable definitions, to the sample or to the model specification. Most coefficient estimates, especially for the variables that capture the effects of structural fundamentals and policy variables (excluding capital controls) are stable. The largest changes from updating the data are: (i) a one standard error increase in the NFA coefficient; (ii) a decline in the coefficient of the reserve currency status variable (defined, as before, as the share of a country's currency in world reserve holdings), which becomes not statistically significant; (iii) an increase in the NFA high debtor dummy coefficient, which switches signs, although it is not statistically significant; and (iv) a generalized decrease in the coefficients of the capital openness interactions.[5] In particular, the effect of output per worker interacted with capital openness is no longer statistically significant, but this

[3] The fiscal balance is instrumented with the lagged trade-weighted structural fiscal balance of trading partners, as well as with the instrument set discussed in Cubeddu and others (2019), which includes lags for relevant global factors (world real GDP growth, world output gap and global risk aversion, proxied by the U.S. corporate credit spread) and country-specific features (lagged GDP per capita, lagged output gap, the exchange rate regime, and a democracy index). The change in foreign exchange reserves is instrumented with the variables as in Cubeddu and others (2019): a measure of global accumulation of reserves, reflecting the desire of countries to maintain FX liquidity (for precautionary motives) at par with peer countries; a measure of reserve adequacy linked to M2, which is defined as (M2-reserves)/GDP relative to the average emerging market group; and an emerging market and developing economy dummy.

[4] A conventional approach in the BMA literature is to refer to a variable as "effective" if its estimated inclusion probability is greater than 50 percent. For additional details on the BMA approach, see, for example, Hoeting and others (1999) and Masanjala and Papageorgiou (2008).

[5] The reserve currency status variable is motivated by the notion that issuers of reserve currencies, such as the United States, benefit from an "exorbitant privilege" reflecting global demand for safe assets, which reduces the issuer's funding costs, tilts consumption towards the present, raises investment and reduces the CA balance. Exploring factors that could explain a decline in the relation between CA balances and the share of a country's currency in world reserve holdings is beyond the scope of the analysis.

decrease is partially offset by an increase in the contribution of output per worker (uninteracted) among the macroeconomic fundamentals. The global risk aversion variable has a smaller impact than in previous versions of EBA: the coefficient of the VIX interacted with capital account openness declines and is not statistically significant, while the coefficient of the VIX interacted with capital account openness and reserve currency status switches signs, while remaining statistically and economically insignificant.

The next step after updating the data is to analyze the robustness of the model by using BMA and to exclude variables that are not robustly associated with the CA balance. Column (3) presents the estimated PIPs for the previous model specification with updated data. These results suggest that the NFA interacted with the high debt dummy and the three capital openness interactions are not robust. Therefore, they are excluded from the updated version of the model. The estimated coefficients for all other variables change little, but output per worker becomes statistically significant and has a larger point estimate once output per worker interacted with capital account openness is excluded from the regression model.

Column (4) presents the refined CA model that incorporates all the proposed additional refinements: improved definitions of the commodity terms-of-trade gap and oil and gas reserves, capital controls measured with FARI, the inclusion of the lagged REER change as a short-term factor and the addition of three economies to the sample. In addition, since after the introduction of these changes the coefficient for reserve currency status is no longer statistically significant and has a low probability of inclusion according to the BMA, the final specification excludes this variable.[6] Column (5) presents the estimated PIPs for the final model specification; all the variables included in the refined model are robustly associated with the CA. Generally, estimated coefficients do not change much from the version with only updated data or the previous model. The short-term effect of the lagged change in the REER is significant although quantitatively small, suggesting that it may play a role only in the case of large and sudden currency movements. Moreover, the inclusion of the lagged change in the REER has little effect on all other coefficient estimates, in line with the notion that it reflects movements unrelated to the medium-term fundamentals.

Model Fit

Online Annex Table 1.1.3 shows that the model fit measured using the *R*-squared statistic is about 52 percent for the refined model, which is unchanged from the previous model estimated with data up to 2019. This model fit is comparable to other studies in the literature that estimate similar cross-country CA regressions either by IMF staff or by other authors. One way to increase model fit would be to include country fixed effects or the lagged CA balance. However, for the purposes of the EBA exercise, such factors are excluded as they would reflect country-specific persistent factors, including policy distortions that have persistent effects, and complicate relating differences in CA balances to cross-country differences in fundamentals.

EBA CA Norms

Online Annex Figure 1.1.2 presents a comparison of the EBA CA norms for 2021 estimated with the previous model (horizontal axis) and the refined model (vertical axis). Interestingly, while there are some numerical changes in the norms coming from the updated parameter values, the sign of the norms is generally stable: advanced economies with aging populations, creditor positions, high income per capita and low growth potential have positive CA norms in both the previous and refined models, while emerging market and developing economies with younger populations, low income per capita and high growth potential tend to have negative CA norms. In a few cases, norms change signs but remain near zero.[7] Online Annex Tables 1.1.4-1.1.7 provide the norm breakdowns, indicating the main drivers for each economy. In general, the contribution of policy variables to the norms is stable across models.

[6] Specifically, the PIP for the reserve currency variable drops to 0.22 in the refined model. Excluding the non-robust variables from the CA model has very small quantitative implications for the estimated CA norms and gaps, and hence on assessments.

[7] In the non-ESR sample, there is a large change in Ireland's norm primarily driven by the effect of its large negative NFA, combined with the change in the NFA coefficient and the removal of the large NFA debtor dummy.

Other Modifications Considered

In addition to the adopted refinements, some extensions to the CA model were considered following recent contributions to the literature. This subsection discusses these extensions even if they were not incorporated in the refined model at this point.

NFA Components. Standard models of the CA predict that economies with more positive NFA positions have higher CA balances—though not necessarily higher trade balances—reflecting net income earned on the NFA position, keeping other factors, including valuation effects, constant.[8] Accordingly, numerous empirical studies, including those presented in Online Annex Table 1.1.3, estimate a positive coefficient on the lagged stock of NFA. At the same time, it is plausible that the composition of the NFA may have implications for the primary income balance, and hence the CA, due to different rates of return across components. For example, debt and equity external assets and liabilities may earn different returns.

To investigate this possibility, the refined CA model was re-estimated while replacing the NFA term with its components: foreign exchange reserves, portfolio equity, FDI and external debt. As reported in column (2) of Online Annex Table 1.1.8, the results from this exercise are mixed. The *R*-squared of the model rises but the estimated large coefficient on the stock of foreign exchange reserves is hard to interpret. Reserves often include government debt of reserve currency-issuing advanced economies that typically pay a low or even negative growth-adjusted rate of return. These estimation results may reflect endogeneity issues—unobserved country characteristics may drive both the CA balance and the composition of the NFA. In addition, the coefficients on other fundamentals (such as output per worker, demographics and institutional quality) and policy variables (including the fiscal balance) weaken in this more complex specification. Moreover, for any model that includes foreign exchange reserves as an individual component, the need to provide a desirable level of reserves when computing CA norms might become necessary. However, ascertaining a desirable level of reserves for all economies in the sample is difficult and lies beyond the scope of this exercise. Reflecting these mixed results and operational considerations, a decomposed NFA variable is not added to the CA model at this point.

Demographic Polynomials. In the EBA CA model, three demographics variables constructed with specific age groups proxy for the saving rate of the young, prime aged, and old (population growth, the share of prime age savers and the old age dependency ratio, respectively). A recent study by Koomen and Wicht (2020) of the Swiss National Bank suggests using the full information of the population age structure to understand how demographic differences across countries can affect the current account. Since this approach could potentially involve estimating a large set of parameters, the effects across age groups are approximated with a third-order polynomial as proposed by Fair and Dominguez (1991). The estimation results are presented in Online Annex Table 1.1.8, column (3). When the static demographic variables are replaced with these polynomials, the model fit does not improve. Moreover, the demographic variables currently in the model are statistically significant, their signs align with economic priors, and are robust when tested with the BMA. Therefore, the CA model maintains the existing EBA demographic block.

Safe Asset Index. To account for the effect of "flight to safety" on CA balances, Herman, Harris, and Hall (2021) construct a safe asset index for use in the U.S. Department of the Treasury Global Exchange Rate Assessment Framework (GERAF). The index is based on the notion that "in a risk-off environment, as uncertainty or volatility rises, a safe haven country will generally see its exchange rate appreciate and its government bond yields fall" (p. 7).[9] A replication of the safe asset index based on the approach of Herman, Harris, and Hall (2021) suggests that the price component is difficult to interpret as a measure of asset quality in several cases. Considering these findings, the safe asset index is not included in the CA model at this point.

Complementary Tools

The third element of the CA model refinements involves updating the model's set of complementary tools. These tools are designed to support the interpretation of the part of CA balances not explained by the EBA CA

[8] In addition, as Kumhof and Laxton (2007) explain, in steady state, when an economy is on its balanced growth path, the CA balance-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.

[9] For details on the approach, see Herman, Harris, and Hall (2021).

model (the residuals) that can be associated with structural features such as an economy's pension system or its labor and product regulatory frameworks, or with measurement biases in the CA.

Pensions. The first tool provides insights into how pension parameters may contribute to CA balances for a subset of the 52 EBA economies for which the relevant indicators are available. A pension system's generosity, its system of financing, whether participation is mandatory or voluntary, and the share of the population that it covers can theoretically affect private saving, national saving, and the CA balance. In an economy with myopic households or liquidity constraints, moving from a voluntary approach to a mandatory system could result in higher national saving and a rise in the CA balance, although the relationship between pension system features and the CA is not straightforward from a theoretical standpoint.[10] As with other CA drivers, the overall outcome for the CA balance would depend on how pension system parameters compare with those in the rest of the world.

Online Annex Box 1.1.3 analyzes how pensions system characteristics help to explain EBA CA residuals using two different datasets. It finds that some pension system characteristics have implications for CA balances, but the uncertainties associated with the estimates and methodological differences regarding the measurement of pension parameters across databases suggest the need for caution in interpreting the results. Overall, while using the estimates to quantify formal adjustors to normative EBA CA benchmarks is not currently warranted, the results can aid in the interpretation of EBA CA model residuals and the formulation of policy advice.

Product and Labor Market Regulations. Building on the earlier work of Cubeddu and others (2019), the second tool provides insights into the role of labor market and product market regulations, focusing on advanced economies. The stringency of regulations in labor and product markets, as well as reforms aimed at easing them, can, in principle, have an impact on saving, investment and the CA balance. Easing labor market regulation could, for example, increase export competitiveness and raise the CA balance, while easing product market regulations could raise investment and reduce the CA balance. Introducing product and labor market regulation indicators in the EBA CA model is precluded by data limitations, but results for a subset of economies with the necessary data can inform policy discussions on the role of structural reforms. Online Annex Box 1.1.4 analyzes the effects of labor and product market regulations on the CA. Overall, while using the results to quantify formal adjustors to normative EBA CA benchmarks is not currently warranted, the results can aid in the interpretation of EBA CA model residuals and the formulation of policy advice.

Measurement and Accounting Biases. The third tool improves on the estimation of CA measurement and accounting biases due to inflation-related distortions and the treatment of portfolio equity investment retained earnings in the current account. The "hybrid" approach previously used to estimate portfolio retained earnings (see Adler and others 2019 and IMF 2018) was dropped since it does not bring any new information (as it combines the two other existing methods), lacks a clear interpretation and can be prone to measurement issues. As part of the refinements, a new method that combines national accounts and foreign portfolio holdings data to reapportion the share of domestic corporate saving (or undistributed profit) attributed to foreign portfolio investors was designed (see Online Annex Box 1.1.5). It complements the existing methods (based on financial market data) by capturing activities of multinationals firms missing in domestic stock market data. It also ensures consistency between the measure of retained earnings and external sector data, as both are compiled using the same SNA/BOP methodology. This method can be also be complemented with more granular sectoral data shared by country authorities on a case-by-case basis.[11]

[10] For a discussion of theoretical channels through which economies with similar demographic trends can have different saving behavior due to different pension systems, see Amaglobeli and others (2019).

[11] This approach could ultimately be revised depending on the outcome of the upcoming revision of the treatment of retained earnings in the current account, in the context of the Balance of Payments Manual update (see guidance note F.2 - Asymmetric treatment of retained earnings), scheduled for 2025. Indeed, recommendations include adding supplementary data on portfolio equity retained earnings to the core accounts.

EBA REER-Index and REER-Level Models Refinements

In the EBA framework, the main input of the overall external sector assessment is the CA model. Hence, the starting point for estimating the staff REER gap is transforming the staff CA gap into a REER gap using the CA-REER elasticity, as described in the following section. However, the CA-implied REER gap may not fully capture currency fluctuations due, for instance, to lags between currency movements and CA adjustments. In such cases, the REER models can provide a useful benchmark for the overall assessment. This section presents updated estimates of the two existing EBA REER models: the REER-Index and REER-Level regressions.

The two REER models build on the EBA CA model but capture distinct aspects of the data (see Cubeddu and others 2019 for more details). The REER-Index model focuses on the determinants of movements in REER indices. A limitation of the model is that its use of REER index data, which are typically normalized to 100 in the base year, precludes assessing how a country's exchange rate *level* compares to that of other economies. The REER-Level model aims at understanding differences in relative price levels across countries. The model was introduced in 2015 and builds on the work by Bergstrand (1991), who established a positive cross-country correlation between REER levels and GDP per capita (the "Penn effect").[12] Both models include similar determinants as in the EBA CA model, as most factors that influence the current account also influence the real exchange rate, although some indicators vary across models reflecting differences in economic and statistical significance. For instance, both REER models exclude fiscal policy due to its counterintuitive results and include monetary policy (reflected in interest rate differentials interacted with capital account openness).

Data Updates and Refined Variables

Data updates with respect to the previous version include the extension of all series by three additional years, to 2019, as well as data revisions and the inclusion of the latest vintages of the variables that are periodically revised. Specifically, the price level data used to compute the REER level series are updated using the latest International Comparison Program (ICP) 2020 release. The level of REER is computed by combining cross-sectional information from PPP price level data with the time-series of REER. The reference year continues to be 2011 to provide continuity with the previous model version. Capital stock data uses the latest Penn World Table release (version 10.0). The Net Foreign Assets series is taken from the latest External Wealth of Nations release (Sep 2021). The ratio of traded to non-traded sector productivity extends the Mano and Castillo (2015) series using the World Bank's World Development Indicator (WDI) database. The value added tax dataset is updated using data from the OECD, the IMF's World Revenue Longitudinal Data (WoRLD) dataset, and UNU-WIDER Government Revenue dataset. The demographic variables (population growth and old-age dependency ratio) are recalculated using the 2019 revision of the UN World Population Prospects.

The share of administered prices in the CPI was included in previous versions of both the REER-Index and REER-Level models. While administered prices can in principle lower consumer price levels and hence affect the real exchange rate, this series, originally published by the European Bank for Reconstruction and Development (EBRD), has now been discontinued and there are no other cross-country datasets on administered prices with the same coverage. It is thus no longer included in the REER models.

As in the EBA CA model, both REER models now include the Financial Account Restriction Index (FARI) constructed by Fund (MCM) staff instead of the Quinn index used in previous EBA versions. Finally, the commodity terms-of-trade index used is now consistent across both REER models. Previous versions of the REER-Index model included a 6-commodity terms-of-trade index, which has now been replaced with the 42-

[12] The REER-Level variable is constructed combining cross-sectional information from PPP exchange rates with information across time contained in REER indices. First, cross-country data from the World Bank's International Comparison Program (ICP) is used to compute price levels relative to the United States for the base year (2011). Then, the REER-Level data is extended across the sample period (1990-2019), using REER indices re-scaled to their base year value. See Mano and others (2018) for details.

commodity index that is used in the REER-Level model. The same 42 categories are used to construct the terms-of-trade *gap* used in the refined CA model.[13]

Model Estimation and Selection

In both models, an increase in the REER implies appreciation. As explained above, the REER-Index model does not provide information on how a country's exchange rate level compares relative to other countries at any point in time. Therefore, the estimation requires the use of country fixed effects. In both models, most variables are expressed as deviations from each country's trading partners weighted average. FXI is interacted with the capital controls index and instrumented to deal with potential reverse causality issues. As in Cubeddu and others (2019), the fiscal balance remains excluded from the REER models because its impact is either insignificant or counterintuitive.[14] Instead, the REER models include a monetary policy variable, proxied by real interest rate differentials. Both models are estimated for the 1990-2019 period, with the REER-Index model using 41 economies while the REER-Level model includes 40 economies. In both models, statistical inference is based on heteroskedastic and autocorrelation consistent (HAC) standard errors. As in the case of the refined CA model, the analysis uses Bayesian Model Averaging (BMA) to select robust variables for both REER models.

REER-Index Model. Online Annex Table 1.1.9 presents the estimates of the refined REER-Index model and compares them to the previous model as well as the previous specification with updated data. Results from the BMA suggest that some variables are not robust and hence are excluded from the refined version. These include global risk aversion (interacted with capital account openness and with reserve currency status), population growth, and reserve currency status. These variables are also not significant when estimating the model on updated data. The conclusion that omitting these variables is now warranted is in line with the conclusion from the EBA CA model analysis, where global risk aversion with its interactions and reserve currency status were also dropped from the refined model specification. Overall, parameter estimates are quite stable across the two specifications, both for macroeconomic fundamentals and policy variables.

REER-Level Model. Online Annex Table 1.1.10 presents the estimates of the refined REER-Level model. As in the case of the REER-Index and the CA models, global risk aversion with its interactions is found to be non-robust and, along with the capital stock variable, is excluded from the refined model. In addition, after running the previous model with updated data, the results for the credit gap variable are either not statistically significant or counterintuitive so this variable is excluded from the refined specification.[15] Parameter estimates are generally comparable across specifications, although there are some noteworthy differences. In particular, the estimates for the interest rate differentials and foreign exchange intervention coefficients are larger with the new specification that uses the FARI capital control index. The VAT revenue coefficient is larger in the refined specification compared to the previous specification and becomes statistically significant. Dropping the non-robust variables does not alter the fit of the model much. The effect of demographic variables also becomes larger and with stronger statistical significance, while the impact of the reserve currency status variable is smaller in absolute value and has weaker statistical significance.

CA-REER Elasticities

Medium-term, country-specific semi-elasticities between the CA and the REER are a key element of external sector assessments as they help translate the estimated CA gap into a consistent REER gap, and to compare results with those from the REER models.

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[13] The commodity terms-of-trade index is measured as the ratio of a geometric weighted-average price of 42 commodity export categories to the equivalent geometric weighted-average price of commodity imports, each relative to manufactured goods prices in advanced economies. As in the previous version of the models, the REER index model uses the log index of the commodity terms-of-trade, while the REER level uses its level, normalized to its 2011 value, and interacted with trade openness.

[14] In some specifications, the fiscal balance is positively associated with the REER, contrary to the predictions of standard theoretical frameworks. The existing empirical literature suggests mixed results (see amongst others Ferrara and others, 2021 and Monacelli and Perotti, 2010).

[15] The credit gap variable was found to be not statistically significant in the previous REER-Level model. See Online Annex Table 1.1.10 and the discussion in Cubeddu and others (2019).

The semi-elasticity of the CA-to-GDP ratio with respect to the REER is defined as:

$$\frac{\Delta(CA/GDP)}{\Delta REER/REER} = \eta^{CA} = \overbrace{\eta^{TB}}^{goods\ and\ services\ trade} + \overbrace{\eta^{IB}}^{income\ account}, \qquad (2)$$

where $\eta^{TB} = \frac{\Delta(TB/GDP)}{\Delta REER/REER}$ is the semi-elasticity of the trade balance-to-GDP ratio and $\eta^{IB} = \frac{\Delta(IB/GDP)}{\Delta REER/REER}$ is the semi-elasticity of the income balance-to-GDP ratio. For a given CA gap, the corresponding REER gap (in percent) can then be derived as:

$$REER^{gap} = \frac{CA^{gap}}{\eta^{CA}}. \qquad (3)$$

This round of refinements updates the estimates of the trade balance semi-elasticities and introduces estimates of the income balance semi-elasticities, that were assumed to be zero in previous versions of the EBA framework. Estimates suggest that the trade balance response is larger than the income balance response to REER movements, and that the relation between the CA and the REER still mainly reflects the movement in exports and imports following a change in the REER.

In the EBA framework, the focus is on *medium-term* CA and REER gaps, and for this purpose the elasticities being used are appropriate. At the same time, to reach an overall assessment on the exchange rate gap, it is important to consider that—in line with the recent literature on currency of trade invoicing (for a summary, see Gopinath and Itskhoki 2022 and Adler and others 2020)—recent currency movements may have reduced an economy's exchange rate gap even if the observed near-term trade balance response has been modest.

Trade Balance Semi-Elasticities

As discussed in Cubeddu and others (2019), the semi-elasticity of the trade balance-to-GDP ratio with respect to the REER (η^{TB}) is given by:

$$\eta^{TB} = \eta^{X} s^{X} - \eta^{M} s^{M} \qquad (4)$$

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. Cubeddu and others (2019) refer to this methodology as the "CGER-inspired approach", in reference to the original CGER approach which was based on the model-based results of Isard and Faruqee (1998). The estimates presented in this note replace these earlier estimates for use in the EBA framework.

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.[16] Values for η^{X} and η^{M} are estimated at the panel level using data for all EBA countries. Specifically, dynamic export (X) and import (M) equations—with X and M expressed in nominal USD—are estimated using an unbalanced panel covering EBA countries with quarterly data between 1980 and 2019. The following reduced-form equations are estimated:[17]

$$\ln(X_{it}) = \sum_{j=1}^{n} \delta_j^X \ln(X_{it-j}) + \sum_{j=0}^{n} \beta_j^X \ln(REER_{it-j}) + \gamma^X \ln(RGDP^{TP}{}_{it}) + \varepsilon_{it} \qquad (5)$$

$$\ln(M_{it}) = \sum_{j=1}^{n} \delta_j^M \ln(M_{it-j}) + \sum_{j=0}^{n} \beta_j^M \ln(REER_{it-j}) + \gamma^M \ln(RGDP_{it}) + \varepsilon_{it} \qquad (6)$$

where both specifications include time and country fixed effects. Equation (5) 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 (6). Using estimates from the panel regression, long-run export and import elasticities are obtained as follows:

[16] 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.

[17] These import and export equations follow the tradition of Houthakker and Magee (1969) but include the REER instead of a ratio of relative prices between domestic and foreign goods.

$$\eta^F = \frac{\sum_{j=0}^{n} \beta_j^F}{1-\sum_{j=1}^{n} \delta_j^F}, \text{ with flow } F = \{X, M\}. \quad (7)$$

Cubeddu and others (2019) used quarterly data from 1980Q1 until 2017Q4 and allowed for a rich dynamic lag structure involving up to eight lags. They obtained values of -0.11 and 0.56 for η^X and η^M, respectively. These elasticities are re-estimated using data for all EBA countries (including the three economies now included in the sample—Bangladesh, Romania and Vietnam) with data up to 2019Q4.[18] The resulting updated estimates for the elasticities are -0.15 and 0.65 for the exports and imports, respectively (Online Annex Table 1.11). Only the long-term imports elasticity is significant at the 5 percent level. To guard against the influence of outliers on the estimation results, the analysis also estimates the relationships in equations (5) and (6) while excluding outliers based on Cook's distance. The long-run elasticity of imports does not change when outliers are excluded, while the long-run elasticity of exports increases somewhat but remains imprecisely estimated.

Income Balance Semi-Elasticities

The method to estimate the income balance semi-elasticity is analogous to the one employed to estimate trade balance elasticities, and it was implemented recently by Colacelli and others (2020). More precisely, the income balance semi-elasticities are:

$$\eta^{IB} = \eta^{IC} s^{IC} - \eta^{ID} s^{ID}, \quad (8)$$

where η^{IC} and η^{ID} are the elasticities of the ratios of income credit and debit flows to GDP, respectively, with respect to the REER, and s^{IC} and s^{ID} are the ratios of income credit and debit flows to GDP. As in the case of trade flows, the elasticities of income credit (IC) and debit (ID) flows are estimated using a panel approach with all EBA economies, using annual data from 1986-2019. Colacelli and others (2020) estimate the following equations:

$$ln\left(\frac{IC_{it}}{GDP_{it}}\right) = \delta_1^{IC}\, ln\left(\frac{IC_{it-1}}{GDP_{it-1}}\right) + \sum_{j=0}^{n} \beta_j^{IC}\, ln\left(REER_{it-j}\right) + \gamma_1^{IC}\, ln\left(\frac{FA_{it-1}}{GDP_{it-1}}\right) + \varepsilon_{it} \quad (9)$$

$$ln\left(\frac{ID_{it}}{GDP_{it}}\right) = \delta_1^{ID}\, ln\left(\frac{ID_{it-1}}{GDP_{it-1}}\right) + \sum_{j=0}^{n} \beta_j^{ID}\, ln\left(REER_{it-j}\right) + \gamma_1^{ID}\, ln\left(\frac{FL_{it-1}}{GDP_{it-1}}\right) + \varepsilon_{it} \quad (10)$$

where FA and FL are the stock of foreign assets and liabilities, respectively. As in the case of the exports and imports equations, the estimation includes country and time fixed effects. Long-term elasticities of income credits and debits can then be calculated as:

$$\eta^F = \frac{\sum_{j=0}^{n} \beta_j^F}{1-\delta_1^F}, \text{ with flow } F = \{IC, ID\}. \quad (11)$$

The long-run semi-elasticity of the income balance (as a ratio to GDP) η^{IB} is then derived using η^{IC}, η^{ID}, and the corresponding shares (ratios of income credits and income debits to GDP) as described by equation (8).

Using the preferred specification of Colacelli and others (2020), the estimates for the relevant elasticities are η^{IC}=-0.25 for income credits and η^{ID}=-0.13 for income debits, with coefficients statistically significant at the 1 percent and 5 percent levels, respectively.[19] The negative sign in both elasticity estimates, resulting from valuation effects and IIP and income flows currency composition, implies that the effects of REER fluctuations on income credit and debit flows will tend to partially offset each other.[20] Additionally, Colacelli and others (2020) document that gross income flows (the absolute values of income credits and debits) tend to be significantly smaller than gross trade flows (the absolute values of exports and imports), including in countries where the income balance (credits minus debits) is larger than the trade balance (exports minus imports). As a result, the response of the income balance-to-GDP ratio to changes in the REER is expected to be relatively modest,

[18] The year 2020 is excluded from the estimation since it could distort the parameter estimates due to the Covid crisis.

[19] These estimates differ from Colacelli and others (2020) because of a different country sample and longer sample period. That earlier paper uses data for about 40 countries, starting in 1999, while the estimates in this note are obtained for the full EBA sample, starting in 1986.

[20] Following an REER appreciation, income credits and debits will be both lower in percent of GDP, to the extent that they are partially denominated in foreign currency. In this context, panel regression estimates of elasticities can be seen as the response of income flows for a country with average share of foreign-currency-denominated flows.

especially in countries where the income balance is of relatively small magnitude with respect to GDP, with much of the relation between the REER and the CA driven by the responses of imports and exports.

Updated CA-REER Semi-Elasticities

Online Annex Figure 1.1.3 provides the updated semi-elasticities for the EBA sample. The trade balance elasticities are obtained by using economy-specific averages of the exports- and imports-to-GDP ratios between 2016-2026, using WEO forecasts where needed. In addition, the refined CA elasticities include income balance elasticities, also using data for 2016-2026 for the income credit- and debit-to-GDP ratios from the WEO database. The updated trade balance elasticities are generally similar to those estimated previously (Cubeddu and others 2019).

In most cases, the income balance elasticities are close to zero, and smaller in magnitude than trade elasticities. This finding implies that the external sector adjustment is mainly driven by the medium-term effects of the REER on the trade balance. On a GDP-weighted basis, the average CA elasticity moves from -0.17 to -0.20, with substantial heterogeneity reflecting the different degrees of (de facto) trade openness across economies. A 10 percent REER appreciation is thus on average associated, other things equal, with a 2 percent of GDP fall in the CA balance.

Online Annex Table 1.1.1. EBA Data Sources

	Variables	Sources
CURRENT ACCOUNT	**Current Account**	World Economic Outlook
	Net Foreign Assets (NFA) position	EWN: Lane, Milesi Ferretti and World Economic Outlook
	Output per worker, relative to top 3 economies	World Economic Outlook
	Expected Real GDP growth 5 years ahead	World Economic Outlook
	Output Gap	World Economic Outlook
	Commodity Terms of Trade	World Economic Outlook and World Integrated Trade Solution(WITS)
	Real Effective Exchange Rate	Information Notice System (INS)
	Demographic varaibles	UN World Population Prospects, 2019 Vintage
	Institutional Quality	International Country Risk Guide (ICRG)
	Exhaustible Resources of Oil and Natural Gas	World Economic Outlook, WITS and BP Statistical Review of World Energy
	Fiscal Policy	World Economic Outlook
	Health Spending	OECD, and WDI
	Foreign Exchange Intervention (FXI)	World Economic Outlook, Data Template on International Reserves and Foreign Currency Liquidity
	Capital Account Openness	IMF (Baba and others, forthcoming)
	Credit Gap	BIS (Credit statistics) and World Bank (Global Financial Development Database)
REER INDEX	**Real Effective Exchange Rate**	Information Notice System (INS)
	Trade Openness	World Economic Outlook
	Share of administered prices	European Bank of Reconstruction and Development (Structural Changes Indicators)
	Home bias	BIS (Debt Securities Statistics)
	Real Interest Rates (interacted with capital controls)	International Financial Statistics, World Economic Outlook, Haver, and Quinn Database
REER LEVEL	**Price Level**	World Bank's International Comparison Program, 2011
	Capital Stock per employed person	Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2013), "The Next Generation of the Penn World Table"
	Ratio of Traded/Non-Traded sector Productivity	Rui C. Mano and Marola Castillo (2015), "The Level of Productivity in Traded and Non-Traded Sectors for a Large Panel of Countries", and World Bank's WDI Database
	VAT Revenue	OECD's Revenue Statistics Dataset, the Council of State Govenments (USA) and the Bureau of Economic Analysis

Note: Dependent variables in each model are in bold font.

Online Annex Table 1.1.2. Estimation Results: EBA Current Account Model

	(1) Previous Model	(2) Updated Data	(3) BMA PIP	(4) Refined Model	(5) BMA PIP
Temporary and Cyclical Factors					
Output gap	-0.356***	-0.333***		-0.297***	
Commodity terms of trade, interacted with trade openness	0.161***	0.316***		0.291***	
REER annual log-change (lagged)				-0.015***	
Macroeconomic Fundamentals					
Net foreign asset (NFA) position	0.023***	0.029***	[1.00]	0.036***	[1.00]
NFA, interacted with high debt dummy	-0.006	0.011	[0.03]		
Output per worker	0.023	0.030	[0.97]	0.034***	[1.00]
Expected GDP growth	-0.302***	-0.299***	[1.00]	-0.296***	[0.81]
Reserve currency status (RCS)	-0.030***	-0.019	[0.67]		
Structural Fundamentals					
Old-age dependency ratio (OAD)	-0.069	-0.076*	[0.71]	-0.096**	[0.88]
Population growth	-0.692*	-0.795**	[0.89]	-0.797**	[0.95]
Share of prime-aged savers	0.138**	0.154***	[0.99]	0.124**	[0.99]
Life expectancy	-0.005***	-0.005***	[1.00]	-0.004***	[1.00]
Life expectancy, interacted with OAD	0.013***	0.013***	[0.95]	0.013***	[0.99]
Institutional quality	-0.047**	-0.048**	[1.00]	-0.046**	[0.81]
Oil and gas reserves	0.310***	0.357***	[1.00]	0.304***	[1.00]
Policy Variables					
Fiscal policy	0.329***	0.313***	[1.00]	0.307***	[1.00]
Health spending	-0.399***	-0.287**	[1.00]	-0.298**	[1.00]
FXI, interacted with capital controls	0.754***	0.706***	[1.00]	0.631***	[0.92]
Credit gap	-0.104***	-0.095***	[1.00]	-0.096***	[1.00]
Output per worker, interacted with capital openness	0.041*	0.007	[0.05]		
Global risk aversion, interacted with capital openness	0.020	0.014	[0.03]		
Global risk aversion, interacted with capital openness and RCS	0.002	-0.004	[0.04]		
Observations	1,367	1,445		1,480	
Number of economies	49	49		52	
R-squared	0.550	0.522		0.523	
Root MSE	0.031	0.032		0.032	

Notes: "BMA" denotes Bayesian model averaging. "PIP" denotes posterior inclusion probability. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent based on Driscoll-Kraay standard errors (not shown).

Online Annex Table 1.1.3. EBA Current Account Model Fit: Comparison with the Literature

	R-squared	Country FE	Lagged CA	Economies	Years
Refined model	0.52	No	No	52	1986-2019
Comparator IMF papers					
Cubeddu and others (2019)	0.55	No	No	49	1986-2016
Cubeddu and others (2019), updated data	0.52	No	No	49	1986-2019
Phillips and others (2013)	0.52	No	No	49	1986-2010
Lee and others (2008)	0.52	No	No	54	1973-2004
Lee and others (2008)	0.56	Yes	No	54	1973-2004
Lee and others (2008)	0.62	No	Yes	54	1973-2004
Comparator external papers					
Chinn and Ito (2022)	0.39	No	No	162	1972-2016
Coutinho, Turrini and Zeugner (2018) - EC	0.64	No	No	65	1987-2016
Coutinho, Turrini and Zeugner (2022)	0.62	No	No	65	1987-2018
Gagnon and Sarsenbayev (2021)	0.53	No	No	138	1986-2018
Gagnon and Sarsenbayev (2021)	0.70	Yes	No	138	1986-2018
Gruber and Kamin (2007)	0.36	No	No	59	1982-2003
Herman, Harris and Hall (2021) - GERAF	0.39	No	No	51	1986-2018

Online Annex Table 1.1.4. Previous Model: Summary of EBA Current Account Norms and Contributions for 2021

(Percent of GDP)

	Constant + MLC[1]	NFA	Output per worker	Other macroeconomic fundamentals[2]	Demographics	Other structural fundamentals[3]	Policy variables	Cyclically adjusted EBA norm
Argentina	-0.2	0.4	-1.3	0.2	-0.7	0.3	0.4	-0.9
Australia	-0.2	-1.2	2.2	0.0	-0.5	-0.5	0.5	0.3
Austria	-0.2	0.2	2.0	-0.3	1.1	-0.4	0.3	2.6
Belgium	-0.2	1.1	1.9	-0.2	0.3	-0.3	0.1	2.7
Brazil	-0.2	-0.8	-1.8	0.2	-0.1	0.4	0.4	-1.8
Canada	-0.2	0.8	1.8	0.3	0.3	-0.5	0.3	2.8
Chile	-0.2	-0.4	-1.1	0.1	0.1	0.0	0.3	-1.2
China	-0.2	0.4	-1.4	-0.7	0.6	0.6	1.1	0.5
Colombia	-0.2	-1.1	-2.0	-0.2	0.1	1.9	0.8	-0.7
Costa Rica	-0.2	-1.3	-1.8	-0.2	-0.2	0.1	0.1	-3.5
Czech Republic	-0.2	-0.5	0.6	0.0	-0.4	-0.3	0.7	-0.1
Denmark	-0.2	1.5	2.7	0.3	0.1	-0.4	1.7	5.7
Egypt	-0.2	-1.2	-2.0	-0.9	0.4	0.7	0.8	-2.3
Finland	-0.2	0.0	2.1	-0.2	-0.4	-0.7	0.8	1.5
France	-0.2	-0.5	1.7	-0.3	0.5	-0.1	-0.7	0.4
Germany	-0.2	1.2	2.3	-0.2	0.8	-0.5	-0.6	2.8
Greece	-0.2	-3.0	-0.5	-0.3	1.2	-0.1	0.7	-2.0
Guatemala	-0.2	-0.4	-2.7	-0.2	-1.6	0.4	1.3	-3.3
Hungary	-0.2	-1.2	0.1	-0.1	-0.5	-0.3	1.8	-0.3
India	-0.2	-0.4	-2.6	-1.1	0.9	0.5	0.7	-2.1
Indonesia	-0.2	-0.7	-2.0	-0.7	1.6	0.7	1.3	0.0
Ireland	-0.2	-3.3	6.9	-0.7	0.1	-0.6	0.3	2.4
Israel	-0.2	0.9	1.1	-0.2	-1.4	0.3	0.6	1.1
Italy	-0.2	-0.1	0.8	-0.1	2.3	-0.2	0.5	3.0
Japan	-0.2	1.4	1.9	0.5	1.6	-0.4	-1.4	3.4
Korea	-0.2	0.6	0.8	0.1	2.2	-0.3	1.0	4.3
Malaysia	-0.2	0.0	-0.3	-0.5	-0.3	0.4	0.9	0.0
Mexico	-0.2	-1.1	-1.5	0.2	-0.5	0.5	1.0	-1.5
Morocco	-0.2	-1.5	-2.5	-0.2	-0.3	0.4	1.4	-2.8
Netherlands	-0.2	1.9	2.9	-0.3	0.8	-0.6	-0.5	4.2
New Zealand	-0.2	-1.3	1.1	0.1	0.3	-0.7	0.1	-0.6
Norway	-0.2	5.3	5.1	0.4	-0.1	3.8	-1.6	12.8
Pakistan	-0.2	-0.8	-2.8	-0.7	0.6	1.1	1.4	-1.3
Peru	-0.2	-0.9	-2.3	-0.1	-0.4	0.4	1.6	-1.9
Philippines	-0.2	-0.2	-2.5	-1.1	1.3	0.4	1.8	-0.4
Poland	-0.2	-1.3	0.1	-0.1	-0.4	-0.2	0.5	-1.7
Portugal	-0.2	-2.2	-0.1	-0.4	1.4	-0.4	1.5	-0.3
Russia	-0.2	0.5	-0.3	0.6	-0.1	1.7	2.4	4.6
South Africa	-0.2	0.3	-2.1	0.4	1.5	0.4	1.6	2.0
Spain	-0.2	-1.8	0.5	-0.4	2.3	-0.1	0.3	0.7
Sri Lanka	-0.2	-1.3	-2.0	0.0	0.4	0.6	1.8	-0.7
Sweden	-0.2	0.2	2.8	0.2	-0.2	-0.7	-0.1	2.0
Switzerland	-0.2	2.3	3.7	0.3	0.9	-0.7	0.1	6.3
Thailand	-0.2	0.0	-1.6	-0.1	1.1	0.7	1.0	0.9
Tunisia	-0.2	-2.6	-2.2	0.2	-0.1	0.4	1.1	-3.5
Türkiye	-0.2	-1.1	-0.4	-0.2	-0.2	0.9	0.6	-0.5
United Kingdom	-0.2	-0.4	1.4	0.1	0.1	-0.4	-0.6	0.1
United States	-0.2	-1.2	3.6	-1.6	-0.3	-0.5	-0.5	-0.6
Uruguay	-0.2	-0.6	-1.1	0.2	-0.3	0.0	0.7	-1.3

Source: IMF staff estimates. Notes: (1) MLC refers to Multilateral Consistency Adjustment. (2) Other macroeconomic fundamentals include expected GDP growth and reserve currency status. (3) Other structural fundamentals include oil and gas reserves and institutional quality.

Online Annex Table 1.1.5. Previous Model: Contribution of Policy Variables to EBA Current Account Norms for 2021

(Percent of GDP)

	Policy variables			Fiscal balance			Health expenditure			Δ Reserves * capital controls			Credit			Other capital controls interactions	
	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic
Argentina	0.4	-2.8	-3.2	0.0	-0.5	-0.5	0.1	-2.6	-2.7	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.1
Australia	0.5	-2.7	-3.2	0.5	0.0	-0.5	-0.2	-2.9	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Austria	0.3	-2.9	-3.2	0.3	-0.2	-0.5	-0.3	-2.9	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Belgium	0.1	-3.1	-3.2	0.4	-0.1	-0.5	-0.5	-3.2	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Brazil	0.4	-2.8	-3.2	-0.6	-1.2	-0.5	0.9	-1.8	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Canada	0.3	-2.9	-3.2	0.3	-0.2	-0.5	-0.1	-2.8	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Chile	0.3	-2.9	-3.2	0.2	-0.3	-0.5	-0.1	-2.8	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
China	1.1	-2.1	-3.2	-0.1	-0.6	-0.5	1.1	-1.6	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Colombia	0.8	-2.4	-3.2	0.0	-0.5	-0.5	0.6	-2.1	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Costa Rica	0.1	-3.1	-3.2	-0.1	-0.7	-0.5	0.1	-2.6	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Czech Republic	0.7	-2.5	-3.2	0.5	0.0	-0.5	0.0	-2.6	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Denmark	1.7	-1.5	-3.2	0.5	0.0	-0.5	-0.5	-3.2	-2.7	0.0	0.0	0.0	1.5	1.5	0.0	0.2	0.2
Egypt	0.8	-2.4	-3.2	-1.1	-1.6	-0.5	1.7	-0.9	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Finland	0.8	-2.4	-3.2	0.7	0.2	-0.5	-0.1	-2.8	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
France	-0.7	-3.9	-3.2	0.1	-0.4	-0.5	-1.0	-3.7	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Germany	-0.6	-3.8	-3.2	0.3	-0.2	-0.5	-1.2	-3.8	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Greece	0.7	-2.5	-3.2	0.0	-0.5	-0.5	0.6	-2.1	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Guatemala	1.3	-1.9	-3.2	-0.1	-0.7	-0.5	1.3	-1.4	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Hungary	1.8	-1.4	-3.2	1.3	0.8	-0.5	0.3	-2.4	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
India	0.7	-2.5	-3.2	-1.4	-1.9	-0.5	2.0	-0.7	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Indonesia	1.3	-1.9	-3.2	-0.3	-0.8	-0.5	1.5	-1.2	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Ireland	0.3	-2.9	-3.2	0.5	0.0	-0.5	-0.4	-3.1	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Israel	0.6	-2.7	-3.2	-0.1	-0.7	-0.5	0.5	-2.2	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Italy	0.5	-2.7	-3.2	0.7	0.2	-0.5	-0.4	-3.0	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Japan	-1.4	-4.6	-3.2	0.3	-0.2	-0.5	-1.0	-3.6	-2.7	0.0	0.0	0.0	-0.9	-0.9	0.0	0.2	0.2
Korea	1.0	-2.2	-3.2	0.5	0.0	-0.5	0.3	-2.4	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Malaysia	0.9	-2.3	-3.2	-0.3	-0.8	-0.5	1.0	-1.6	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Mexico	1.0	-2.2	-3.2	-0.4	-0.9	-0.5	1.2	-1.4	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Morocco	1.4	-1.8	-3.2	-0.5	-1.0	-0.5	1.7	-1.0	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
The Netherlands	-0.5	-3.7	-3.2	0.2	-0.3	-0.5	-0.8	-3.5	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
New Zealand	0.1	-3.1	-3.2	0.2	-0.3	-0.5	-0.3	-3.0	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Norway	-1.6	-4.8	-3.2	-1.1	-1.6	-0.5	-0.6	-3.3	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Pakistan	1.4	-1.8	-3.2	-0.3	-0.8	-0.5	1.8	-0.9	-2.7	0.3	0.3	0.0	-0.5	-0.5	0.0	0.1	0.1
Peru	1.6	-1.6	-3.2	0.2	-0.3	-0.5	1.2	-1.5	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Philippines	1.8	-1.4	-3.2	-0.2	-0.8	-0.5	1.9	-0.8	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Poland	0.5	-2.7	-3.2	0.2	-0.3	-0.5	0.2	-2.5	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Portugal	1.5	-1.7	-3.2	0.3	-0.2	-0.5	-0.1	-2.8	-2.7	0.0	0.0	0.0	1.2	1.1	0.0	0.2	0.2
Russia	2.4	-0.8	-3.2	1.8	1.2	-0.5	0.5	-2.2	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
South Africa	1.6	-1.6	-3.2	0.0	-0.5	-0.5	1.0	-1.6	-2.7	0.3	0.3	0.0	0.0	0.0	0.0	0.1	0.1
Spain	0.3	-2.9	-3.2	-0.1	-0.7	-0.5	0.1	-2.6	-2.7	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.2
Sri Lanka	1.8	-1.4	-3.2	-0.5	-1.0	-0.5	1.5	-1.2	-2.7	0.6	0.6	0.0	0.0	0.0	0.0	0.1	0.1
Sweden	-0.1	-3.3	-3.2	0.6	0.1	-0.5	-0.9	-3.6	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Switzerland	0.1	-3.2	-3.2	0.2	-0.3	-0.5	-0.3	-3.0	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Thailand	1.0	-2.3	-3.2	-0.2	-0.8	-0.5	1.0	-1.6	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Tunisia	1.1	-2.1	-3.2	0.0	-0.6	-0.5	1.0	-1.7	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Türkiye	0.6	-2.6	-3.2	-0.9	-1.4	-0.5	1.2	-1.4	-2.7	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1
United Kingdom	-0.6	-3.8	-3.2	-0.3	-0.8	-0.5	-0.5	-3.1	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
United States	-0.5	-3.8	-3.2	0.0	-0.6	-0.5	-0.7	-3.4	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Uruguay	0.7	-2.5	-3.2	0.1	-0.4	-0.5	0.5	-2.2	-2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2

Source: IMF staff estimates.

Online Annex Table 1.1.6. Refined Model: Summary of EBA Current Account Norms and Contributions for 2021

(Percent of GDP)

	Constant + MLC[1]	NFA	Output per worker	Other macroeconomic fundamentals[2]	Demographics	Other structural fundamentals[3]	Policy variables	Cyclically adjusted EBA norm
Argentina	-0.1	0.8	-0.6	0.2	-0.6	0.3	0.3	0.2
Australia	-0.1	-1.8	1.3	0.1	0.0	-0.6	0.3	-0.9
Austria	-0.1	0.3	1.4	0.3	0.6	-0.5	0.1	2.2
Bangladesh	-0.1	-0.4	-1.6	-1.2	0.6	0.8	0.6	-1.3
Belgium	-0.1	1.4	1.4	0.5	0.3	-0.4	0.0	3.1
Brazil	-0.1	-1.3	-1.1	0.2	0.2	0.4	0.1	-1.6
Canada	-0.1	1.4	1.1	0.3	0.2	-0.4	0.2	2.6
Chile	-0.1	-0.5	-0.6	0.1	0.3	-0.1	0.1	-0.9
China	-0.1	0.6	-1.0	-0.6	0.7	0.6	0.7	0.8
Colombia	-0.1	-1.8	-1.1	-0.2	0.0	2.3	0.5	-0.5
Costa Rica	-0.1	-2.0	-0.8	-0.1	0.3	0.0	-0.1	-2.8
Czech Republic	-0.1	-0.7	0.6	0.0	-0.6	-0.3	0.5	-0.6
Denmark	-0.1	2.5	1.8	0.3	-0.1	-0.5	1.5	5.4
Egypt	-0.1	-2.0	-1.1	-0.9	0.1	0.7	0.4	-3.0
Finland	-0.1	-0.1	1.4	0.4	-0.4	-0.7	0.6	1.1
France	-0.1	-0.9	1.1	0.3	0.7	-0.1	-0.6	0.3
Germany	-0.1	2.1	1.5	0.4	0.4	-0.5	-0.5	3.3
Greece	-0.1	-5.9	-0.1	0.3	1.5	-0.1	0.5	-4.0
Guatemala	-0.1	-0.5	-1.4	-0.2	-1.2	0.4	0.8	-2.3
Hungary	-0.1	-1.7	0.1	0.0	-1.0	-0.3	1.5	-1.6
India	-0.1	-0.5	-1.6	-1.1	0.8	0.4	0.2	-1.9
Indonesia	-0.1	-1.0	-1.2	-0.7	0.8	0.7	0.8	-0.8
Ireland	-0.1	-6.5	4.1	-0.1	0.2	-0.7	0.2	-2.9
Israel	-0.1	1.5	0.9	-0.2	-1.1	0.3	0.3	1.4
Italy	-0.1	0.0	0.7	0.5	2.3	-0.3	0.4	3.4
Japan	-0.1	2.3	0.9	0.7	1.8	-0.5	-1.2	3.9
Korea	-0.1	1.0	0.6	0.1	3.1	-0.3	0.7	5.0
Malaysia	-0.1	0.0	-0.3	-0.5	-0.2	0.5	0.5	-0.1
Mexico	-0.1	-1.7	-0.8	0.2	0.2	0.4	0.6	-1.2
Morocco	-0.1	-2.4	-1.5	-0.1	0.0	0.4	0.9	-2.9
Netherlands	-0.1	3.3	1.7	0.4	0.9	-0.6	-0.4	5.1
New Zealand	-0.1	-2.0	0.7	0.1	0.5	-0.7	0.0	-1.5
Norway	-0.1	8.7	2.2	0.4	0.1	5.8	-1.5	15.6
Pakistan	-0.1	-1.3	-1.6	-0.6	0.4	1.0	1.1	-1.2
Peru	-0.1	-1.3	-1.2	-0.1	-0.4	0.3	1.1	-1.8
Philippines	-0.1	-0.4	-1.4	-1.1	0.5	0.4	1.2	-0.8
Poland	-0.1	-1.8	0.2	-0.1	-0.5	-0.2	0.3	-2.4
Portugal	-0.1	-3.7	0.2	0.2	1.3	-0.4	1.3	-1.2
Romania	-0.1	-1.6	0.0	-0.2	-0.5	0.2	0.4	-1.9
Russia	-0.1	0.9	-0.2	0.6	-0.7	2.0	2.0	4.4
South Africa	-0.1	0.6	-1.1	0.4	1.1	0.3	1.4	2.6
Spain	-0.1	-2.9	0.4	0.2	2.4	-0.1	0.1	0.0
Sri Lanka	-0.1	-2.1	-1.1	0.0	0.3	0.6	1.7	-0.8
Sweden	-0.1	0.5	1.6	0.2	-0.2	-0.7	-0.1	1.2
Switzerland	-0.1	3.7	2.6	0.3	1.2	-0.7	0.0	6.8
Thailand	-0.1	0.1	-0.9	-0.1	1.2	0.7	0.6	1.4
Tunisia	-0.1	-5.4	-1.3	0.2	0.0	0.4	0.7	-5.6
Türkiye	-0.1	-1.6	-0.1	-0.2	0.0	0.9	0.3	-0.8
United Kingdom	-0.1	-0.7	0.9	0.3	0.0	-0.5	-0.6	-0.7
United States	-0.1	-2.0	2.0	0.2	-0.3	-0.5	-0.5	-1.3
Uruguay	-0.1	-0.9	-0.5	0.2	-0.3	-0.1	0.4	-1.4
Vietnam	-0.1	-1.6	-1.3	-1.2	0.4	0.4	0.4	-3.0

Source: IMF staff estimates. Notes: (1) MLC refers to Multilateral Consistency Adjustment. (2) Other macroeconomic fundamentals include expected GDP growth. (3) Other structural fundamentals include oil and gas reserves and institutional quality.

Online Annex Table 1.1.7. Refined Model: Contribution of Policy Variables to EBA Current Account Norms for 2021

(Percent of GDP)

	Policy variables			Fiscal balance			Health expenditure			Δ Reserves * capital controls			Credit		
	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
Argentina	0.3	-2.2	-2.5	0.0	-0.5	-0.5	0.0	-1.9	-2.0	0.2	0.2	0.0	0.0	0.0	0.0
Australia	0.3	-2.1	-2.5	0.5	0.0	-0.5	-0.2	-2.1	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Austria	0.1	-2.3	-2.5	0.3	-0.2	-0.5	-0.2	-2.2	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Bangladesh	0.6	-1.9	-2.5	-1.1	-1.6	-0.5	1.6	-0.4	-2.0	0.0	0.0	0.0	0.1	0.1	0.0
Belgium	0.0	-2.5	-2.5	0.4	-0.1	-0.5	-0.4	-2.4	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Brazil	0.1	-2.4	-2.5	-0.6	-1.1	-0.5	0.7	-1.3	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Canada	0.2	-2.3	-2.5	0.3	-0.2	-0.5	-0.1	-2.1	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Chile	0.1	-2.4	-2.5	0.2	-0.3	-0.5	-0.1	-2.1	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
China	0.7	-1.8	-2.5	-0.1	-0.6	-0.5	0.8	-1.2	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Colombia	0.5	-2.0	-2.5	0.1	-0.4	-0.5	0.4	-1.6	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Costa Rica	-0.1	-2.6	-2.5	-0.1	-0.6	-0.5	0.0	-1.9	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Czech Republic	0.5	-2.0	-2.5	0.5	0.0	-0.5	0.0	-2.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Denmark	1.5	-1.0	-2.5	0.5	0.0	-0.5	-0.4	-2.4	-2.0	0.0	0.0	0.0	1.4	1.4	0.0
Egypt	0.4	-2.1	-2.5	-1.0	-1.5	-0.5	1.3	-0.7	-2.0	0.1	0.1	0.0	0.0	0.0	0.0
Finland	0.6	-1.9	-2.5	0.6	0.2	-0.5	-0.1	-2.1	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
France	-0.6	-3.1	-2.5	0.1	-0.3	-0.5	-0.8	-2.8	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Germany	-0.5	-3.0	-2.5	0.3	-0.2	-0.5	-0.9	-2.9	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Greece	0.5	-2.0	-2.5	0.0	-0.5	-0.5	0.4	-1.6	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Guatemala	0.8	-1.7	-2.5	-0.1	-0.6	-0.5	0.9	-1.0	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Hungary	1.5	-1.0	-2.5	1.3	0.8	-0.5	0.2	-1.8	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
India	0.2	-2.3	-2.5	-1.3	-1.8	-0.5	1.4	-0.5	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Indonesia	0.8	-1.7	-2.5	-0.3	-0.8	-0.5	1.1	-0.9	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Ireland	0.2	-2.3	-2.5	0.5	0.0	-0.5	-0.3	-2.3	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Israel	0.3	-2.2	-2.5	-0.1	-0.6	-0.5	0.4	-1.6	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Italy	0.4	-2.1	-2.5	0.6	0.2	-0.5	-0.3	-2.3	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Japan	-1.2	-3.7	-2.5	0.3	-0.2	-0.5	-0.7	-2.7	-2.0	0.0	0.0	0.0	-0.8	-0.9	0.0
Korea	0.7	-1.8	-2.5	0.5	0.0	-0.5	0.2	-1.8	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Malaysia	0.5	-2.0	-2.5	-0.3	-0.8	-0.5	0.8	-1.2	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Mexico	0.6	-1.9	-2.5	-0.4	-0.9	-0.5	0.9	-1.1	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Morocco	0.9	-1.6	-2.5	-0.4	-0.9	-0.5	1.3	-0.7	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
The Netherlands	-0.4	-2.9	-2.5	0.2	-0.3	-0.5	-0.6	-2.6	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
New Zealand	0.0	-2.5	-2.5	0.2	-0.3	-0.5	-0.2	-2.2	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Norway	-1.5	-4.0	-2.5	-1.0	-1.5	-0.5	-0.5	-2.5	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Pakistan	1.1	-1.4	-2.5	-0.3	-0.8	-0.5	1.3	-0.7	-2.0	0.5	0.6	0.0	-0.4	-0.5	0.0
Peru	1.1	-1.4	-2.5	0.2	-0.3	-0.5	0.9	-1.1	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Philippines	1.2	-1.3	-2.5	-0.2	-0.7	-0.5	1.4	-0.6	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Poland	0.3	-2.2	-2.5	0.2	-0.3	-0.5	0.1	-1.9	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Portugal	1.3	-1.2	-2.5	0.3	-0.2	-0.5	-0.1	-2.1	-2.0	0.0	0.0	0.0	1.1	1.0	0.0
Romania	0.4	-2.1	-2.5	-0.4	-0.9	-0.5	0.1	-1.8	-2.0	0.0	0.0	0.0	0.7	0.7	0.0
Russia	2.0	-0.5	-2.5	1.6	1.2	-0.5	0.3	-1.6	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
South Africa	1.4	-1.1	-2.5	0.1	-0.4	-0.5	0.8	-1.2	-2.0	0.5	0.6	0.0	0.0	0.0	0.0
Spain	0.1	-2.4	-2.5	-0.1	-0.6	-0.5	0.1	-1.9	-2.0	0.0	0.0	0.0	0.1	0.1	0.0
Sri Lanka	1.7	-0.8	-2.5	-0.4	-0.9	-0.5	1.1	-0.9	-2.0	1.0	1.0	0.0	0.0	0.0	0.0
Sweden	-0.1	-2.6	-2.5	0.6	0.1	-0.5	-0.7	-2.7	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Switzerland	0.0	-2.5	-2.5	0.2	-0.3	-0.5	-0.3	-2.2	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Thailand	0.6	-1.9	-2.5	-0.2	-0.7	-0.5	0.8	-1.2	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Tunisia	0.7	-1.8	-2.5	0.0	-0.5	-0.5	0.7	-1.3	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Türkiye	0.3	-2.2	-2.5	-0.8	-1.3	-0.5	0.9	-1.1	-2.0	0.2	0.2	0.0	0.0	0.0	0.0
United Kingdom	-0.6	-3.1	-2.5	-0.3	-0.7	-0.5	-0.4	-2.3	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
United States	-0.5	-3.0	-2.5	0.0	-0.5	-0.5	-0.5	-2.5	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Uruguay	0.4	-2.1	-2.5	0.1	-0.4	-0.5	0.3	-1.7	-2.0	0.0	0.0	0.0	0.0	0.0	0.0
Vietnam	0.4	-2.1	-2.5	-0.7	-1.2	-0.5	1.1	-0.9	-2.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: IMF staff estimates.

Online Annex Table 1.1.8. Alternative Specifications Considered

	(1) Refined Model	(2) NFA Decomposition	(3) Demographic Polynomials
Temporary and Cyclical Factors			
Output gap	-0.295***	-0.312***	-0.300***
Commodity terms of trade, interacted with trade openness	0.291***	0.296***	0.290***
REER annual log-change (lagged)	-0.015***	-0.014**	-0.015**
Macroeconomic Fundamentals			
Net foreign asset (NFA) position	0.036***		0.037***
Reserves		0.058***	
Net portfolio equity		0.027***	
Net FDI		0.058***	
Net external debt + derivatives		0.032***	
Output per worker	0.034***	0.025**	0.025**
Expected GDP growth	-0.296***	-0.310***	-0.268**
Structural Fundamentals			
Old-age dependency ratio (OAD)	-0.096**	-0.080**	
Population growth	-0.797**	-0.651*	
Share of prime-aged savers	0.124**	0.124**	
1st order demographic polynomial			-0.074
2nd order demographic polynomial			0.015
3rd order demographic polynomial			-0.001
Life expectancy	-0.004***	-0.003**	-0.005***
Life expectancy, interacted with OAD	0.013***	0.010**	0.014***
Institutional quality	-0.046**	-0.037*	-0.050**
Oil and gas reserves	0.304***	0.323***	0.326***
Policy Variables			
Fiscal policy	0.307***	0.259***	0.315***
Health spending	-0.298**	-0.303**	-0.318**
FXI, interacted with capital controls	0.631***	0.599***	0.584***
Credit gap	-0.096***	-0.089***	-0.098***
Observations	1,480	1,473	1,480
Number of economies	52	52	52
R-squared	0.523	0.552	0.522
Root MSE	0.032	0.031	0.032

Notes: *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent based on Driscoll-Kraay standard errors (not shown).

Online Annex Table 1.1.9. Estimation Results: EBA REER-Index Model

	(1) Previous Model	(2) Updated Data	(3) BMA PIP	(4) Refined Model
Cyclical Factors				
Output Gap	0.392**	0.533***	[0.94]	0.516**
Commodity terms of trade (log, index)	0.184***	0.182***	[1.00]	0.160***
Macroeconomic Fundamentals				
Net foreign asset (NFA) position	-0.109***	-0.104***	[1.00]	-0.105***
Output per worker	0.217***	0.167***	[1.00]	0.241***
Expected GDP growth	2.012***	2.834***	[1.00]	3.112***
Financial Home bias (lagged)	0.193***	0.223***	[1.00]	0.258***
Reserve currency status (RCS)	-0.068	-0.035	[0.10]	
Structural Fundamentals				
Population growth	2.003	0.117	[0.04]	
Trade Openness	-0.208***	-0.159*	[0.99]	-0.153
Share of administered prices in CPI	-1.713***	-1.747***		
Policy Variables				
Real interest rates, interacted with capital openess	0.697***	0.793***	[0.97]	0.875***
Health spending	2.040***	2.046**	[1.00]	1.886**
Credit gap	0.093***	0.090**	[0.93]	0.099**
Global risk aversion, interacted with capital openness	-0.164***	-0.056	[0.10]	
Global risk aversion, interacted with capital openness and RCS	0.483**	0.261	[0.03]	
FXI, interacted with capital controls	-2.479**	-2.782**	[0.76]	-1.901*
Observations	1,004	1,117		1,105
Adjusted R-squared	0.553	0.530		0.557
RMSE	0.086	0.090		0.090
Cragg-Donald Wald F statistic		37.957		36.509
Number of Economies	40	40		41

Notes: "BMA" denotes Bayesian model averaging. "PIP" denotes posterior inclusion probability. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent.

Online Annex Table 1.1.10. Estimation Results: EBA REER-Level Model

	(1) Previous Model	(2) Updated Data	(3) BMA PIP	(4) Refined Model
Cyclical Factors				
Commodity terms of trade, interacted with trade openness	0.064***	0.0257	[0.67]	0.054
Macroeconomic Fundamentals				
Net foreign asset (NFA) position	0.056***	0.0667***	[1.00]	0.112***
Output per worker	0.171***	0.284***	[1.00]	0.247***
Expected GDP growth	1.961**	1.720**	[1.00]	3.308***
Reserve currency status (RCS)	-0.357***	-0.204***	[0.93]	-0.174**
Capital stock per employed person (lagged)	0.110***	0.0153	[0.03]	
Traded/Non Traded productivity (log, lagged)	0.184***	0.116***	[1.00]	0.180***
Structural Fundamentals				
Old-age dependency ratio (OAD)	0.362*	0.739***	[1.00]	0.894***
Population growth	2.570	3.475	[1.00]	9.081***
Institutional quality	0.653***	0.525***	[1.00]	0.587***
Trade Openness	-0.336***	-0.328***	[1.00]	-0.400***
VAT revenue, percent of GDP	0.662	1.511***	[1.00]	1.209**
Share of administered prices in CPI	-2.809***	-2.412***		
Policy Variables				
Real interest rates, interacted with capital openess	0.585*	1.721**	[0.99]	1.511***
FXI, interacted with capital controls	-3.561*	-6.017***	[0.99]	-9.290***
Health spending	4.196***	3.067***	[1.00]	3.580***
Credit gap	0.032	-0.104		
Global risk aversion, interacted with capital openness	-0.150	0.0839	[0.04]	
Global risk aversion, interacted with capital openness and RCS	0.829	0.398	[0.06]	
Observations	990	1,077		1,078
Adjusted R-squared	0.893	0.877		0.801
RMSE	0.146	0.153		0.194
Cragg-Donald Wald F statistic	66.224	76.740		40.831
Number of Economies	39	39		40

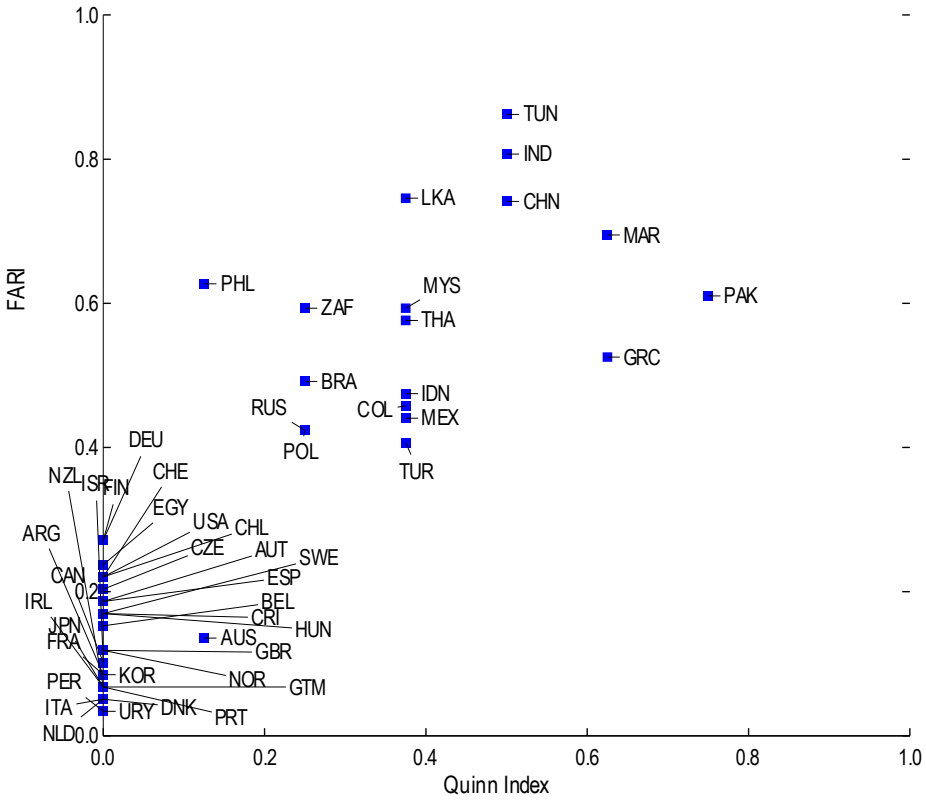
Notes: "BMA" denotes Bayesian model averaging. "PIP" denotes posterior inclusion probability. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent.

Online Annex Table 1.1.11. Estimation Results: Exports and Imports Medium-Run Elasticities

	Full Sample		Excluding Outliers[2]	
	Previous[1]	Refined	Previous[1]	Refined
Exports	-0.115	-0.152	-0.525	-0.464
	(0.358)	(0.397)	(0.372)	(0.433)
Imports	0.560***	0.645***	0.540***	0.561***
	(0.138)	(0.184)	(0.115)	(0.118)
Sample Period	1980-2017	1980-2019	1980-2017	1980-2019
Countries	49	52	49	52

Notes: (1) Previous estimates use the same country and time sample as Cubeddu and others (2019).
(2) Observations with Cook's distance greater than 4/N, where N is the sample size, are discarded.

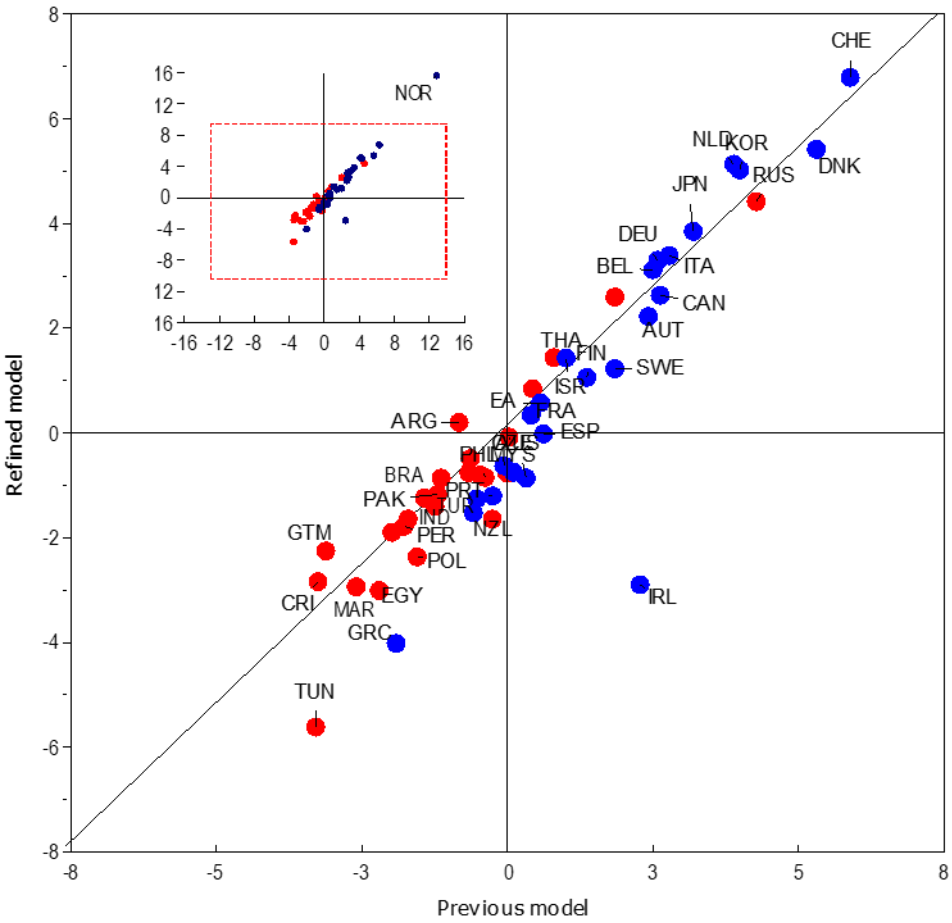
Online Annex Figure 1.1.1. Capital Control Indices: A Comparison



Sources: IMF (Baba and others, forthcoming), Quinn Database and IMF staff estimates. Notes: Figure reports correlation between Financial Account Restrictiveness Index (FARI) and Quinn Index values for 49 EBA economies for which both indexes are available. The relation has an R-squared of 77 percent and a slope coefficient estimate of 0.94 (robust s.e. = 0.10) and an intercept of 0.15 (robust s.e. = 0.02). Data labels use International Organization for Standardization (ISO) codes.

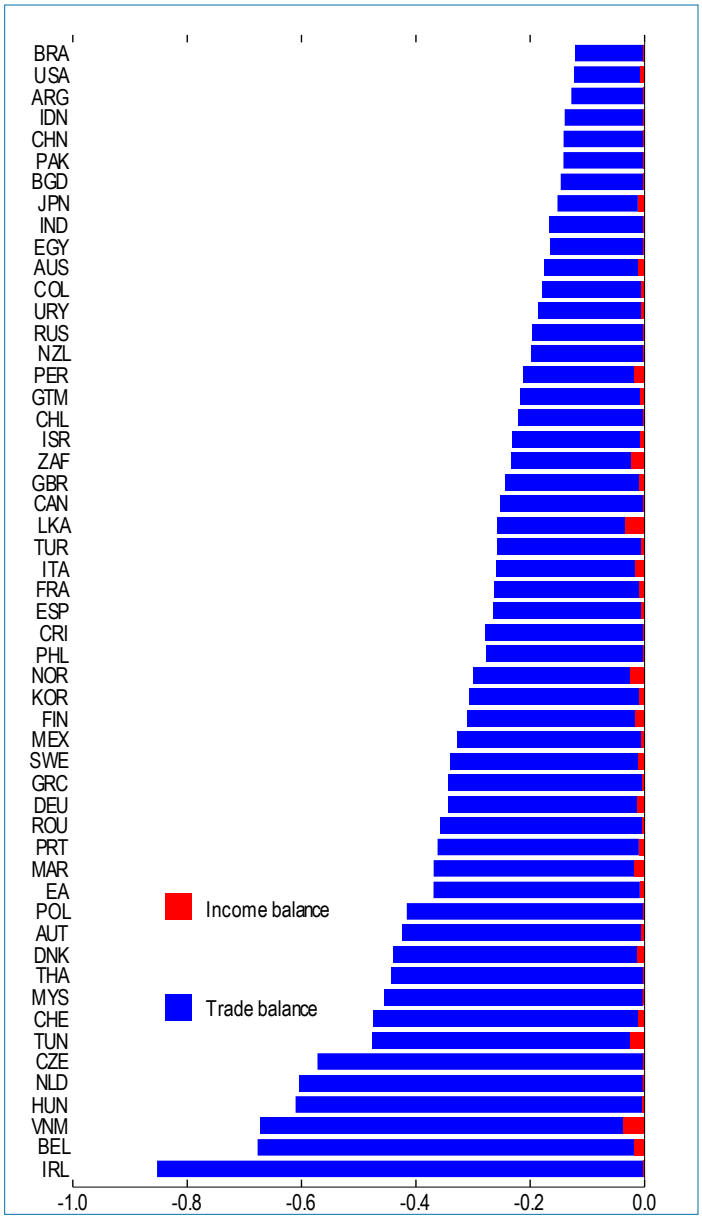
Online Annex Figure 1.1.2. Comparison of EBA Estimated Current Account Norms for 2021, Previous versus Refined Model

(Percent of GDP)



Source: IMF staff estimates. Notes: Blue dots refer to advanced economies; red dots refer to emerging economies. Data labels use International Organization for Standardization (ISO) codes.

Online Annex Figure 1.1.3. Estimated CA-REER Semi-Elasticities, EBA Sample
(Percent change)



Sources: IMF, *World Economic Outlook*, and IMF staff estimates. Notes: EA= Euro Area. Data labels use International Organization for Standardization (ISO) codes.

Online Annex Box 1.1.1. Refinement of the Commodity Terms-of-Trade Gap

Frequency of filtering. Numerous studies report that commodity price fluctuations follow "commodity supercycles" that are longer than standard business cycles (see for example, Erten and Ocampo 2013; Jacks 2013; Stuermer 2018 and Jacks and Stuermer 2020). To incorporate these findings in the EBA model, the analysis refines the commodity terms-of-trade gap. The refined approach uses band-pass filters, as discussed below, instead the Hodrick-Prescott (HP) filter with smoothing parameter of λ=100 in the previous version of the model, that is typically used for business cycle analysis at annual frequencies.

Sequencing of the variable construction. Construction of the new terms-of-trade gap proceeds as follows: (i) applying filtering techniques to individual commodity price series to obtain corresponding gaps (an oil price gap, a copper price gap, and so on); and (ii) aggregating all commodity price gaps, using country-specific trade weights, to build country-specific terms-of-trade gaps. Proceeding this way brings additional benefits in terms of transparency: the contributions of each commodity price gap to a country's overall commodity terms-of-trade gap can readily be calculated. This was not readily available in the previous version of the model since the HP filter was applied to the aggregate terms-of-trade series for each country.

Sample. The sample of 42 individual commodity price series as in Cubeddu and others (2019) is used. Since long annual time series are needed to estimate "super-cycles," data since 1980 from the Fund is extended backwards (up to 1850) using the following external datasets:

- World Bank Commodity Price Data (The Pink Sheet): annual prices, 1960 to present, nominal US dollars.
- Pfaffenzeller et al (2007): annual prices, 1900 to 2003, nominal US dollars.
- Jacks (2013), updated dataset: annual real prices, 1850 to 2015, converted to nominal US dollars using US official CPI.
- Schwerhoff and Stuermer (2015), updated dataset: annual prices, 1700 to 2018, nominal US dollars.

Estimation. The log of the price of commodity *k* at time *t* can be decomposed as follows:

$$lnP_{k,t} = LTT_{k,t} + CSC20\_70_{k,t} + STF_{k,t}$$

where $LTT_{k,t}$ denotes the long-term trend; $CSC20\_70_{k,t}$ denotes the commodity super-cycle (defined as fluctuations in frequencies in the 20-70 years range, following Jacks 2013); and $STF_{k,t}$ denotes short-term fluctuations.

The decomposition proceeds in two steps: (i) isolating the commodity super-cycle component $CSC20\_70_{k,t}$, using the Christiano-Fitzgerald band-pass filter; and (ii) applying the Butterworth high-pass filter (with parameter 40) to the residual, to distinguish the long-term trend $LTT_{k,t}$ from the short-term fluctuations $STF_{k,t}$.

The commodity price gap associated to commodity *k* is then defined as:

$$gap_{k,t} = CSC20\_70_{k,t} + STF_{k,t} = lnP_{k,t} - LTT_{k,t}$$

and commodity price gaps are aggregated using country-specific Comtrade weights to construct country-specific commodity terms-of-trade gaps, defined as:

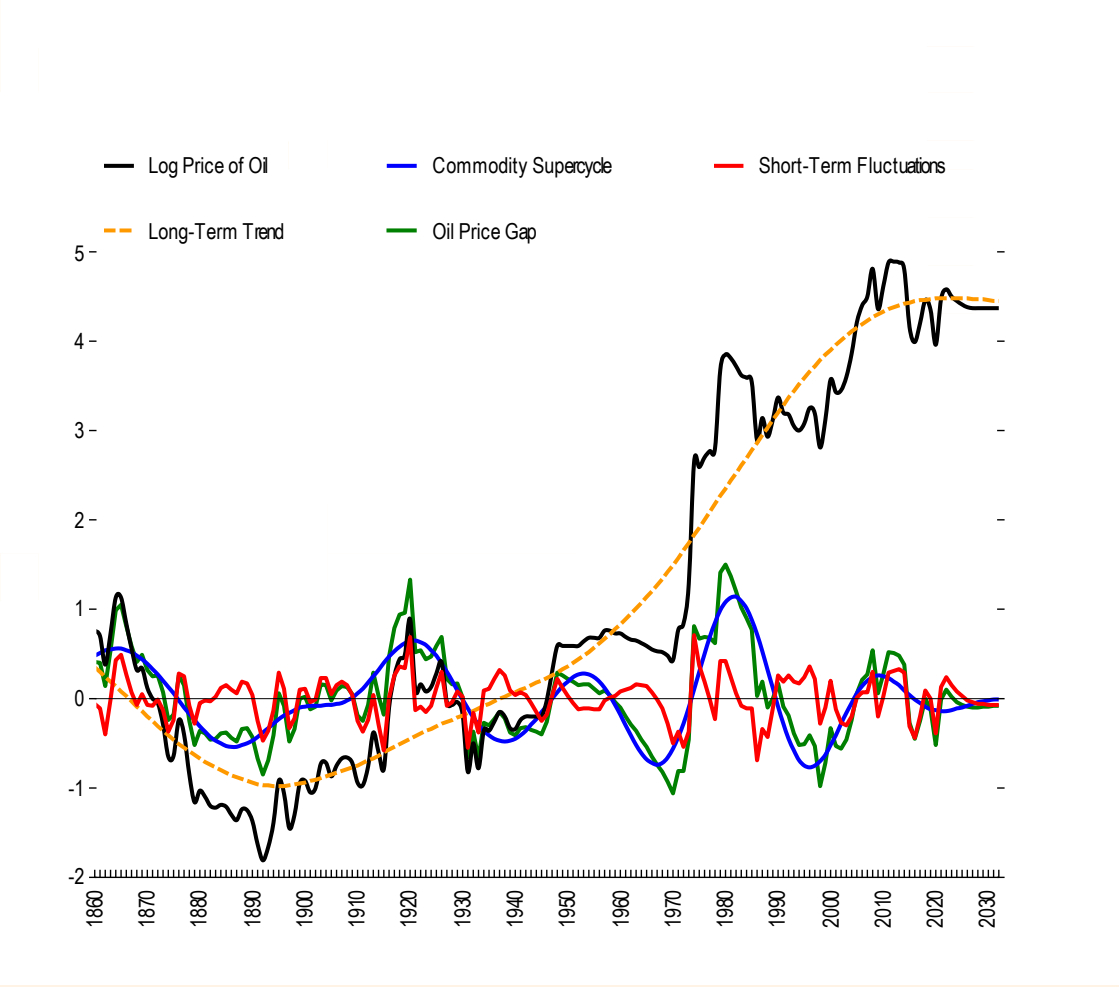
$$commoToTgap_{i,t} = \sum_{k} \left(\omega_{k,i,t}^{Comtrade,X} - \omega_{k,i,t}^{Comtrade,M}\right).gap_{k,t}$$

Online Annex Box 1.1.1 *(continued)*

Finally, the analysis multiplies the country-specific commodity terms-of-trade gap by the openness ratio, as in the previous EBA approach.

Results. Online Annex Figure B1.1.1 below illustrates the new approach in the case of oil prices. Prices in log (black line) are decomposed into (i) a long-term trend (orange, dashed line); (ii) a commodity supercycle (blue line); and (iii) short-term fluctuations (red line). While the different sequencing of the variable construction makes it difficult to directly contrast the old and new approaches (in particular, the old approach did not have commodity price gaps per se), the old approach can be thought of as taking into account only short-term fluctuations (i.e., something akin to the red line in the chart). In contrast, in the new approach, the oil price gap (green line) is defined as the sum of short-term fluctuations and the commodity supercycle.

Online Annex Figure B1.1.1 Oil Price Decomposition in the New Approach



Sources: IMF Primary Commodity Price System, World Bank Commodity Price Data ("Pink Sheet"), Jacks (2013), Minneapolis Fed, and IMF staff estimates. Notes. 1/Historical series extended between 2021 and 2027 using WEO forecasts, and beyond 2027 (up to 2032) using a no-change assumption. 2/Calculated as the sum of the commodity supercycle and short-term fluctuations.

Online Annex Box 1.1.2 Refinement of the Oil and Gas Reserves Variable

In the EBA CA model, the oil and gas reserves variable aims at capturing the "temporariness" of the resource endowment of oil and gas net exporters, which in standard models is central for the decision of how much to save for future generations. The variable contributes to the EBA CA norm. Cubeddu and others (2019) define the variable as follows:

$$Oil\&Gas_{i,t} = \sum_{k\epsilon\{oil,gas\}} \left(\frac{1}{5} \sum_{s=t-5}^{t-1} \frac{X_{k,i,s}}{Y_{i,s}} \right) \frac{temp_{k,i,t}}{temp_{oil,NOR,2010}}$$

where $temp_{k,i,t}$ denotes a measure of resource temporariness (ratio of current oil/gas extraction to proven reserves); $X_{k,i,s}$ denotes nominal oil and gas net exports (if positive; zero otherwise); and $Y_{i,s}$ denotes nominal GDP.

The use of a 5-year moving average aims at smoothing short-term price fluctuations in a way that is roughly consistent with the definition of the commodity terms-of-trade gap in the previous EBA model (Cubeddu and others 2019) based on filtering at business cycle frequencies (with business cycles usually about 5 years long). The revised construction process of the commodity terms-of-trade gap (see Box 1.1) can be further leveraged to revise the oil and gas reserves variable, by:

1. **Neutralizing short- and medium-term price fluctuations in net exports of oil and gas**. Oil and gas price gaps (calculated when constructing the commodity terms-of-trade gaps) are used to correct net oil and gas exports series.
2. **Adapting the moving average**. The 5-year moving average aimed at smoothing both price and volume fluctuations. As the new approach already neutralizes short- and medium-term price fluctuations, a 3-year moving average was found to be enough to smooth the remaining short-term fluctuations in trade volumes.

Denoting with $gap_{k,s}$ the price gap of commodity *k* (oil, gas) at time *s*, in percent, the oil and gas reserves variable can be redefined as:

$$\begin{aligned} Oil\&Gas_{i,t} &= \sum_{k\epsilon\{oil,gas\}} \left(\frac{1}{3} \sum_{s=t-3}^{t-1} \frac{X_{k,i,s}.exp(-gap_{k,s})}{Y_{i,s}} \right) \frac{temp_{k,i,t}}{temp_{oil,NOR,2010}} \\ &= \sum_{k\epsilon\{oil,gas\}} \left(\frac{1}{3} \sum_{s=t-3}^{t-1} \frac{X_{k,i,s}}{Y_{i,s}} . \frac{P_{k,s}^{trend}}{P_{k,s}} \right) \frac{temp_{k,i,t}}{temp_{oil,NOR,2010}} \end{aligned}$$

In this redefined variable, nominal net exports of oil and gas ($X_{k,i,s}$) are assessed as if oil and gas prices were at their long-term trend level (i.e., they are multiplied by the corrective factor $\frac{P_{k,s}^{trend}}{P_{k,s}}$). This helps to better insulate the oil and gas reserves variable from short- and medium-term price fluctuations, thus enhancing its structural nature.

Online Annex Box 1.1.3 Pension System Parameters and CA Balances

This Box explores the relation between pension system parameters and CA balances. The analysis assesses how pension system replacement and coverage rates—which indicate the share of worker's salaries that the system replaces on retirement and the share of the population covered, respectively—relate to the part of CA balances not already explained by the refined EBA CA model. Since the necessary pension data are not available for the full EBA sample of 52 economies during 1986-2019, the analysis focuses on a subsample for which the data are available.

The relationship between pension system features and the CA is not straightforward from a theoretical standpoint. A pension system's generosity, its system of financing, whether participation is mandatory or voluntary, and the share of the population that it covers can theoretically affect private saving, national saving, and the CA balance. In an economy with myopic households or liquidity constraints, moving from a voluntary approach to a mandatory system can result in higher national saving and a rise in the CA balance. More generous pension system parameters, in terms of coverage and replacement rates, should in principle amplify these effects. In addition, mandatory systems with a fully funded (FF) financing scheme, where workers accumulate funds for their retirement in accounts, may raise the CA balance by more than pay-as-you-go (PAYG) schemes, which are based on intergenerational budgetary transfers.[1] As with other CA drivers, the overall outcome for the CA balance depends on how the pension system parameters compare with those in the rest of the world.

International evidence of these effects on CA balances is limited, in part reflecting gaps in comparable data on pension systems across economies and over time. A recent paper by the Swiss National Bank staff (Koomen and Wicht 2022; KW henceforth) collects data on mandatory pensions system replacement rates, as well as coverage rates, for 49 economies over 30 years (1986-2016). The authors find that mandatory FF systems' replacement rates come with higher CA balances, and more so in economies with higher coverage rates, but that the replacement rates of PAYG systems are unrelated to CA balances.

Data and Related Caveats

The analysis starts by using the KW dataset on mandatory pension indicators which are available for 49 economies (all in the EBA sample) during 1986-2016. KW include in their dataset mandatory FF and PAYG replacement rates based on the estimates of Bloom and others (2007) who use information found in the biennial US Social Security Administration (SSA) reports, *Social Security Programs Throughout the World Surveys*. KW fill observations missing in Bloom and others (2007) based on the nearest available year, and use the SSA reports to fill missing observations for countries for which data are not available. KW only consider mandatory systems.

To extend the analysis to consider both mandatory and voluntary systems, and to facilitate updating the related data over time, the analysis also uses a second data source: the replacement rates for voluntary and mandatory pension schemes published in the Organisation for Economic Co-operation and Development (OECD) *Pensions at a Glance* biennial reports. The OECD reports present tables with mandatory and voluntary replacement rates computed for 51 OECD and G20 economies (not all of which are in the EBA sample) spanning 2005-2021. The tables report the OECD staff estimates of total mandatory and voluntary pension replacement rates (gross pension entitlement divided by gross pre-retirement earnings) for different levels of worker earnings. The present analysis uses the OECD staff estimates for full-career average income-earning workers.

[1] For a discussion of theoretical channels through which economies with similar demographic trends can have different saving behavior due to different pension systems, see Amaglobeli and others (2019).

Online Annex Box 1.1.3 *(continued)*

To obtain a measure of *coverage* rates that is comparable across economies and over time, the analysis follows the approach of KW and uses a proxy based on the self-employment share. As KW explain, measures of the pension coverage rate over time are not widely available but the self-employed are more likely to be excluded from pensions systems than employees are. On this basis, the authors propose a proxy for the coverage rate defined as 1 minus the share of workers that are self-employed, annual data for which are available from the International Labour Organization (ILO) via the World Bank *World Development Indicators* (WDI) database.

Estimation Results

The analysis estimates the relation between the aforementioned pension indicators and the residuals from the latest (refined) EBA CA model for economies for which the pension indicators are available. Using the fitted values from this relation provides an estimate of the contribution of the pension system parameters to explaining CA balances. Online Annex Table B1.1.3.1 reports the estimated relation between the residuals of the refined EBA CA balance equation and the pension system parameters. The variables enter the equation in demeaned form—in deviation from the GDP-weighted sample average.[2] Following KW, the specifications include the replacement and coverage rates as explanatory variables, as well as interactions between them. The *R*-squared statistics indicate that the pension variables explain between 1.7 and 8.6 percent of the variation of EBA CA model residuals. This result represents a noticeable improvement in fit, considering that the baseline EBA CA equation has an *R*-squared of about 52 percent. The proportion explained is larger for the subsample of 36 EBA economies for which the OECD replacement rates are available (columns 3-6) than for the 49 EBA economies for which the indicators of KW are available (columns 1-2).

The estimated relation with CA balances is stronger for mandatory FF replacement rates than for PAYG rates, as expected (columns 1 and 2). The relation with FF rates is especially strong for economies with larger coverage rates. These results are broadly consistent with those of KW. To gauge the economic significance of the results, consider that, based on column 2, a 10-percentage point rise in the mandatory FF replacement rate is associated with a 0.41 percentage point of GDP rise in the CA balance (0.1 × 4.08) at the sample average coverage rate. When the coverage rate is one standard deviation higher (by 18 percentage points) a 10-percentage point rise in the FF replacement rate is associated with a 0.57 percentage point of GDP rise in the CA balance.

The results based on OECD *Pensions at a Glance* mandatory and voluntary replacement rates confirm the strong relation between mandatory replacement rates and CA balances, especially at high levels of coverage rates (columns 3-4). The estimated relation between voluntary replacement rates and CA balances is, as expected, relatively weak with estimated coefficients that are statistically indistinguishable from zero. Finally, the OECD mandatory *private* replacement rates have a stronger estimated relation with the CA than do mandatory *public* replacement rates, especially at higher rates of pension coverage (columns 5-6). Since mandatory private replacement rates are often FF, this stronger estimated relation is consistent with the results based on the KW dataset which indicate a stronger relation for mandatory FF replacement rates. By the same token, since mandatory public replacement rates are often PAYG, their weaker estimated relation with the CA is consistent with the results based on the KW dataset which indicates a weaker relation for PAYG replacement rates.

[2] A potential concern is that the pension system variables may be correlated with other variables included in the EBA CA model, which could contaminate the associated estimates. However, robustness analysis suggests that this concern is not warranted: re-estimating the latest EBA CA equation while adding the pension system indicators (for the subset of economies for which these are available) yields very similar coefficient that are economically and statistically indistinguishable from those reported in Online Annex Table 1.1.1.

Online Annex Box 1.1.3 *(continued)*

Contribution to CA Balances

The estimation results in Online Annex Table B1.1.3.1 can be used to estimated CA contributions from pension variables to CA balances. There are considerable uncertainties associated with the different estimates, which in part reflect the fact that the aforementioned replacement rates are estimates of *theoretical* future rates. The replacement rates can differ significantly depending on the assumptions used to construct them. Overall, while directly using the results reported here to quantify formal adjustors to normative EBA CA benchmarks is not warranted, the results can aid in the interpretation of EBA CA model residuals and the formulation of policy advice.

Online Annex Table B1.1.3.1 EBA CA Model Residuals and Pension System Parameters

	Source of replacement rate data					
	KW dataset		OECD dataset			
Variable	(1)	(2)	(3)	(4)	(5)	(6)
PAYG replacement rate #	0.956	1.145				
	(0.675)	(0.769)				
Mandatory FF replacement rate #	3.083***	4.087***				
	(0.895)	(1.006)				
Coverage rate #	2.397**	-1.611	5.080***	-2.139	4.812***	-1.988
	(1.027)	(2.171)	(1.559)	(3.824)	(1.510)	(3.779)
PAYG replacement rate x Coverage rate #		4.892				
		(3.278)				
Mandatory FF replacement rate x Coverage rate #		9.354***				
		(2.573)				
Mandatory replacement rate #			3.026**	3.818***		
			(1.266)	(1.359)		
Voluntary replacement rate #			-5.009*	-1.072	-4.437	-1.716
			(2.911)	(3.819)	(2.749)	(3.754)
Mandatory replacement rate x Coverage rate #				15.428***		
				(5.927)		
Voluntary replacement rate x Coverage rate #				-41.486		-35.698
				(26.265)		(25.958)
Mandatory public replacement rate #					2.590**	1.936
					(1.150)	(1.338)
Mandatory private replacement rate #					7.083***	3.762*
					(1.735)	(1.938)
Mandatory public replacement rate x Coverage rate #						9.689*
						(5.255)
Mandatory private replacement rate x Coverage rate #						51.287***
						(11.305)
Constant	0.068	0.067	-0.477	0.098	-0.715**	-0.212
	(0.208)	(0.205)	(0.384)	(0.521)	(0.358)	(0.521)
Observations	1,254	1,254	484	484	475	475
R-squared	0.017	0.025	0.044	0.062	0.072	0.086
Number of economies	49	49	36	36	36	36

Notes: # denotes deviations from world GDP-weighted average. Sample is 1986-2019. Pension variables for missing years imputed based on nearest year available. Heteroskedasticity and autocorrelation robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Online Annex Box 1.1.4 Product and Labor Market Regulation

The stringency of regulations in labor and product markets, as well as reforms aimed at easing them, can have an impact on saving, investment, and the CA balance. Several studies have confirmed this relationship both from the theoretical and empirical point of view (for example, Cacciatore and Fiori 2016; IMF 2018; Duval, Furceri and Jalles 2022). While introducing product and labor market regulation indicators in the EBA CA model is precluded by data limitations, an analysis of the relation between the EBA CA model residuals and indicators of regulatory stringency for a subset of economies with the necessary data can inform policy discussions on the role of structural reforms.

The equation estimated is as follows:

$$\hat{\mu}_{jt} = \alpha + S_{jt}\gamma + \varepsilon_{jt}$$

where $\hat{\mu}$ denotes the estimated EBA CA residual for country j in year t, and S_{jt} is a vector of variables measuring regulatory stringency, expressed as deviations from their-GDP weighted world average. The analysis considers indicators on product and labor market regulations produced by the OECD staff.[1] Specifically, these include the OECD overall indicator for product market reforms, a product market regulation sub-indicator capturing "legal barriers to entry", and an aggregated indicator of labor market regulations tha combines sub-indicators on severance pay at different tenures (9 months, 4 years, and 20 years) and strictness of regulation on the use of fixed-term contracts (valid cases for fixed-term contracts, and maximum numbers of fixed-term contracts).[2]

Online Annex Table B1.1.4.1 sumarizes the findings on the extent to which the EBA CA residuals relate to indicators of labor and product market regulations. The results show that the CA relation with the OECD overall indicator for product market reforms has the opposite sign from what could be expected based on theory and is also not statistically significant (column 1). However, the sub-indicator capturing "legal barriers to entry" is found to have the expected positive relation with CA balances: deregulation along this dimension (lower barriers) is associated with lower CA balances, although the relationship is not statistically significant at conventional levels (column 2). The combined indicator of labor market regulations has a negative relation with the CA balance. Overall, these suggest that, while several structural indicators are not strongly associated with CA balances, some product market reforms, notably reducing barriers to entry, are associated with a lower CA balance. Moreover, an easing of some labor market regulations is associated with a higher CA balance. The results presented in column 2 are those of the preferred specification.

Overall, while using the results to quantify formal adjustors to normative EBA CA benchmarks is not currently warranted, the results can aid in the interpretation of EBA CA model residuals and the formulation of policy advice. Ultimately, however, the impact of structural reforms on the CA will be highly country-specific and will depend on the mix of reforms implemented. Depending on the type of reform, the persistence of the effect on the CA may also vary. This calls for granular policy recommendations regarding structural reforms based on country-specific circumstances, within the overall package of recommended policies.

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[1] The latest dataset used here covers Product Market Regulation (PMR) and Employment Protection Legislation (EPL) for years spanning 1998 to 2018 for 22 AEs. The indicators run from 0 to 6, with 6 being most heavily regulated. For the purposes of the current analysis, data for missing observations are imputed using the nearest available year.

[2] The rationale for using the combined labor market indicator is twofold: first, it summarizes the impact of regulation both in terms of cost (the severance pay) and restrictions (the use of fixed-term contracts); and second, it was found to explain well the EBA residuals in previous studies (including IMF 2018). However, it is important to acknowledge that some aspects of labor market regulation such as minimum wage legislation, collective bargaining, universal income, and the labor tax wedge are not captured by it.

Online Annex Box 1.1.4 *(continued)*

Online Annex Table B1.1.4.1 EBA CA Model Residuals and OECD Product and Labor Market Rigidities

	(1)	(2)
Product market regulation	-0.018	
	(0.9838)	
Legal barriers to entry		0.773
		(0.6128)
Labor market regulation	-0.408	-0.722**
	(0.2803)	(0.2958)
Observations	484	352
Number of economies	22	22
R-squared	0.003	0.011

Notes: Dependent variable is the EBA CA model residual in percentage points of GDP. * significant at 10%; ** significant at 5%; *** significant at 1%.

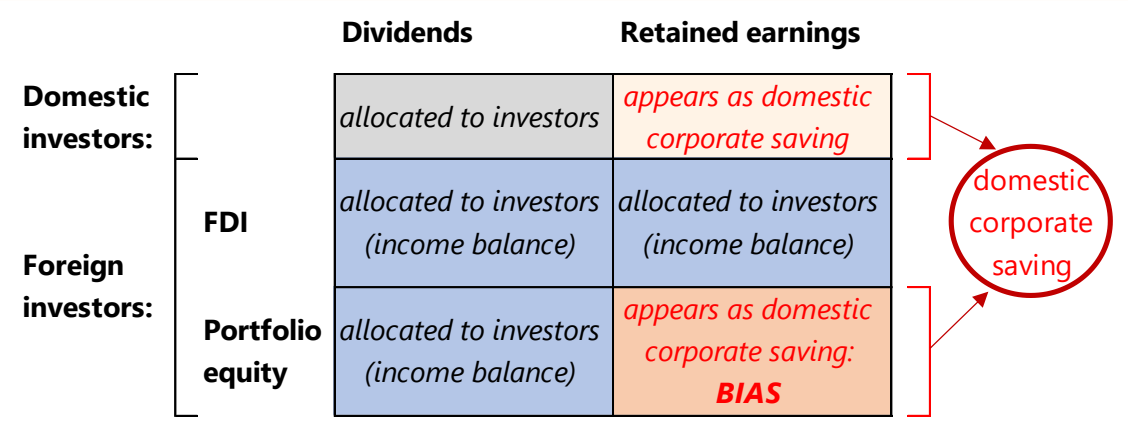
Online Annex Box 1.1.5 Measurement and Accounting Biases

In 2018, a complementary tool was introduced to take into account CA measurement and accounting biases in some countries, due to inflation-related distortions and to the asymmetric treatment of portfolio equity retained earnings (see Adler and others 2019, IMF 2018). In particular, unlike retained earnings from foreign direct investment (FDI), retained earnings from portfolio equity are not included in the CA balance (see Diagram 1). The estimates of the portfolio equity retained earnings bias relied on an average of three different methods (*stock*, *flow* and *hybrid*), combining balance of payments (BOP) and/or international investment position (IIP) components with financial market data (price-earning ratios, dividend yields), with the *hybrid* approach combining in a different way data already used in the *stock* and *flow* approaches (see IMF 2018 for a description).

In the 2022 refinements, the *hybrid* method is discontinued, as it does not bring any new information and can introduce a bias when stock and flow data are not fully consistent. In addition, a new *corporate saving* method that combines national accounts and foreign portfolio holdings data to estimate the portfolio equity retained earnings bias is introduced.

Introducing the corporate saving approach. The existing *flow* and *stock* approaches use financial market data and implicitly assume that firms with foreign shareholders have the same payout ratios as domestic listed companies. Conversely, the *corporate saving* approach uses national account data and implicitly assumes similar average saving behavior across firms with different foreign ownership ratios. Specifically, the corporate saving approach uses foreign portfolio holdings data to reapportion the share of domestic corporate saving, net of depreciation, that should be attributed to foreign portfolio investors instead of domestic investors (see orange cell in Online Annex Figure B1.1.5.1).

Online Annex Figure B1.1.5.1. Allocation of Corporate Profits in the National Accounts



In practice, country i's portfolio equity retained earnings bias (on the liability side) is computed as:

$$RE_i^L = S_i \times \left(\frac{for_i \times peq_i}{(for_i \times peq_i)+(1-for_i)}\right),$$

where S_i denotes corporate saving (net of depreciation), for_i denotes the foreign ownership rate (percentage owned by both FDI and foreign portfolio equity investors in overall equity liabilities of the corporate sector), and peq_i denotes the share of portfolio equity investors among foreign investors (FDI and portfolio equity).[1] The asset side is calculated as a CPIS-weighted sum of partner countries' portfolio equity retained earnings on the liability side, with the net balance obtained as $RE_i^{net} = RE_i^A - RE_i^L$.

[1] In turn, for_i and peq_i are calculated in the following manner: (i) portfolio equity liabilities (excluding investment funds) plus FDI equity liabilities, as a share of outstanding equity liabilities of the domestic corporate sector; and (ii) portfolio equity liabilities (excluding investment funds) as a share of foreign portfolio equity liabilities (excluding investment funds) plus FDI equity liabilities.

Online Annex Box 1.1.5 *(continued)*

***Results*.** Estimates based on the new *corporate saving* approach are generally broadly in line with other existing estimates (based on the *stock* and *flow* approaches), but could differ in countries where the level of retained earnings of listed firms deviates considerably from that of the overall domestic corporate sector. As the three approaches are complementary, adjustors to the EBA model results to account for the portfolio equity retained earnings bias are designed as the average of the three approaches. In some cases, more granular data (e.g. distinguishing between multinational companies, large firms, and SMEs as for the Netherlands can be used to refine the corporate saving approach estimate.

Online Annex 1.2. COVID-19–Related External Balance Assessment Adjustments[21]

The COVID-19 crisis affected affecting countries' external positions in 2020 (IMF 2021). The effects of the pandemic continued to have an important impact on external positions in 2021, due to the emergence of the Delta and Omicron variants that, in many cases, delayed reopening plans and a return to pre-pandemic activity in the most affected sectors. To assess underlying external positions in 2021, additional adjustments to the External Balance Assessment (EBA) model estimates are needed beyond the standard cyclical adjustments—those for movements in domestic and foreign output gaps and in the terms of trade (see Cubeddu and others 2019)—to strip out transitory factors related to the impact of the crisis on hard-hit economic sectors. This annex explains how these adjustments were estimated for the 2021 external sector assessments reported in Chapter 3 and summarized in Chapter 1.

The IMF staff identified four main adjustments related to the impact of the crisis in 2021 on specific economic sectors that were applied across economies in an evenhanded and multilaterally consistent way, as was the case last year. These adjustors relate to the impact of the crisis on (1) the travel services balance (including tourism) due to restrictions on international travel; (2) the transport services balances, reflecting the sharp increase in shipping costs in 2021; (3) trade in medical products triggered by the health emergency; and (4) the shift in household consumption composition from services to durables and other consumer goods. In addition, more country-specific adjustors related to the COVID-19 crisis were also included, as described in what follows.[22]

Travel Services

To inform the design of EBA adjustors to the current account in 2021 associated with the impact of the crisis on the travel services balance, the analysis estimates the historical relationship between the EBA cyclically adjusted current account balance and travel services, respectively, after controlling for the effect on the current account balance through the relative output gap and terms of trade. The following relationship is estimated using annual data for 1986–2019 for the sample of economies included in the EBA exercise:

$$y_{i,t} - y_{i,t-1} = \alpha_i + \lambda_t + \beta_1 x_{i,t} + \gamma \text{Controls}_{i,t} + \varepsilon_{i,t} \,, \qquad (1.2.1)$$

where

- $y_{i,t}$ is the EBA cyclically adjusted current account balance for economy *i* in year *t*, in percent of GDP.
- α_i and λ_t are economy and time fixed effects, respectively.
- $x_{i,t}$ is the change in the travel services balance in percent of GDP based on *World Economic Outlook* (WEO) historical data.
- $\text{Controls}_{i,t}$ contains additional controls (three lags of the change in the current account, the output gap, and the change in the terms of trade).
- $\varepsilon_{i,t}$ is an unexplained residual.

A two-stage least squares strategy is used to estimate equation (1.2.1) to address endogeneity issues regarding the comovement of the current account and travel services balances (see Online Annex Table 1.2.1 for details). The estimated coefficients suggest that the impact effect of a 1 percent of GDP rise in the travel services balance on the current account is about 0.75 percent of GDP. The effect being less than 1 is consistent with the notion that the current account adjusts by less than the direct impact of the shock, reflecting associated adjustments in domestic demand. These results are based on using and averaging across alternative estimation

[21]The authors of this annex are Mahir Binici, Adam Jakubik, Daniel Leigh, Pau Rabanal, Cyril Rebillard, and Niamh Sheridan.

[22] The 2021 ESR included an adjustor for the decline in oil demand due to the Great Lockdown in 2020. In 2021, world oil demand and prices recovered to levels close to 2019. For this reason this adjustor is not applied in 2021. Fluctuations in oil prices are taken into account in the terms-of-trade gap variable in the EBA CA model.

methods and specifications (such as the inclusion of additional controls and instruments; see Online Annex Table 1.2.1).

The resultant travel services adjustment to the current account in 2021 is computed based on (1) the estimated relationship between changes in travel services balances and the current account in equation (1.1.1); and (2) the projected transitory COVID-19 impact on the travel services balance in 2021 compared to pre-pandemic levels. The baseline assumption was that the impact would fade over the medium term. This assumption was modified in economies where IMF staff projections assume that the impact is more persistent or permanent. Online Annex Figure 1.2.1 and Online Annex Figure 1.2.2 present the estimated impact on the current account in percent of GDP and in US dollars, respectively; Online Annex Table 1.2.2 presents the associated EBA *adjustors* to the current account in percent of GDP (equal to the estimated impact, but with the opposite sign). The impact across economies is highly asymmetric, with economies with substantial exports of tourism, such as Spain, Thailand, and Türkiye having large negative current account impacts and positive impacts spread more evenly over economies.

Transport Services

In 2021, the combination of high demand for tradable goods in advanced economies and supply bottlenecks associated with the pandemic lead to a three-fold increase in shipping costs. The Baltic Exchange Dry Index experienced a three-fold increase between 2020 and 2021 on average, with a five-fold increase in September 2021. These supply bottleneck pressures eased somewhat in early 2022, but the war in Ukraine has led to another increase in shipping costs in mid-2022.

As a result, transport services balances have fluctuated sharply in a few countries in 2021. Annex Table 1.2.2 reports changes in the transport service balances (as percent of GDP) in 2021 compared to 2020. Changes in this item in the current account were sizable (more than ½ percent of GDP in absolute value) in a number of cases such as France, Korea, and Thailand. The impact of the shipping costs increase on the transport services balance and the current account were treated as temporary and expected to dissipate over the medium term.

Household Consumption Composition Shift

The pandemic has shifted the composition of household consumption from services toward durables and other consumer goods. In advanced economies, the composition shift has generally been toward both durable and nondurable consumer goods, while in emerging market and developing economies the shift away from services has been less pronounced and has come with a larger share of nondurables consumption. The calculation for this adjustor focuses on the shift in consumption composition as opposed to the overall level of consumption, which declined in 2020 but whose impact on the current account is already reflected in the standard EBA cyclical adjustment.

The impact on imports is estimated based on a comparison of (1) the level of durables, nondurables, and services consumption that would have occurred in 2021 based on their 2019 shares in private consumption and the evolution of total private consumption in 2021; (2) the actual level of durables, nondurables, and services consumption in 2021; and (3) the import content of durables, nondurables, and services consumption. The latter is available for the United States from a study by the Federal Reserve Bank of San Francisco staff (Hale and others 2019). For other economies, this estimate of import content is scaled, based on the percentage of foreign value added in domestic demand (from the OECD's TiVA data set) compared with the United States. Quarterly data are available for 14 advanced economies and 7 emerging market and developing economies. For economies with missing data, the shift in the shares in consumption categories in 2021 compared with 2019 is based on the advanced economy and emerging market and developing economy averages, respectively.

The impact of the associated rise in imports on economies' exports is based on (1) the sum of the impact on imports of durable, nondurable, and services household consumption across economies; and (2) the share of

each economy's exports in total world exports. The share in total exports for durable goods is based on UN Comtrade data, defined by the UN Classification by Broad Economic Categories (BEC) 61 ("Consumer goods not elsewhere specified, durable"). The share of total exports for nondurable goods and the import content of services is based on data for trade in goods excluding oil. The analysis avoids double-counting with the travel adjustor by excluding the share of foreign travel from the consumption of services. It also avoids double-counting with the medical goods adjustors by excluding the share of pharmaceutical and other medical products, respectively, from the consumption of nondurables. Overall, the largest net positive and negative estimated current account impacts are, in US dollars, for China and the United States, respectively (Online Annex Figure 1.2.2).

Trade in Medical Products

The COVID-19 medical emergency has caused an unusual level of exports and imports of medical products, with implications for current account movements in 2020 and 2021. To quantify the impact, the analysis considers export and import data sourced from UN Comtrade and national customs offices for the list of COVID-19 related medical products taken from the WTO (2020) information note "Trade in Medical Goods in the Context of COVID-19," which covers pharmaceuticals, medical supplies, medical equipment, and personal protective equipment (PPE) and the "Joint Indicative List of Critical COVID-19 Vaccine Inputs for Consultation" compiled by the WTO and others (2021). The values of imports and exports are calculated at the Harmonized System (HS) six-digit subheading level for 145 separate subheadings.

The gross export data are adjusted to subtract embedded foreign content (intermediate good imports) using Asian Development Bank Multiregional Input-Output Tables for 2019. The resulting foreign intermediate goods imports are added to imports for each economy considered in the analysis. The intermediate imports are also allocated to exporters based on total goods trade export shares for their respective years from the April 2022 World Economic Outlook database, with the shares computed to add to 100 percent for the sample of economies considered, which covers those included in the EBA and/or ESR exercises. The reallocation of such intermediate goods to exporters has only a modest influence on the results. Finally, the analysis computes the associated change in net exports in 2021 compared with 2019, for economies with the necessary UN Comtrade or customs data. The estimated positive net effect on the current account is particularly large for medical goods exporters such as China and Malaysia (Online Annex Figure 1.1.1).

Other Factors

Other, more idiosyncratic factors associated with the COVID-19 crisis (reported in Online Annex Figure 1.2.1, Online Annex Figure 1.2.2, and Online Annex Table 1.2.2) relate to remittances, the income balance, minerals exports including gold, and aeronautics. Fluctuations in remittances were deemed important in Mexico and Malaysia. Economies with large foreign direct investment liabilities experienced increases in their income and current account balances due to lower dividend payments to foreign investors on their external liabilities (South Africa). In Australia, a temporarily higher net compensation of employees affected the income balance. Increased global demand for gold and other minerals not included in the External Balance Assessment methodology terms-of-trade cyclical component (such as rhodium and palladium) led to temporary increases in mineral exports (South Africa). In France, lower demand for travel services had knock-on effects in the aeronautics sector.

Online Annex Table 1.2.1. Current Account Balance versus Travel and Oil Balances: Historical Relation

Dependent Variable: Change in Cyclically Adjusted Current Account Balance (Percent of GDP)

Method	2SLS		GMM	
Change in Travel Balance/GDP	0.80*** (0.25)	0.72*** (0.23)	0.74*** (0.26)	0.75*** (0.23)
Lags of Change in CA	3	3	3	3
Output Gap and TOT	NO	YES	NO	YES
Economy and Year FE	YES	YES	YES	YES
Observations	1,308	1,301	1,299	1,299
R-squared	0.14	0.14	0.11	0.13

Note: Table reports point estimates and robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1,5, and 10 level, respectively. 2SLS denotes two-stage-least-squares estimates with the change in travel services exports relative to GDP instrumenting the change in the travel services balance relative to GDP, respectively. GMM denotes generalized method of moments estimates with the following instruments: current and one-year lagged values of the change in travel services exports relative to GDP, real GDP partner (trade-weighted) growth, the output gap and the change in the terms of trade. All regressions include a dummy variable for China after 2014 to reflect accounting changes in the travel services balance. CA = current account; FE = fixed effect; TOT = terms of trade.

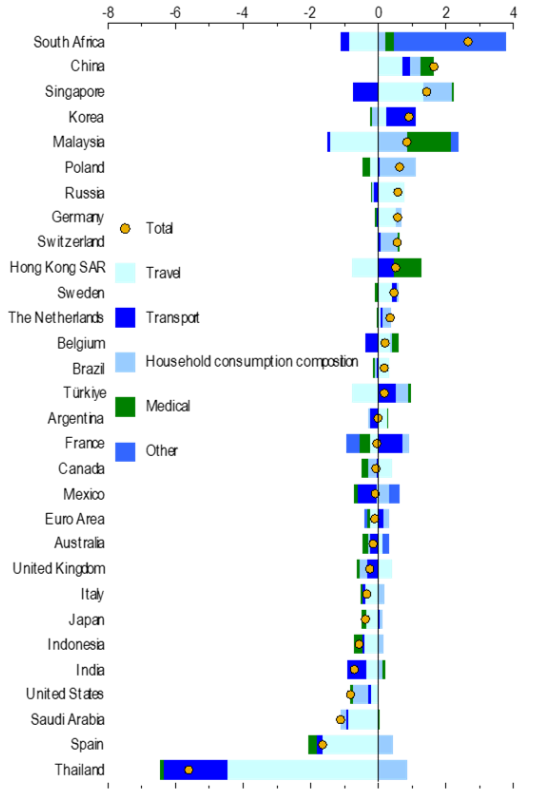
Online Annex Table 1.2.2. ESR Economies. Summary of COVID-19 Adjustments

(in percent of GDP)

Economy	Travel	Transport	Household consumption composition	Medical	Other	Total
Argentina	-0.3	0.3	0.0	0.0	0.0	**0.0**
Australia	-0.1	0.3	0.0	0.2	-0.2	**0.2**
Belgium	-0.3	0.4	-0.1	-0.2	0.0	**-0.2**
Brazil	-0.3	0.1	0.0	0.1	0.0	**-0.2**
Canada	-0.4	0.1	0.2	0.2	0.0	**0.1**
China	-0.7	-0.2	-0.3	-0.4	0.0	**-1.6**
Euro Area	0.2	-0.1	-0.2	0.1	0.1	**0.1**
France	0.2	-0.7	-0.2	0.3	0.4	**0.0**
Germany	-0.5	0.0	-0.2	0.1	0.0	**-0.6**
Hong Kong SAR	0.8	-0.5	0.0	-0.8	0.0	**-0.5**
India	0.4	0.6	-0.1	-0.1	0.0	**0.7**
Indonesia	0.4	0.1	-0.2	0.3	0.0	**0.6**
Italy	0.4	0.1	-0.2	0.1	0.0	**0.3**
Japan	0.4	0.0	-0.1	0.1	0.0	**0.4**
Korea	-0.2	-0.9	0.2	0.0	0.0	**-0.9**
Malaysia	1.4	0.1	-0.9	-1.3	-0.2	**-0.8**
Mexico	0.1	0.6	-0.3	0.1	-0.3	**0.1**
The Netherlands	-0.1	-0.1	-0.3	0.0	0.0	**-0.4**
Poland	0.3	0.0	-1.1	0.2	0.0	**-0.6**
Russia	-0.8	0.1	0.0	0.0	0.0	**-0.6**
Saudi Arabia	0.9	0.0	0.2	0.0	0.0	**1.1**
Singapore	-1.3	0.7	-0.8	0.0	0.0	**-1.4**
South Africa	0.9	0.2	-0.2	-0.3	-3.3	**-2.7**
Spain	1.6	0.2	-0.4	0.3	0.0	**1.7**
Sweden	-0.4	-0.1	0.0	0.1	0.0	**-0.5**
Switzerland	0.0	-0.1	-0.5	0.0	0.0	**-0.6**
Thailand	4.4	1.9	-0.9	0.1	0.0	**5.6**
Türkiye	0.8	-0.5	-0.4	-0.1	0.0	**-0.2**
United Kingdom	-0.4	0.3	0.2	0.1	0.0	**0.3**
United States	0.2	0.1	0.4	0.1	0.0	**0.8**

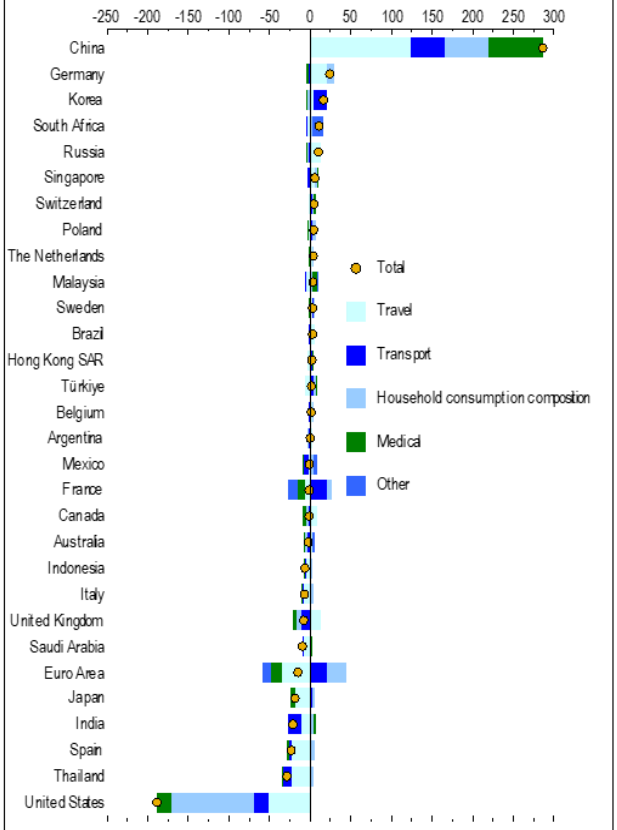
Note: Table reports adjustors to the current account, which equal the estimated impact on the current account but with the opposite sign.

Online Annex Figure 1.2.1. Estimated Effect of COVID-19 Factors on the Current Account, 2021
(Percent of GDP)



Sources: IMF, *World Economic Outlook*; and IMF staff calculations.
Note: Data labels use International Organization for Standardization country codes.

Online Annex Figure 1.2.2. Estimated Effect of COVID-19 Factors on the Current Account, 2021
(Billions of US dollars)



Sources: IMF, *World Economic Outlook*; and IMF staff calculations.
Note: Data labels use International Organization for Standardization country codes.

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