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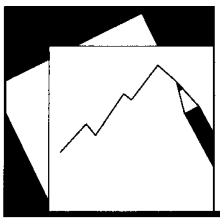

IMF Working Paper

The External Balance Assessment (EBA) Methodology

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Research Department

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Prepared by Steven Phillips, Luis Catão, Luca Ricci, Rudolfs Bems, Mitali Das, Julian Di Giovanni, D. Filiz Unsal, Marola Castillo, Jungjin Lee, Jair Rodriguez and Mauricio Vargas[1]

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Abstract

The External Balance Assessment (EBA) methodology has been developed by the IMF's Research Department as a successor to the CGER methodology for assessing current accounts and exchange rates in a multilaterally consistent manner. Compared to other approaches, EBA emphasizes distinguishing between the positive empirical analysis and the normative assessment of current accounts and exchange rates, and highlights the roles of policies and policy distortions. This paper provides a comprehensive description and discussion of the 2013 version ("2.0") of the EBA methodology, including areas for its further development.

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[2] The body of this paper is identical to the "Technical Background" document posted on www.imf.org since August 2013. Further information on the EBA project, including datasets and the application of the EBA method to recent current accounts and exchange rates, is available at http://www.imf.org/external/np/res/eba/index.htm

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I. INTRODUCTION

The External Balance Assessment (EBA) methodology has been developed by the IMF's Research Department as a successor to the former CGER exercise, on which EBA builds. EBA comprises three methods, each based on its corresponding CGER predecessor.[3] Two methods are panel regression-based analyses of the current account and real exchange rate, while the third method is model-free and focused on sustainability analysis. EBA however brings important differences relative to CGER in the two regression-based methods.

One essential difference is that EBA makes a sharper distinction between positive (descriptive) understanding of current accounts and real exchange rates and making normative evaluations. Another is that EBA takes into account a much broader set of factors—including policies, cyclical conditions, and global capital market conditions—that may influence the current account and real exchange rate. This is done by distinguishing two stages of the regression-based methods:

- The first stage is positive (descriptive), and focused on *understanding* current account and real exchange rate developments, via the estimation of panel regressions.

- The second stage provides estimates that are more suitable for a *normative evaluation* of current accounts and real exchange rates. The second stage thus goes further, drawing on information from the regression results to estimate the contributions of "policy gaps" to current accounts and real exchange rates.

This technical background paper sets out the enhanced version of EBA that was implemented during Spring 2013. Relative to the first version, the changes relate to the panel regression-based methods. In particular, in terms of policies, the EBA analysis now accounts also for the effects of financial policies (or proxies for the effects of policies that in principle should avoid or contain financial excesses) and monetary policy. The role of FX intervention is now also modeled in the real exchange rate regression as well as the current account regression, enhancing the consistency of the two approaches. In terms of fundamentals, both regressions now include terms for the role of productivity/level of economic development that are interacted with capital account openness. The current account regression now accounts for risks related to the institutional/political environment, and extends the role of exhaustible resources to all net exporters of oil and natural gas. A number of other modifications are also explained in this paper.

The organization of the paper is as follows. Section II sets out the basic conceptual framework for the empirical analysis of current accounts and real exchange rates. Sections III and IV then explain the positive analysis of current account balances and real exchange rates, respectively, based on panel regressions. These sections discuss the regression specifications variable by variable,

[3] For full details of CGER, see Lee et al. (2008).

including changes to the specification relative to the first version, and refer also to alternative specifications and hypotheses considered. Related annexes go further in discussing the subjects of financial and structural factors' influence on the current account (CA) and the real effective exchange rate (REER), and empirical investigation of their effects.

Section V explains the second stage: the shift from positive analysis to normative evaluation, combining the regression results with benchmark policy settings to estimate the contributions of "policy gaps" to current accounts and real exchange rates, and to EBA "Total Gaps." Section VI describes the EBA External Sustainability approach to assessing current accounts. Finally, Section VII discusses some key issues in using EBA results to make assessments, including aspects of the relevance and reliability of each of the three EBA methods. The discussion points to the strengths of the EBA exercise but also to certain limitations that warrant attention and further work.

II. EBA Framework for CA and REER Analysis

To illustrate the basic framework behind the EBA empirical analysis, we highlight two well-known relationships which provide the background for EBA analysis. The first expresses the current account as the gap between aggregate saving and investment (the so-called "IS" relation):

$$S(NFA, Y, r, X_s) - I(Y, r, X_I) = CA(Y, REER, Y^{wo}, X_{CA}) \quad (1)$$

where we have in brackets the labels of the respective arguments of the saving and investment functions to be defined just below (with the superscript "wo" denoting the counterpart foreign or world variables).

The second equation comes from the balance-of-payments (BOP) relation:

$$CA(Y, REER, Y^{wo}, X_{CA}) + CF(r - r^{wo}, REER, X_{CF}) = \Delta R \quad (2)$$

where[4]

Y = the domestic output gap;
REER = the real effective exchange rate, which plays an expenditure-switching role;
NFA = net foreign assets (measured at the beginning of the period);
r = interest rate;
ΔR = change in foreign exchange reserves;
CF = balance on the financial account;

[4] Note that in equation (2), ΔR is taken as exogenous (policy determined), and so is not written as a function of any other variable.

$X's$ = all the factors that may influence saving, investment, net exports and the current account, capital flows. In particular:

- X_s = the consumption/saving shifters, which include income per capita, demographics, expected income (shifts in permanent income), social insurance, the budget balance, financial policies, the institutional environment, and net exports of exhaustible resources;
- X_I = the investment shifters, which include income per capita, expected income/output, governance, financial policies;
- X_{CA} = the export/import shifters, which include the world commodity price-based terms of trade (itself a function of the respective country's commodity shares in exports and imports);
- X_{CF} = capital account shifters, which include indicators of global risk aversion, the "exorbitant privilege" that comes with reserve currency status, financial home bias, and capital controls.

Note that estimating the CA as a function of REER and other variables would be inappropriate (as would estimating the REER as a function of CA), since the system above implies that CA and REER are both endogenous and simultaneously determined as a function of other variables. Hence we make use of the system to derive reduced form equations for CA and REER. The model could be solved for *REER* and *Y* given *r* or for *REER* and *r* given *Y*. If we assume that monetary policy is implemented by setting a particular interest rate in order to target an output gap, then these two variables would be interchangeable and the model (combined with a money demand equation) would deliver the following reduced form equations for the current account and for the real effective exchange rate:

$$CA = CA(X_I, X_S, X_{CA}, X_{CF}, Z, Z^{wo}, \Delta R) \tag{3}$$

$$REER = REER(X_I, X_S, X_{CA}, X_{CF}, Z, Z^{wo}, \Delta R) \tag{4}$$

where *Z* could be either the output gap or the short-term interest rate; more generally, the reduced form could be a function of both terms. We will come back to this issue in the following sections. Equations (3) and (4) constitute the analytical backbone of the empirical analyses described in the following two sections.

Equations (3) and (4) constitute the analytical backbone of the empirical analyses described in the following two sections.

The theoretical framework thus suggests that most factors that would influence the current account would also influence the real exchange rate, and vice versa. While the REER is an essential part of the process of adjustment of the CA, through its expenditure switching role—as seen in equation

(1)—note that it does not enter equation (3), as the REER is not itself an exogenous driver of the CA.[5] One implication, borne out in the empirical evidence in the following sections, is that there is often a rough proportionality between the two coefficients estimated on the same variable in the separate CA and REER regressions (e.g., a factor found to lower the CA by 1 percent of GDP will typically be found to *raise* (appreciate) the REER, by say 3-5 percent). Such a directional pattern is to be expected, as a reflection of the expenditure-switching role of REER movements.

When investigating the empirical support for the theoretical framework, we chose a different approach for policy and non-policy variables. For *policy variables*, we do not include regressors that are statistically insignificant; our criterion for policy variables is relatively stringent because we do not want to unduly influence the subsequent normative assessments which require judgments about policies (as discussed in Section V). For *non-policy variables* about which we have strong theoretical prior (corroborated by other empirical studies), we generally are willing to include these as regressors even if not statistically significant, as long as the coefficients have the correct sign. Overall, most regressors in the final specification are statistically significant.

Note that theory does not imply for all variables a simple correspondence and proportionality of effects on the CA and REER. For example, interest rates would be expected have a clear, though temporary, effect on real exchange rates, but would have two opposing effects on the current account. A higher interest rate would temporarily appreciate the REER, which in turn would have a negative effect on the CA via the expenditure switching channel. At the same time, the higher interest rate would act to reduce domestic demand, boosting the CA. Thus the net effect on the CA would be unclear, and perhaps not even empirically detectable. Indeed, it turns out that interest rates are highly significant in the REER regression but not at all in the CA regression. More generally, broader theoretical frameworks suggest that some factors may influence the REER without any clear implication for the CA. For example, controlling for other determinants, a permanent gain in the terms of trade, or in productivity of tradables relative to nontradables, may boost real income and wealth, and appreciate the REER, but without any clear implication for the level of the CA.

Since a given economy's current account and real effective exchange rate is by nature measured relative to other countries, they cannot be determined only by a country's own characteristics—they must reflect also "foreign" characteristics, within a simultaneously determined general equilibrium. While the precise functional form would depend on the specific model adopted, a

[5] For example, for an economy beginning at full employment, a shock that shifts the consumption/ saving rate on a sustained basis will in the first instance directly affect the CA, as well as output—but such a shock will also initiate a process of macroeconomic adjustment involving changes in relative prices, including the REER. When that adjustment is complete and the economy has returned to full employment, the changed level of the REER will have played an essential role in the adjustment process and in the resulting new level of the CA, even though the REER was not the underlying, original cause of the CA change.

good approximation to the general equilibrium implications of our regressors is to measure each country's variables relative to a weighted average of other countries' values prevailing at the same time. This greatly enhances the multilateral consistency of the results of the exercise, as discussed later.

In closing this section it should be recognized that the CA and REER regressions to be estimated are not true reduced form specifications. This poses a number of issues for estimation and interpretation (such as dynamics and endogeneity), to be discussed as they arise in the following sections.

III. Positive Analysis: The EBA Current Account Panel Regression

A. Current account regression specification

The backbone of the EBA CA regression-based exercise is the estimation of the general equation (3).

A number of empirical proxies for each of the variables discussed above were considered, building upon and extending the extensive literature.[6] The estimation results for the final specification, chosen after careful consideration of theory and evidence, are discussed below (and a glossary of variables is reported in Annex I, with a detailed description of how each was constructed).

Importantly, most of these variables are actually measured as a country's deviation, in a given year, from the relevant "world" counterpart (in that same year).[7] Thus a movement in the fiscal balance, e.g., is hypothesized to affect the CA only to the extent that other countries' fiscal balances do not move by the same amount. For the sake of brevity, however, we refer to such a regressor simply as "the fiscal balance," keeping in mind that it is actually a deviation from the "world" fiscal balance. Since in all regressions the individual country's current account is scaled by GDP, the "world" fiscal balance is computed as a GDP-weighted average of individual countries' fiscal balance.

[6] This literature includes the work on the CGER predecessor to EBA (Lee et al. (2008)), and for example, Blanchard (2007), Chinn and Prasad (2003), Chinn, Eichengreen, and Ito (2007, 2011), Debelle and Faruqee (1996), de Santis, Finicelli, and Veronese (2011), Gruber and Kamin (2007, 2008), and Bussiere et al. (2010). Recent IMF staff contributions include, for example, Araujo et al. (2013), Beidas-Strom and Cashin (2011), Bems and de Carvalho Filho (2009a), and Catao and Milesi-Ferretti (2013).

[7] This treatment does not apply to a few variables that by their nature are already measured "relative" to other countries (e.g., net foreign assets). The regression results tables indicate which variables are constructed in this manner.

Considering each country's characteristics relative to a GDP-weighted world counterpart has another important implication. It is also a way of recognizing the role of a country's economic size in governing how much its CA/GDP ratio will respond to a given domestic shock. For example, developments in a very small economy can influence its own CA while having nearly zero effect on other countries' CA. For a very large economy, however, any movement in its CA would require moving the CA of the rest of the world to a notable degree, and thus face more "pushback." Thus a given domestic shock would be expected to move a large economy's CA by less than the same shock would move a small economy's CA. The regression weighting scheme allows for this difference—not by estimating separate coefficients for countries of different size, but by differently measuring their shocks relative to the global average.

B. Estimation

As current account data display strong autocorrelation, it is important to take account of this in the estimation. The estimation uses pooled GLS with a panel-wide AR(1) correction. Another possible approach would be to include the lagged current account in the regression. However, in pooled data this would amount to adding a quasi-fixed effect to the estimates and open up a key interpretative/normative issue related to having the current account in a given year being explained by the previous year's current account. With such a specification, the lagged CA regressor could end up picking up the effects of sustained distortions that are otherwise not captured by the regression (in addition to serving its intended purpose of picking up dynamics and gradual adjustment). Therefore we instead use pooled GLS with a panel-wide AR1 correction to deal with autocorrelation.

The EBA approach to CA assessment avoids a role for country dummy variables in determining CA gaps. Thus a fixed effects specification is not used, on the principle that country dummies would not provide an economic explanation of observed CAs and might pick up the uncaptured effects of sustained distortions on the CA.

C. Country sample and sample period

The set of countries covered is guided by balancing two considerations: capturing a large share of the global economy and avoiding having too much heterogeneity in the regression samples. Country selection focused on countries that have sizeable access to global capital markets and data of sufficient good quality and availability; countries with very low per capita income levels or small geographical area are mostly excluded from the sample (note that in practice these criteria are often interrelated). A further consideration was to exclude countries for which oil exports are a highly dominant share of the economy (e.g., Saudi Arabia, Venezuela). It was judged that assessments of such cases require special considerations that would be too challenging to include in the EBA panel regression.

The balance is struck at a set of 49 economies (listed in Annex II), mainly advanced and emerging market economies, which together encompass about 90 percent of global GDP.

The regression is run on annual data, for the period 1986-2010. The purpose of using annual data, rather than data that has been pre-averaged into 4- or 5-year blocks, is to uncover cyclical sources of current account behavior. In turn, this allows making a cyclical adjustment of the current account, and for the subsequent analysis to focus on the latest observed current account.[8] (For the EBA exercise conducted in Spring 2013, the analysis is of 2012 current account outcomes.)

D. Current account regression model

The CA regression model and estimated coefficients are as shown in Table 1. The coefficients have the expected signs, and nearly all are statistically significant. For the purpose of exposition we divide the regressors in four groups.

D.1 Traditional fundamentals: non-policy variables

Among the more "traditional" current account regressors, the lagged level of net foreign assets (NFA), the relative level of per worker income, the rate of income (GDP) growth, the net oil and gas trade balance, aging speed, and a financial center dummy are clearly significant statistically. Most of these variables featured in the CGER methodology regression (or some of its variants) in some way, though the EBA regression involves refinements to their specification.

Productivity/level of development (interacted with capital account openness). Traditional CA regressions reflect the theory that capital will flow from higher- to lower-productivity economies, according to the extent to which an economy is "behind the economy at the frontier" of highest productivity. This theoretical expectation can only occur to the extent that policies permit capital to flow across countries; the EBA regression therefore includes an interaction with a measure of capital account openness.[9] A further refinement is to measure productivity as an economy's output, measured in PPP terms, to the size of its working age population rather than total population. In turn this productivity is considered relative to three large economies at the frontier of highest productivity. Finally, the relative productivity is demeaned before the interaction with capital account openness, in order to allow capital controls to dampen the lending or borrowing effect associated with high or low productivity: for open countries the effect on the current account is

[8] In contrast, the approach taken in CGER was to focus assessments on the current account expected to hold 5 years into the future, which would be more likely to be free of cyclical influences. The CGER analysis therefore relied on country desk projections of the current account; it did not directly speak to the recently observed level of the current account nor provide a quantification of current cyclical influences.

[9] The role of capital controls in influencing the relation between level of development and the current account was highlighted by Reinhardt, Ricci, and Tressel (2010), who show that accounting for capital controls can help explain the Lucas Puzzle.

greatest, but as capital controls rise the effect is diminished. The finding is that capital tends to flow toward economies with a lower level of productivity and income, but that the scale of such flows and thus the impact on the CA depends on financial openness. An increase in relative productivity by 10 percent is associated with an improvement in the current account by about 0.6 percent in countries with open capital account (and virtually no effect in countries with capital controls).

Expected GDP growth rate 5 years ahead. Economies with faster trend growth rates tend to invest more and have less positive CA balances. A refinement in the EBA regression is that the rate of economic growth is considered on a forward-looking basis, as expectations of future growth rather than a trend estimated on the record of past growth. To focus on the trend growth prospect, as opposed to cyclical considerations, we use WEO projections of the growth rate 5 years from now, rather than annualized growth expected over the next 5 years. (De-trended GDP growth was tried but turned out to be dominated by the forward looking expected growth variable.) An increase in relative forecast growth rate by 1 percentage point is associated with a reduction in the current account of almost half a percentage point of GDP.

Relationship with NFA position. The CA regression includes a country's lagged NFA/GDP ratio; in general, countries with more positive NFA positions tend to have somewhat higher CA balances —though not necessarily higher trade balances, as the higher surplus may reflect higher income earned on the NFA position. For example, a growing economy that was maintaining a constant positive NFA/GDP ratio would be running a CA surplus each year, such that NFA would continue to grow in line with GDP growth, but its trade balance could still be in deficit. Importantly, the estimated positive coefficient on NFA/GDP is only about +0.015,[10] well below likely average rates of return on external assets and liabilities; this implies that economies with larger (initial) NFA positions tend to have lower trade balances, even though they do have higher CA balances. Moreover, the regression allows for a nonlinear relationship of the CA with NFA, since it is apparent that the generally positive association flattens or disappears when NFA/GDP is far into the negative range— perhaps because sustainability concerns become more pressing. Accordingly, an interaction term is used to allow a different slope when NFA is below negative 60 percent of GDP (a threshold suggested by the work of Catao and Milesi-Ferretti (2013), in the context of analyzing crisis probabilities).

Exhaustible resources of oil and natural gas. The EBA model captures the tendency of countries with energy resource wealth to have current account surpluses, relating this pattern to country's motivation to save a portion of its income in recognition of the exhaustible nature of that wealth.

[10] Other CA regressions have found higher values of this coefficient, likely because of differences in country sample. In particular, the coefficient is quite sensitive to the presence or absence of Singapore, which has been an outlier in terms of both CA and NFA/GDP positions over the years.

For all EBA countries that are net exporters of oil (or natural gas, not previously considered by EBA), current accounts are thus expected to be positively related not only to the size of such exports but also to their "temporariness," as measured by the ratio of production to the stock of proven reserves, as predicted by theory (countries with substantial wealth in the form of exhaustible oil and gas resources should save a higher portion of the resulting current income when resources are more temporary).[11] The temporariness measure takes account of differences in countries' energy endowments: the oil and gas trade balance for each of the net exporter countries is adjusted by the ratio of the respective oil or gas production to reserves relative to that of Norway's ratio for oil in 2010 (see Annex III for more detail on the construction of the variable and the differences with respect to pilot EBA). Each 1 percentage point of GDP of "temporariness-adjusted" net exports of oil and gas is associated with an improvement in the current account of 0.6 percentage points of GDP.[12] On the other hand, among net *importers* of oil and natural gas (the majority of countries in our sample), there was no robust relationship between the oil and natural gas trade balance and the overall CA balance. Indeed theory would not predict a relationship, except perhaps in the short-run, as CA adjustment to energy price shocks is unlikely to be immediate. (Note that the regression also includes a separate regressor for the cyclical component of the commodity terms of trade, as discussed below.)

Demographic factors. An "aging speed" regressor (not used in CGER) is clearly statistically significant; faster projected aging is associated with a stronger current account.[13] With the aging speed variable included, the CGER's two demographic variables, population growth and the old age dependency ratio, enter with the expected negative signs, but are not statistically significant (though the former just misses being significant at the 10 percent level). Nevertheless both are included in the final regression as controls, and to facilitate comparison with previous analyses. Overall, an increase in relative aging speed by 1 percentage point is associated with a stronger current account by 0.16 percent of GDP; an increase in relative population growth by 1 percentage point is associated with a weaker current account by 0.6 percent of GDP; and an increase in relative dependency ratio by 1 percentage point is associated with a weaker current account by 0.03 percent of GDP.

Financial center status. As in CGER and some other studies, a single dummy variable is entered for a limited number of economies that are relatively small and have "financial center" characteristics. These are the Netherlands, Switzerland (and also Belgium, but only in the first part

[11] More precisely, the variable accounts for the oil and gas balance when and where it exceeds zero. In recent years, this criterion is met by more than a dozen countries within the 49 country sample.

[12] Hence 0.6 would be the effect when resources are expected to be depleted in about 9 years, which was the estimated years-until-exhaustion for Norway's oil in 2010.

[13] The aging speed concept has been used previously in CA analysis, including Lane (2010) and Lane and Milesi-Ferretti (2011).

of the sample period).[14] The use of a financial center dummy follows tradition and serves the purpose of avoiding potential bias in estimates of other regression coefficients, but it does not substantively advance the understanding or assessment of the CAs of such economies, which remains problematic.[15] On average, financial centers are found to have a CA balance about 3½ percent of GDP higher than others'.

Risk associated with the institutional/political environment. Greater risk—or the perception of such risk—is likely to be a disincentive to investment spending, and possibly an incentive to save more, and to that extent be reflected in a more positive CA balance. The EBA CA regression now includes an indicator of such risks drawn from the ICRG survey data, a source which has been widely used in economic studies. While risks of this kind are difficult to measure precisely in any one country, and this should be kept in mind in country-level analysis, the strength of the overall empirical association between such risk indicators and current account balances argues for utilizing them in the CA regression. Our indicator is constructed so as to measure less risk or safer environment; the effect is significant and robust, with a coefficient such that a reduction in the risk indicator by one standard deviation is associated with a weaker current account by about 1½ percentage points of GDP. (Note that such risks in principle might be influenced and reduced over time by policy efforts; however, as discussed in the Section on the normative stage of EBA analysis, the EBA method takes them as given characteristics; i.e., they are not treated as policy distortions driving CA gaps.)

D.2 Financial factors

The EBA regression model considers several financial factors not included in traditional CA regressions:

Reserve currency status: the share of a country's own currency in the total stock of world reserves—a proxy for the so-called "exorbitant privilege" of reserve currency countries such as the U.S. in potentially financing their current accounts by issuing widely accepted money liabilities. Coefficient has the expected negative sign and is statistically significant. This variable is also used as an interaction variable in the VIX regressor, below. For every 10 percent of global reserve held

[14] Note that other small economies that are sometimes considered as financial centers, including Luxembourg and Singapore, are not in the EBA regression sample. The definition of what is a small "financial center" economy is another question. For example, it is debatable whether Belgium should be considered a financial center also after 2004 (as tax advantages for financial coordination centers were discontinued, but were substituted with the notional interest deduction).

[15] Other than by use of simple dummies, empirical research over the years has not quantitatively explained the tendency of such countries to have higher CA balances than others, though there are a number of plausible hypotheses for this pattern. Certain aspects of CA measurement, related to international standards for accounting for income on equity shares, are likely to be part of the story, as argued by Mancini-Griffoli and Stoffels (2012).

in its own currency, a country experiences a current account deficit which is lower by 0.45 percentage points.

Global capital market conditions, or global risk aversion, proxied by the VIX/VXO index.[16] As hypothesized, this shows up as a significant determinant of current account balances, but one that does not affect all economies equally: only countries with open capital accounts are likely to be affected; moreover, for non-reserve currency countries, a rise (fall) in the global risk aversion is associated with a rise (fall) in the current account, while for reserve currencies the opposite holds. Hence, the VIX is interacted with the share of a country's own currency in world reserves—a proxy to capture differing degrees of flight to safety effects. Moreover, the VIX is interacted with the degree of openness of the capital account: the greater is openness (the fewer are capital controls), the greater the effect of the VIX on the current account. An increase in the VIX by 10 percentage points is associated with an improvement in the current account (capital outflows) by about 0.7 percent of GDP in non-reserve currency countries with open capital accounts. In countries which experience 10 percent of global reserve held in own currency, the current account worsens (capital inflows) by 0.14 percent of GDP in response to a similar change in the VIX.

Private credit/GDP (relative to own historical average). We include private credit in the regression. As this variable is considered as a proxy for financial policies that can influence and limit financial excesses, it is discussed further below.

D.3 Cyclical / temporary factors

The EBA CA regression, run on annual data, includes a number of other variables that were not part of the CGER regression, including some that are temporary in nature:

The relative output gap regressor reflects the fact that cyclically lower output is typically associated with higher saving and lower investment (i.e., lower domestic demand): an increase in the relative output gap by 1 percentage point is associated, other things constant, with a decline of the current account by about 0.4 percent of GDP. The regressor is statistically significant and turns out to be a strong factor in explaining shorter-term movements in the CA (even though countries' output gaps often move in the same direction, so that *relative* output gaps do not move as much). Note that some of the demand shocks driving the output gap could arise from movements of variables included in the regression, such as the cyclically-adjusted fiscal balance.[17] This means

[16] The VIX index is calculated by taking the weighted average of the implied volatility of a subset of call and put options on the S&P index with an average time to expiration of 30 days. High readings of the index relative to average are oversold (excessive market bearishness) and low readings are overbought (excess of bullishness). From 2003, the Chicago Board Options Exchange (CBOE) changed the way the VIX is calculated, but the old VIX index (now called VXO) is still available, so a consistent historical series is available starting in 1986.

[17] However, in our sample, the correlation between the output gap and the cyclically-adjusted fiscal balance is very low. Correlations with the interest rate and demeaned credit are also very low.

that estimated coefficients on those other variables are measuring their effects for a given output gap.

The commodity terms of trade (TOT), measured so as to capture only its cyclical element, and interacted with trade openness, enters with the expected positive sign. An increase in the terms of trade relative to trend by ten percentage points is associated with an improvement of the current account of about ¾ percent of GDP, in a country with trade openness of 30 percent of GDP.

D.4 Policy-related regressors

The EBA current account regression also includes terms to capture the effects of a number of policies.

Fiscal policy is measured by the ***cyclically-adjusted fiscal balance***, and is instrumented.[18] The coefficient on this fiscal balance is positive and statistically significant, indicating that Ricardian equivalence does not hold, so the fiscal stance can affect the current account (and not only in the short run when for example fiscal tightening might induce a recession). An increase in the relative fiscal balance by 1 percentage point of GDP is associated with an improvement of the current account by about one-third of a percentage point of GDP. Again, the presence of the output gap regressor means that the coefficient on the fiscal variable measures its effect for a given output gap.

The level of public expenditure on health, in relation to GDP, is considered as a type of social protection policy that may influence the national saving rate. Consistent with the hypothesis that such protection tends to reduce households' need for precautionary saving, the estimated coefficient is negative in the current account regression; it also statistically significant.[19] An increase in the relative health expenditure by 1 percentage point of GDP is associated with a lower level of the current account, by about ½ percent of GDP.

[18] The instrument list includes: lagged world cyclically adjusted fiscal balance, the exchange rate regime, the institutional setup (as proxied by the polity index), GDP per capita, lagged U.S. corporate credit spread, lagged world growth, lagged output gap, lagged world output gap, and the time average of fiscal balance, in addition to all non-instrumented regressors.

[19] Other studies also find an association of higher public health expenditure with lower current accounts, though using different samples and techniques; see for example Kerdrain, Koske and Wanner (2010) and Cheung, Furceri, and Rusticelli (2010). Barnett and Brooks (2011) also find that health expenditure affects consumption patterns across provinces in China.

Foreign exchange (FX) intervention, interacted with capital controls. The instrumented ratio of the change in international reserves (measured as a share of GDP), interacted with the index of capital controls, enters with a positive coefficient of about +0.35.[20] Under imperfect capital mobility, intervention should affect the exchange rate and by implication the current account. The issue of endogeneity is however a serious one, as some part of FX intervention may occur in response to capital flow or current account shocks. This issue is partly alleviated by the presence of some control variables, such as the interaction between the VIX and capital account openness, but may still be present. To mitigate endogeneity problems, the change in reserves (scaled by GDP) interacted with capital controls is instrumented with variables capturing reserve accumulation motives (in turn interacted with capital controls. The instruments are: the ratio of M2 to GDP, to capture the crisis prevention motive; the U.S. short term real interest rate to capture the exchange rate stabilization motive as well as the return on reserves, and the global rate of reserve accumulation to capture global trends in accumulation behavior.[21] The coefficient estimate suggests that an increase in reserve accumulation of 2 percentage points of GDP is associated with a current account that is higher by one third of a percentage point of GDP for a country with a capital control index value of 0.5. This result appears plausible, although both upward and downward biases are possible and estimating the magnitude of such an effect precisely is difficult. This remains an area for further research.

Capital controls.[22] As discussed above, the degree of a country's capital controls/openness enters the CA regression now in the form of interaction terms with both reserves and the level of development. These interaction terms seem to absorb the main role of capital controls. Indeed, when capital controls was also included as a standalone regressor, the estimated coefficient was no longer statistically significant (unlike in the previous version of EBA which lacked the interaction between development and capital account openness), while the results for other variables were virtually unaltered (see Table 2). Hence, it was preferred to not include such an insignificant policy-related term, which would have been associated also with a policy gap.

[20] Other recent work also links the CA with reserve accumulation via panel regressions, with different specifications: Gagnon (2011, 2012, and 2013), Bayoumi and Saborowski (2012), and Reinhardt, Ricci, and Tressel (2010). A notable difference in results is that Gagnon's analysis does not find a role for capital controls in governing the effect of FX intervention. In line with the results of the other two studies mentioned, entering reserve accumulation alone—i.e. without taking account of capital controls—yielded a coefficient that was statistically insignificant (and of the wrong sign), and so such a regressor is not included in the final regression (see Table 2).

[21] As countries seem to have very different behaviors in terms of these motives, we allow country-specific slopes in the first stage instrumentation.

[22] The capital controls data is an update of the Quinn dataset, provided by Professor Dennis Quinn and coauthors through 2011. For background on these data, see Quinn (1997) and Quinn and Toyoda (2008).

Private credit/GDP, as an indirect indicator of policies to contain financial excesses. Financial excesses—and the failure of policies to prevent them—may cause demand booms, weakening current accounts, and real appreciation. Such excesses and policy shortcomings are very difficult to measure; after investigating many possibilities, the EBA regressions now use the ratio of private credit to GDP as a proxy (more specifically, each country's current level of such credit is measured relative to its own historical average, and then—as most other regressors—relative to an average of the same for all countries). Certainly this is an imperfect proxy for financial excesses, and a very indirect indicator of financial policy shortcomings; the issues and alternatives are discussed further below and in Annex IV. For those reasons, such an indicator was considered but not included in the first EBA model, with the implication that effects of financial excesses would show up only indirectly inside the regression residual. The inclusion of this indicator in the revised EBA model is motivated by the objective of having some gauge of the impact of financial policies, even if rough, and by recognizing the strong statistical association with the CA. Notably, this indicator explains, in a statistical sense, some part of the deterioration of some countries' current accounts in the years prior to the recent global crisis, by up to 2½ percentage points of GDP. It is interesting that there is evidence of an effect of private credit even while controlling for the output gap, probably because economic cycles do not generally coincide with financial cycles (see for example Borio (2012). Overall, an increase in relative private credit to GDP by 10 percentage points is associated with a weaker current account by 0.3 percentage points.[23]

E. Effects on the current account via saving or investment?

In order to understand whether the factors above operate through saving and/or investment channels, we run separate saving and investment regressions, using with same specification as the CA benchmark (see Table 4).

The majority of the significant variables in the CA regressions appear to operate mainly through the saving channel. However, the investment channel is the dominant one for: output gap (investment is highly cyclical), expected GDP growth (it may be mainly associated with investment), VIX for non reserve currency countries (foreign flows may finance mainly investment). The investment channel plays also a significant role, although smaller than the saving one for: demographics (aging countries and those with slow population growth invest more but save even more), public expenditure on health (associated with less investment and even less saving), fiscal balance (associated with more investment, and even more saving). The effect of institutional risk on investment is borderline significant and quite sizable.

[23] Private credit as an explanatory variable for the current account has been employed by Christiansen, Prati, Ricci, and Tressel (2010).

F. Fit of the CA regression

Regarding regression fit, the root mean squared error (RMSE) is about 3.2 percent of GDP. The "typical" error value—measured as the median absolute value of the residual in a recent year—is smaller, about 2 percent of GDP. The higher RMSE value of course reflects the greater weight it gives to outlying cases. Indeed, the size of the residuals found here and the challenge of fitting CA data can be viewed in the perspective the very large dispersion of current accounts that is observed within the "modern era" of our sample period (e.g., with current accounts ranging from deficits of 15 percent of GDP or more (Greece, Peru) to surpluses of 18 percent of GDP or more (Russia).

The fit of the regression is better in some periods than others. The divergence of current account balances in the period before the global crisis, e.g., 2007, remains difficult to explain fully. However, the addition of the private credit regressor does go some way to improving the fit during that period, particularly for economies with widening CA deficits (up to 2 percentage points of GDP for some countries). Nonetheless, it remains difficult for the regression to fully explain the wide swings in current accounts in some countries that have gone through severe boom and bust episodes in credit and asset markets.[24]

The issue of the interpretation of regression residuals—whether they should be taken as signs of uncaptured distortions, or of uncaptured fundamentals or other error—will be discussed in Section V.

G. Other hypotheses explored in the CA regressions

Beyond the variables in the pilot EBA CA specification, a number of other hypotheses have been explored but are not represented in the benchmark CA regression specification. These include various hypotheses related to monetary, financial and structural policies and factors, which are described more extensively in Annex IV and Annex V, respectively.

The role of monetary policy was not significant in the CA regression (unlike in the REER regression), probably owing to opposing effects; higher interest rates would not only affect negatively the CA through inducing exchange rate appreciation and expenditure switching (which will be discussed in next section) but positively by inducing lower domestic demand (see Table 3 with various versions of interest rates interactions). The lack of significance is not due to the

[24] Comparisons to the fit of the CGER's CA regression are not straightforward, including because CGER had the advantages of working with smoothed (4-year averaged) data and employed the lagged CA as a regressor, among other differences. Moreover, comparisons of R-squared values are sensitive to the country sample (e.g., adding a country that is an outlier in terms of its CA and its NFA position substantially boosts the R-squared without improving the RMSE).

presence of the output gap regressor; the interest rate was not significant even when the output gap regressor was dropped.[25]

With respect to financial policies, we focused on exploring alternative financial indicators, given their crucial importance (as witnessed by their role in the recent global crisis).

- Other proxies of financial excesses (either alternative indicators based on private credit, or indicators based on housing prices) were not considered to be superior to our private credit term, either because not significant or because the estimated coefficient was not economically relevant.

- Measures of financial risk (such as stock market volatility or macroeconomic volatility) or of risk pooling (the extent of insurance markets), although intuitively appealing, were not found to be robust.

- Indicators of financial structure (such as bank concentration) also were not found to be relevant.[26]

The focus on structural indicators was on labor and product market regulation. One of the biggest obstacles to the investigation was the limited availability of indicators.

Only labor market flexibility was robustly significant; it was associated with a lower current account (apart from the EMU countries). However, in the absence of clear evidence on the channel of influence it was decided to omit such policy variable (which would have entailed a policy gap contribution to the CA and REER misalignment). A higher investment channel was not visible in saving-investment regressions similar to the ones in Table 4. A lower saving channel should have been associated with a lower risk of unemployment, but including unemployment in the regression would not absorb the effect (Table 10 column 4). Nor could we find evidence that the labor regulation variable works through an interaction between employment protection and unemployment insurance (Table 10 column 5).

In addition, consideration was given to other hypotheses and to the following variables, which turned out to be insignificant statistically and/or economically, or were otherwise inferior to alternatives:

[25] As discussed earlier, if monetary policy tends to follow Taylor-type rules, it might be correlated with the output gap variable included in the CA regression. However, excluding the output gap regressor does not allow interest rates to enter the CA regression significantly (see Table 3).

[26] These were found to be significant in other studies (such as Tan, Wei, Yao and Zhao, 2012).

- Beyond our finding on the role of public health expenditure, other types of public expenditure or social insurance policies might also be relevant. For example, public expenditure on education might have been expected to also reduce incentives for private saving and thus weaken the CA; however, this variable was generally not significant and often switched sign. Pension systems, public or private, could be relevant (though fully understanding their effects would likely require more than single number for total expenditure, as for example the extent to which pension systems are publicly funded and well capitalized could be important). Note that Kerdrain, Koske and Wanner (2010) find a significant role of public health expenditure, as we do, but do not find robust results for public spending on old age, nor for a much broader measure of total public social spending.

- The index by Djankov et al. (2005) about "de jure" social protection was statistically significant (and with the right sign) but the index suffered from data limitations for the purpose at hand. It was outdated (based on 2002 cross country information) and did not cover all countries in the EBA sample.

- Another variable tried without success was the composition of net foreign liabilities (in particular the share of FDI in gross liabilities, given evidence that financing of current account deficits through FDI tends to make them be more sustainable).

- In addition, variables that control for the composition of government spending, some alternative proxies of global risk aversion (such as the US corporate spread and the US treasury bond real interest rate), and a country's (historical) terms of trade volatility, among other variables, were also tried, but proved unsuccessful in helping explaining the current account and (in some cases) in yielding signs consistent with theoretical priors.

IV. Positive Analysis: The EBA Real Exchange Rate Panel Regression

This section discusses the REER panel regression of equation (4) from Section II. Again the analysis builds upon and extends the extensive literature.[27] As noted in Section II, there is a focus on ensuring consistency and parallelism between EBA's two regression-based approaches, as most factors that would influence the current account should also influence the real exchange rate. For

[27] The literature on exchange rate determinants is huge and we will not attempt to summarize it here. Standard contributions include Dornbusch (1976), Edwards (1988, 1989), Edwards and Ostry (1992), Edwards and Savastano (2000), Engel and West (2005), Engel, Mark, and West (2008), Froot and Rogoff (1995), Khan and Ostry (1992), Hinkle and Montiel (1999), Obstfeld and Rogoff (1996), Ostry (1988), Rogoff (1996). For recent IMF contributions see, for example, Bayoumi et al. (2005), Bems and de Carvalho Filho, (2009b), Cashin, Céspedes, and Sahay (2004), Christiansen et al. (2009), Lee et al. (2008), Ricci, Milesi-Ferretti, and Lee (2013).

example, a factor that pushed down the saving rate of a country, and thereby boosted its domestic demand, would result in both a decline in the current account balance and an appreciation of the real exchange rate.

A key point is that the EBA REER regression-based approach relies on a panel regression of separate REER *indices* for each country, which contain no cross-country information. This in turn requires using Fixed Effects (FE) estimation; i.e., a full set of country dummy variables. In that sense it is comparable to the CGER approach, which also used REER indices and FE estimation. However, significant differences from CGER arise from the inclusion of a wider set of determinants (including policy variables and short term factors), in line with the spirit of the new EBA analysis and the EBA CA regression-based approach.

Note that FE estimation forces each country's regression residuals to average to zero over the sample period, so that fitted values are heavily influenced by past REER levels. This implies that results are less reliable for countries with a short sample span or that have experienced large structural changes that are not well captured by the regression. A short sample span will make results very sensitive to the sample length and would generally tend to understate the extent of the gap.

A potential solution to these problems would be a regression analysis based on estimates of real exchange rate levels, rather than a time series of exchange rate indices that cannot be compared across countries. Work to develop such a method is ongoing, for use in future EBA analyses.

A. The real effective exchange rate (REER) measure

The real exchange rate is the Fund's standard REER index for each country, from the IMF's INS data. An increase in the REER signifies a real *appreciation*.

B. Estimation method and sample

The estimation method entails fixed effect OLS coefficients and standard errors corrected for autocorrelation and heteroskedasticity. The choice is mainly due to the properties of OLS coefficient estimates, which are compatible with the data being either stationary or nonstationary (but cointegrated). Indeed, results of testing of stationarity of REER were inconclusive. Inference, however, needs to be distinguished in the case of stationarity or nonstationarity. In the case of stationarity, standard errors are corrected via the Newey-West HAC method, which accounts for heteroskedasticity both within countries and across countries, as well as serial correlation within countries. In the case of nonstationarity, these standard errors are not reliable, and the relevance of variables is instead determined by the cointegration test (which indeed rejects the null of no cointegration for the specification presented; obviously, this test is relevant only if variables are nonstationary).

Reflecting data availability constraints, the REER regression sample period is 1990-2010 (rather than 1986-2010), while the country sample (see Annex II) contains 40 of the 49 countries included in the current account regression. As in the case of the current account, for the EBA exercise conducted in Spring 2013 the analysis is centered on REER outcomes for 2012 (year average levels).

C. Explanatory variables and regression results

Regression results are presented in Table 5. Note that regressors for each country are generally defined relative to the values of their trading partners, using the same country weights used to the construct the REER. Some variables are lagged for endogeneity but results are generally robust to an alternative 2SLS instrumental variable approach. As there is a strong presumption that most variables that affect the current account should also affect the REER and vice versa, the EBA exercise makes a strong effort to include similar variables in the two regressions (unless wrongly signed or highly insignificant).

Note that the need to employ fixed effects implies that the regression is unable to take advantage of much of the cross-country information on determinants of real exchange rates, unfortunately reducing its statistical power to detect relationships. Indeed, variables which exhibit mainly a cross-sectional dimension (such as institutional and political risk) do not show up significantly in the REER regression.

C.1 Non-policy fundamentals and financial factors

Productivity/level of development, both alone and interacted with capital account openness. These two terms reflect two important theoretical arguments. First, as in the CA regression, the ratio of an economy's output (income, measured in PPP terms) to the size of its working age population measures relative to economies at the "frontier" of highest productivity. Recall that a relatively poor economy tends to have a higher investment rate, and a lower current account, to the extent it is also open to capital flows. Such an economy would also have a more appreciated exchange rate. This theoretical channel is not usually tested in REER regressions. Second, that channel is offset by the Balassa-Samuelson effect, in which less-advanced economies have lower prices of non-tradable goods and lower real exchange rates. The REER regression now picks up each of these effects. An increase in relative productivity by 1 percent is associated with an appreciation of 0.8 percent in a country with a closed capital account, and about 0.2 percent in a country with open capital account.

VIX/VXO (indicator of global risk aversion), interacted with capital account openness (lagged). As expected, the coefficient is generally negative for most countries (i.e. non reserve currency countries), associated with the need to generate a CA surplus when global risk aversion increases and access to credit becomes more difficult. The effect is stronger the more open is the capital account. For reserve currency economies, the effect is in the opposite direction, and appreciates the

currency. The VIX measure is time-demeaned: hence for the periods in mid-1990s and mid-2000s when global risk aversion was particularly low, these variables would indicate capital flowing from reserve currency countries to the others in the sample. (Entered as a separate regressor, the share of the own currency in global reserve holdings is insignificant; its inclusion mainly serves the purpose of allowing a proper analysis of the interaction term, however the sign is positive as expected suggesting that being a reserve currency is associated with a more appreciated REER). An increase in the VIX by 10 percentage points is associated with a depreciation of the REER of about 2½ percent in non-reserve currency countries with open capital accounts; the effect is not particularly robust. In countries which experience 10 percent of global reserve held in own currency, the REER appreciates by about 0.8 percent in response to a similar change in the VIX.

Financial home bias (lagged) has positive sign. This variable is an indicator of the domestic preference for domestic assets. It is calculated as the share of domestic debt owned by residents. If a country has a greater preference for holding its own (domestic) assets, this tends to appreciate the REER. Given that certain other variables in the regression tend to capture international investors' preference/demand for a country's assets (which would have the opposite effect on the exchange rate), the resident-owned share of domestic debt can be thought as the residual effect from a home bias. The variable is lagged, as changes in the exchange rate can affect the indicator purely from a composition effect (as the share of foreigners is more likely to be denominated in foreign currency). An increase in the relative share of domestic debt owned by residents by 10 percentage points of GDP is associated with an appreciation of the real exchange rate by about 3½ percent.

Population growth has a positive sign: the higher the population growth rate, the higher the share of inactive young population, which is associated with lower net saving, and more appreciated real exchange rates. The other two demographic variables used in the current account regressions were not significant and did not always have correctly-signed coefficients.[28] An increase in relative population growth by 1 percent is associated with an appreciation of the real exchange rate by 3½ percent.

Expected GDP growth (5-year ahead) has a positive coefficient, consistent with the negative coefficient found in the CA regression (faster growth is associated with a weaker current account and a more appreciated real exchange rate). An increase in relative expected growth by 1 percent is associated with an appreciation of the real exchange rate by almost 2½ percent.

Commodity terms of trade has a positive sign. In line with standard literature on real exchange rates, we use the ratio of real exports to imports prices of commodities (not just the cyclical components as in the current account regression). The size of the coefficient is somewhat lower than existing CGER results and other standard literature based on samples until mid-2000s. An

[28] The role of demographics in explaining exchange rates was first pioneered by Rose, Supaat, and Braude (2009), who employed fertility as a key indicator.

increase in the commodity terms of trade by 10 percent would be associated with an appreciation of the real exchange rate by about 1 percent.

Trade openness has a negative sign. Average exports and imports to GDP is a proxy for trade liberalization, which generally lowers the domestic price of tradable goods, thus depreciating the CPI-based real exchange rate. As a change in the exchange rate affects differently the numerator and denominator of openness, this is indicator is lagged. An increase in relative trade openness by 1 percentage point of GDP is associated with a depreciation of the real exchange rate by about 0.4 percent.

The share of administered prices in the CPI has a negative sign (as administered prices are generally imposed to lower prices). This variable is available only for a few transition economies (for the rest it is assumed to be 0), which experienced a significant reduction in the share of administered prices during the economic transition towards a market economy. A decrease in the share of administered prices by 1 percent is associated with an appreciation of almost 2 percent.

Finally, recognizing a significant structural break at the end of the apartheid in South Africa, we add a dummy for this country in the early years of the sample period, until 1994. This has very little effect on results, even for South Africa's 2012 gap.

C.2 Policy-related regressors

Health expenditure to GDP (lagged) has a positive sign, consistent with a negative sign in the CA regression. An increase in relative health expenditure by 1 percentage point of GDP is associated with almost a 2 percent appreciation.

FX intervention, interacted with capital controls. Consistent with the finding that FX accumulation is associated with stronger CA balances, it is also associated with a weaker REER. This relationship was not detected in the first EBA, perhaps because of endogeneity problems: a country is most likely to accumulate reserves at a time when its currency is already strong, and to lose reserves to defend a weakening currency, i.e. trying to "lean against the wind."[29] As would be expected in that light, the finding of an effect that is statistically significant depends on the choice and quality of the instruments used. Using the same instruments employed in the CA regression discussed earlier, we find that an increase in reserve accumulation 1 percentage point of GDP is associated with a 1½ percent depreciation, in countries with capital controls, and half that amount in countries with an index of capital controls equal to 0.5. As in the case of the current account regressions, entering reserve accumulation alone (i.e. without interacting it with account of capital controls), yielded a coefficient that was statistically insignificant, and therefore such a regressor is not included in the final regression (see Table 6).

[29] Another challenge is that the cross-sectional (between country) variation of reserve accumulation is twice its time variation within countries, making the effect difficult to detect under fixed effects estimation.

Monetary policy, interacted with capital account openness.[30] The EBA REER regression now uses short-term interest rate differentials, adjusted for inflation differentials—and, for a few countries, roughly adjusted for unconventional monetary policies—to proxy for the effect of monetary policy on the exchange rate. The EBA model confirms that monetary policy helps explain movements of real exchange rates, but with the strength of that link depending on the degree of openness to capital flows. (Note that with the addition of a monetary policy regressor, the case for also including an output gap regressor is unclear; more on this subject below) An increase in the relative real short term interest rate by 1 percentage point is associated with 0.7 percent appreciation in countries with open capital accounts.

Private credit to GDP (relative to an economy's own mean level) has a positive sign, consistent with the CA regression results. As discussed, this variable aims at proxying for policies that help contain financial excesses. An increase in private credit to GDP by 10 percentage points is associated with a 1.3 percent more appreciated REER.

Capital controls. Regarding capital controls, as in the current account regression, the REER regression takes account of the influences of capital controls via interaction terms, it does not include a plain term for capital controls. The introduction of interaction terms of capital controls with other variables captures the role of controls, and capital controls alone is not significant when added to the regression (Table 6).

D. Fit of the REER regression

Regarding the fit of the REER regression, the root mean squared error is about 8 percent, which can be compared to an unconditional standard error of the REER (i.e. controlling only for fixed effects) of 18 percent. (The corresponding figure from the first version of the EBA model was 9.5 percent, while CGER's REER regression was about 12 percent.)

E. Other hypotheses explored in the REER regressions

Some variables that are present in the current EBA account regression, or have been employed in other empirical analyses of real exchange rates, turned out to not be significant in the REER regression. In particular:

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[30] For monetary policy we constructed a special interaction term which would have the following properties: a) when a country has closed capital account, there should be no effect on exchange rates from either domestic or foreign interest rates; b) when a country has an open capital account, there should be no effect from interest rates of partner countries with closed capital account, but only from countries with open capital accounts. Hence the interaction term adopted is "domestic capital account openness * (domestic interest rates – trading partner average of `the interaction of their interest rates * their capital account openness`)". Table 7 column 2 shows that adopting a standard interaction structure would deliver similar results (the effect of interest rates in the absence of capital controls is about 0.7 as in the benchmark, and in the presence of controls is offered by the sum of the two coefficients which is about 0).

- The final REER regression does not include the fiscal balance. When estimated, the coefficient on the fiscal balance turns out negative, as expected, and consistent with an improvement of the external balance found in the CA regression. However, the coefficient was rather small in economic terms and not generally statistically significant (even when instrumented), as indicated in column 4 of Table 7. We take this not as evidence that such an effect does not exist, but most likely a reflection of the difficulty of detecting effects in a fixed effects regression of a variable that has mainly cross-country variation (particularly when instrumented).[31]

- When adding the output gap to the REER regression, this is statistically significant, even though interest rates are also present (Table 7, Column 3). However, including both terms would have complicated the interpretation of the results, as discussed in Section II; of the two, we prefer to include the interest rate, because policy variables are central to the EBA exercise. The exclusion of the output gap does not substantially affect the results. First, it has a relatively small contribution to the fitted REER value. Second, the interest rate coefficient and the coefficients on most regressors are little affected by the presence or absence of the output gap regressor.

- Net foreign assets (NFA) would be expected to have a positive coefficient mainly because of the presumed steady state relationship (a country with a higher NFA can afford a lesser trade balance and a more appreciated REER). However, such a relationship would be expressed mainly in the cross-country dimension and so be difficult to detect in fixed effects estimation.

- The indicator of risk related to the political/institutional environment did not enter significantly, likely because this variable presents mainly a cross-sectional dimension which is absorbed by the fixed effects.

V. Toward Normative Evaluation: Estimation of Policy Gaps and Total Gaps

This section explains how the EBA methodology uses the results of the regressions, described in the previous two sections, as a tool to guide a normative evaluation of current account balances and real exchange rates. The essential idea is to take account of the impact of policy distortions, whether of domestic or foreign origin, on a country's current account and real exchange rate.[32]

[31] Note that an improvement of the fiscal stance might in some situations have a positive (appreciating) confidence effect on the REER (an oppositely-signed effect from that consistent with the CA finding).

[32] Blanchard and Milesi-Ferretti (2011) emphasize that a country's current account surplus or deficit may arise as a consequence of domestic distortions, the correction or elimination of which would be desirable from a country's own

(continued…)

For the purpose of exposition, this discussion below focuses on analysis of the current account. The EBA analysis of the real exchange rate proceeds in analogous manner.

As discussed above, the estimated current account equation includes a number of variables that are under policy control (fully or partially) in the near term: fiscal balances, capital controls, social spending, reserve accumulation, and financial policies (proxied by private credit). The observed values of these policies, along with other variables, contribute to the regression-predicted values of the current account.

The EBA exercise, however, aims to go beyond decomposing observed current accounts into regression-explained and regression residual components. EBA seeks to gauge how far observed current account balances are being driven by deviations of policies from their desirable or appropriate levels.

A. Policy gaps

It is easy to see how we can gauge the contribution of such "*policy gaps*" to the overall current account gap in the context of the estimated regression. Start from the fitted regression value (where country and time subscripts are omitted to lighten notation):

$$(\frac{\hat{CA}}{Y}) = \boldsymbol{\alpha} + \mathbf{X}'\boldsymbol{\beta} + \mathbf{P}'\boldsymbol{\gamma} \tag{5}$$

where $\mathbf{X}$ is the vector of non-policy "structural" variables and $\mathbf{P}$ is the vector comprising the above policy variables measured by their actual values. Let $\mathbf{P}^*$ be the desirable values for those policy variables. Then simply add and subtract $\mathbf{P}^{*\prime}\boldsymbol{\gamma}$ from the right hand side of equation (5) to obtain:

$$(\frac{\hat{CA}}{Y}) = \underbrace{\boldsymbol{\alpha} + \mathbf{X}'\boldsymbol{\beta}}_{\text{EBA's CA "norm"}} + \underbrace{\mathbf{P}^{*\prime}\boldsymbol{\gamma} + (\mathbf{P} - \mathbf{P}^*)'\boldsymbol{\gamma}}_{\text{Contribution of policy gaps}} \tag{6}$$

(i.e. EBA's predicted CA at P*) to deviations from CA norm

That is, the fitted CA values from the regression can be decomposed into two parts:

- The first part is the EBA CA "norm," i.e., the CA value implied by the regression if all policies were at desirable P* levels (and all other regressor variables were at their actually observed levels).

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point of view. Obstfeld (2012) argues that one reason why analysis of the CA is important is precisely because we have seen that large deficits, for example, can be a symptom and signal of other problems.

- The second term represents the *contributions of policy gaps* to explain deviations of the actual current account balance from the EBA norm. These policy gap contributions are measured as the product of each of the estimated coefficients on the respective policy variables by the policy gap $(\mathbf{P} - \mathbf{P}^*)$.

Similarly, the *actually observed* current account for 2012 can be broken down into three parts, the last of which is the regression residual:

$$\frac{CA}{Y} = \frac{\hat{CA}}{Y} + \text{regression residual} = EBA \text{ norm} + (\mathbf{P} - \mathbf{P}^*)'\boldsymbol{\gamma} + \text{regression residual} \qquad (7)$$

The EBA estimated *Total Current Account Gap* is defined and measured as follows, in several equivalent ways:

$$\begin{aligned} \textbf{Total CA gap} &= \frac{CA}{Y} - EBA \text{ norm} = \frac{CA}{Y} - \left[\frac{\hat{CA}}{Y} - (\mathbf{P} - \mathbf{P}^*)'\boldsymbol{\gamma} \right] \\ &= \textbf{Regression Residual} + (\mathbf{P} - \mathbf{P}^*)'\boldsymbol{\gamma} \end{aligned} \qquad (8)$$

Thus the Total CA Gap is the deviation of the observed CA from its EBA norm level; it is also equal to the sum of the CA regression residual and the *contributions of policy gaps* to the CA (which as noted are the product of each of the estimated coefficients on the respective policy variables and the policy gaps $(\mathbf{P} - \mathbf{P}^*)$).

As an illustration of how to measure the policy contribution to the Total CA Gap, consider the case of the fiscal variable. As discussed in section II, that variable enters the regression in the form of the cyclically-adjusted fiscal balance with a combined coefficient $\gamma_{fiscal} = 0.32$ (see Table 1). So, the contribution of the fiscal "gap" to the overall current account balance of any given country in 2012 is estimated by 0.32 times the gap between the 2012 cyclically adjusted fiscal balance minus the desired P* medium-term fiscal balance.

Consider a country that has an actual current account deficit of 2% of GDP in 2012 which is entirely explained by the fitted regression, so the regression residual is zero. Such a case of perfect regression fit would not necessarily mean that "all is well" according to the EBA analysis. Say that country runs a cyclically-adjusted fiscal balance of -6 percent of GDP when its desirable long-term fiscal balance is zero. In other words, it has a fiscal gap of minus 6 percent of GDP in 2012. By equation (8), the EBA Total CA Gap will be the regression residual (0%) plus (-6%)*0.32, or about -2% of GDP. Thus the entire CA deficit of that country in 2012, and its entire Total CA Gap, is due to deviations of fiscal policy from its recommended position.

For the sake of simplicity, the above example did not refer to the fiscal policy of other countries. However, in these calculations of (P-P*) policy gaps, it is also important to take into account that—as noted earlier—a country's own policy needs to be measured relative to the policies of other countries. This is essential for logical consistency, and to ensure global consistency of the estimates.[33] Naturally, this need to consider "international relativities" arises also when analyzing the contributions of policy *gaps* to current accounts.

To see this, consider again the example of fiscal policy. It follows from the construction of this metric (i.e. measuring a country's P-P* relative to the foreign (world) counterpart, which we call P_{wo}-P^*_{wo}) that in a hypothetical situation in which *every country had the same size "own" fiscal policy gap, then the contribution of fiscal policy gaps to each country's CA would be zero*.[34] This example also relates to a point that happens to be critical in the present global conjuncture, in which many economies (including advanced countries that have a large weight in the global economy) now are judged to have sizeable negative fiscal gaps. Since what matters for their effect on the current account is the country-specific gap *relative to other economies*, the overall effect of such sizeable negative fiscal gaps on the respective country's current account will be dimmed accordingly. Another implication: in today's environment, even a country that now has a zero "own" fiscal policy gap will find that its CA is being influenced (upward) by the sizable negative fiscal policy gaps that prevail in the rest of the world, in fact by about 1 percent of GDP.

In short, an estimated policy gap contribution to the CA of a given country can reflect not only that country's "own" policy gap (if any), but also the effects of policy gaps that may be present in other countries. The same also applies to a country's Total CA Gap.

B. Specifying benchmarks for policy variables

The EBA exercise thus requires specifying normative *policy benchmarks* (P*) for appropriate settings (levels) of each of six policy areas: the fiscal balance, capital controls, social spending (public health spending/GDP), FX market intervention (as proxied by changes in foreign exchange reserves), financial policies (as proxied by their effect on private credit), and monetary policy.

Policy benchmarks were defined and obtained as follows:

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[33] It can be formally shown that using foreign counterpart variables based on the their values weighed by the respective country share in world GDP ensures that this multilateral consistency constraint is essentially built in the estimates of the panel regressions.

[34] While it is a common practice to denote starred variables as the foreign counterpart of the domestic variable under consideration, here we use P* as the *desirable* level of a policy variable, be it domestic or foreign. We continue to use instead the subscript "wo" to denote the foreign (world) counterpart.

- For fiscal policy, the exercise uses levels of the cyclically-adjusted fiscal balance that country desks suggest would be desirable for the future. In particular, these are *recommendations for a medium- or longer-term horizon when the economy would in a position of full employment*, a time when consideration of the business cycle and a possible counter-cyclical role of fiscal policy would not be relevant. Thus these fiscal policy settings are likely to differ from what would be recommended for the current year, when cyclical considerations could be important. (An alternative exercise, based on short-term fiscal policy recommendations could also be considered.)

- Regarding public expenditure on health (as a share of GDP), we construct a suggested benchmark from a regression of this variable on countries' level of (PPP-based) GDP per capita (which alone explains about 80 percent of the cross-country variation in health spending) as well as on their demographics (the current old age dependency ratio) and income inequality (see Annex VI). In some cases, country desks may choose to identify a different P* level.

- Policies relevant for financial excesses (as indicated by private credit/GDP, relative to a country's history). As discussed earlier, this variable is chosen as a proxy for financial policies (such as supervision, regulation, as well as micro- and macro-prudential tools), that can prevent or dampen the occurrence of financial excesses, such as the excesses associated with the financial crisis. In this light, country desks may indicate desired private credit as lower level than current level if they wish to identify a situation of financial excess which is in part due to inappropriate financial policies. Note however that identifying such a gap would *not* imply a recommendation that an immediate reduction of private credit would be desirable, irrespective of current business cycle conditions, but only that the gap should be closed when the economic cycle has adjusted. (Also note that precision in identifying such a gap is not necessary, as the very small coefficient means that only substantial gaps would play a relevant role in the assessment.)

- For capital controls, the benchmark level that is suggested as desirable for the medium term is either the cross-country average level of the controls index (0.17 in 2011, out of a potential 0 to 1 range), or a country's actual level, whichever is the smaller.[35]

- For the change in reserves, the presumption for most countries is that the observed change, if any, in 2012 represented the appropriate policy response to current conditions. However, for those countries with levels of reserves in excess of the reserves metric "suggested

[35] Note that this suggested benchmark for the medium term does not imply a view that all countries should have zero capital controls at all times. For discussions of how and when capital controls may be part of the policy toolkit, see Arora et al. (2012) and Ostry et al. (2010, 2011, and 2012).

adequacy range," we specify zero as the appropriate change in reserves.[36] In some cases, desks may choose to identify a P* of zero for countries that have relatively low reserves levels that declined in 2012.

- Regarding monetary policy, if the current policy stance were judged by the country desk to be inconsistent with that country's own inflation and output stabilization needs, the EBA method allows for such a monetary policy gap to be identified (in terms of the interest rate differential regressor) and thus contribute to a country's overall REER gap.

It should be clarified that most P* policy benchmarks are specified to be those appropriate for a given country, not for the current conjuncture but generally for a medium to long term horizon at which the economy is at full employment. This means that it is unnecessary, for the basic purposes of the EBA exercise, for judgments about desirable policies for one country to be informed by predictions of the future state of other economies or of their future policy settings. Note also that P* settings of policies are defined as those that would be appropriate for achieving the natural objectives of policy in question. For example, fiscal policy should aim at sustainability and inter-generational equity, but would not aim at particular target for the current account. Public health expenditure would be guided by welfare considerations (not only for health outcomes but to avoid distortions to consumption that may result from lack of risk-sharing mechanisms) but not by an objective for the current account. For monetary policy, in contrast, the natural focus is inherently for the short run. Monetary policy, which is likely to be neutral beyond the short run, is by nature a matter of fine-tuning to achieve short-run impacts, and so appropriate P* settings are geared toward natural objectives of inflation and output stabilization in the near term (and again, not toward an objective for the current account).

C. The final step: confirming multilateral consistency

Multilateral consistency is an important aspect of EBA analysis. To a large degree such consistency is built into the design of the methodology, but a final check and a small adjustment is necessary to confirm it. In the case of the current account, perfect consistency would require that the sum of current accounts and current account gaps (say, expressed in U.S. dollars) of all countries would sum to zero. In practice, this is not a feasible objective because there is a global statistical discrepancy in the reported CA data. Moreover, the EBA country sample does not quite cover the global economy, though it does include the reported CA balances of countries representing just over 90 percent of global GDP.

The feasible objective for consistency then becomes matching the sum of the CA of the EBA sample countries, and ensuring that the sum of any gaps for these countries is zero. As a final step

[36] For an overview of the reserves adequacy metric, see Appendix III of the 2012 Pilot External Sector Report (http://www.imf.org/external/np/pp/eng/2012/070212.pdf).

in EBA analysis, the CA norms and gaps for each country are checked and adjusted as necessary (by a uniform amount, in terms of each country's own GDP) to ensure that objective. The net necessary adjustment turns out to be fairly small (about 0.4 percent of GDP for 2012). This is because multilateral consistency is to a large degree "built in" to the regression specification, as most determinants of a country's CA are constructed not simply as that country's own value, but relative to other countries' levels, with an appropriate country weighting scheme.

In the case of the real exchange rate, for multilateral consistency, it is important to ensure that that the weighted average of residuals is zero in each year. To a large extent such consistency is achieved via careful construction of the variables, by relating each variable to the trading partner weighted average of the same variable. However, in principle this alone may not be sufficient to ensure full consistency. As in the CGER practice,[37] multilateral consistency can be ensured by adjusting each exchange rate residual by the global weighted average of residuals (for each year, the weights are given by the eigenvector associated with the unit eigenvalue of the trade weights matrix for that year). It turns out that the necessary consistency adjustment is very small, at about 1 percent in the residuals.

VI. EBA External Sustainability (ES) Approach

This section describes EBA's external sustainability (ES) approach, which remains essentially unchanged from that in CGER.[38] The ES approach is the only one among the three EBA approaches that is neither based on regression analysis nor on a model/set of hypotheses. Its simple structure is both a strength and a limitation of the approach.

The ES approach assesses the sustainability of a country's external position by comparing the CA/GDP expected to prevail in the medium-term to the CA/GDP that would stabilize the external stock position (NFA/GDP) at a specified benchmark level. Unlike the other two EBA approaches, the ES approach does not seek to identify the adjustment required to bring the CA/GDP or RER to an "optimal" level. Nor does the ES approach itself identify a sustainable or optimal level of NFA/GDP.

In order to calculate the CA/GDP adjustment consistent with stabilizing NFA/GDP at a benchmark level, the ES approach requires only a few assumptions about a country's potential growth rate, inflation rate, rates of return on external assets and liabilities, and the benchmark level of NFA/GDP. For the majority of countries analyzed by EBA, the NFA/GDP benchmark is set at the

[37] See Isard and Faruqee (1998), chapter 7.

[38] For greater detail on the ES approach, see Lee et al (2008).

recent (2011) actual level.[39] Although this benchmark has little normative content, it allows the ES to provide perspective on whether the projected medium-term CA/GDP, at current REERs, is likely to lead to increase debtor or creditor positions relative to their current level.

The ES calculation is done in two steps. The first involves calculation of the CA/GDP level that would stabilize the NFA/GDP at the benchmark level. The second step calculates the CA/GDP gap as the WEO projected (2018) CA/GDP (assuming closed output gaps, current real exchange rates, and current policies, including those due to take effect between 2012 and 2018) less the NFA benchmark-stabilizing CA/GDP. Where this gap is different from zero, the ES assessment is that the projected medium term CA/GDP will not stabilize the benchmark NFA/GDP position.

The ES gap is complementary to the gaps calculated in the CA and REER regression-based approaches, but is not directly comparable. A key difference is that the ES does not attribute its CA gaps to the contributions of deviations from optimal policies (nor to any particular driver of the CA). Another difference is that the regression-based gaps focus on the current conjuncture (while controlling for cyclical influences, to the extent possible), whereas the ES approach is forward-looking (in this case, relative to 2017). In particular, the ES gap may be more informative about sustainability when countries have large net debtor positions, especially if these positions are projected to grow over the medium-term. The ES gap may also provide a complementary perspective where the regression approaches yield unsatisfactory empirical fits or face other particular country-specific challenges. Differences in the regression-based CA gap and the ES CA gap could arise from several factors, among others: (a) achieving the particular NFA/GDP benchmark used in the ES may not be consistent with optimal CA and NFA paths; (b) discrepancies between current policies (assumed in ES) and the desirable mix of policies (assumed in CA); and (c) an unsatisfactory regression fit (which increases the CA Total Gap). Nevertheless, the two types of CA gaps tend to point in the same direction, even if their magnitudes differ.

Work on a new framework to analyze external sustainability is ongoing. The conceptual basis for the new framework is the intertemporal solvency constraint that all countries face.[40] The revised framework improves upon the ES approach in two key ways. First, it extends the analysis of sustainability to allow for the fact that even though a country's current NFA/GDP may be on a sustainable path, it may not yet have reached its steady-state. Thus the current NFA/GDP is not

[39] For a select group of economies with extremely high external liabilities (e.g., Greece, Hungary, Portugal, Spain), low external liabilities (e.g., South Africa) and exporters of non-renewable resources (e.g., Russia), the benchmark is modified on the basis of regional averages or other criteria.

[40] The intertemporal solvency constraint requires that the current value of NFA/GDP be equal to the present discounted value of the expected future stream of trade surpluses and expected future net income on NFA (which may reflect expected valuation changes as well). See Evans (2012). The framework behind this exercise is set out in Evans (2013).

assumed to be at its "benchmark" level. Second, it provides an explicit role for financial factors—specifically, the rates of return on external assets and liabilities—in addition to the usual trade balance channel, in determining the external adjustment required to place a country's external position on a path consistent with sustainability.

The first step in implementing this exercise is obtaining long-term forecasts for trade flows and rates of return on a country's external assets and liabilities, which are the inputs required to verify whether the inter-temporal solvency constraint holds. Various alternatives are under consideration for extending desks' trade forecasts to a horizon well beyond the WEO's 5-year projection horizon. For rates of return on foreign assets and liabilities, the approach is to use the historical time-series on returns and country-specific information to project future expected rates of return. The second step of this exercise then compares a country's current NFA/GDP level with the sustainable path of the country's NFA/GDP consistent with the trade and rate of return forecasts, as an input in determining external sustainability.

The key output of the exercise is an estimate of the real exchange rate change that would be associated with placing the NFA/GDP on a path consistent with sustainability. Where the estimated change is small, the implication is that the country's external position is consistent with external sustainability. A large required exchange rate adjustment would imply that—, conditional on the trade and return forecasts—the country's external position is not yet on a sustainable path. An exploratory application of this framework, to a select group of economies with diverse external positions, indicates the practicability of the new approach. It is currently being extended to additional countries and evaluated for robustness and other implementation issues.

VII. Interpreting EBA results: Relevance, Reliability, and Pending Issues

As will be clear from the previous sections, the three EBA approaches each have relative strengths and limitations. While each can act as a check on the others, each is known to perform better or worse in certain situations:

- ***The current account regression-based approach:*** This approach is often but not always the most informative and reliable of the three EBA approaches. It is able to take full advantage of cross-country information. Its limitations tend to be most apparent in analyzing countries with high reliance on natural resource sectors, such as large oil exporters, and relatively small economies that are financial centers. For a few economies, this approach yields very large regression residuals, and thus large Total CA Gaps, which require careful further interpretation.

- ***The real exchange rate regression-based approach:*** This approach is especially useful where the first approach faces a particular difficulty. Its limitations are a reduced reliability

in countries with large structural changes, as well as those with short data spans. This method forces gaps for each country to average to zero over time, and the resulting RER gaps may be understated as a consequence. A related problem is that RER gap estimates for the current year can be very sensitive to the length of the prior sample period used to analyze a given country. (The potential solution to these problems would be a regression analysis based on estimates of real exchange rate levels, rather than a time series of exchange rate indices that cannot be meaningfully compared across countries. Work is ongoing to develop such a method, for use in future EBA analyses.)

- ***The external sustainability approach:*** This approach focuses on a different question than the others. It is most relevant and informative for countries with large NFA imbalances, and for which there is a clear view of what would be a more appropriate NFA level—or at least a clear view that any further widening of the NFA imbalance be undesirable. Such a situation may apply only to a minority subset of economies, but for those cases the question of external sustainability may among the most important.

It is clear that EBA's two regression-based methods are the more ambitious, in terms of taking account of many factors in regressions, and then using those as a base for normative evaluation. As such, results of the first two methods in principle should be more meaningful than the less-ambitious ES exercise. However, despite a range of technical advances and refinements, the regression-based approaches of EBA cannot entirely overcome certain essential issues (issues that were also present in CGER). The underlying difficulty is that the positive empirical analysis still leaves one with an incomplete understanding of CA and REER levels and movements: there remains an unexplained, residual component, one that in many cases will be too large to completely ignore. In such a case, the challenge is to interpret that residual appropriately, since it can reflect policy distortions but also might reflect uncaptured fundamentals or other limitations of the empirical analysis (including measurement error, sampling error as well as possible misspecification). Absent perfectly complete information from the standardized EBA regressions, additional information and judgment will be needed to complete a normative analysis, that is, an *assessment*. Essentially, a judgment must be made as to what is missing from the EBA regression's analysis of a given country, and whether the regression residual reflects the effects of distortions or of fundamentals on the CA and REER. In many cases, what is missing from the EBA analysis may be something well known to experienced analysts of a given country, even if it is not feasible to measure and include that factor in the EBA panel regressions.

In light of the above, as well as the element of uncertainty that comes with any econometric analysis, it is suggested that EBA be seen as a tool that provides useful—and multilaterally consistent—estimates to inform and guide assessments, rather than as a mechanical means of generating a final external assessment for each and every economy.[41] Any such assessments cannot

[41] See "Guidance Note for Surveillance under Article IV Consultations" (IMF, 10/10/12)

be made entirely on a one country at a time basis, as economies need to be assessed jointly in order to preserve a sensible, multilaterally consistent pattern of assessments.

On its own technical terms, the greater richness of the EBA regression specifications offer a more complete picture of reality, but is well to note that the ability to provide greater detail in decomposing contributions to current account balances into multiple parts does not come with full precision about each subcomponent. This suggests focusing on the larger components and avoiding over-interpretation of the smaller pieces.

Moreover, the ability of EBA to speak to current account developments year-by-year, and to consider the roles of policies and policy shifts, are advantages over previous approaches that relied on smoothed data and medium-term forecasts. Indeed, this allows to have a better understanding of the relation between the economic cycle and the current account, and to gauge more quickly vulnerabilities and policy gaps that may suddenly arise.

At the same time, this aspect of the EBA approach brings to the fore the challenges of analyzing current accounts in a setting in which economies may be away from full employment, and more generally out of equilibrium, in a gradual process of transitioning from one steady-state position to another. As discussed, demand shocks that drive both output gaps and current account developments may not be fully captured by the EBA regression; policies may have impacts on both output gaps and current accounts, and policies will likely react to the business cycle; and impact effects may differ from final effects that may require a number of years, and a possibly slow adjustment process of relative prices, to materialize. Moreover, the adjustment process itself may depend on monetary and fiscal policy actions, and on the exchange rate regime. All these considerations, and particularly those related to dynamics and endogeneity, identify challenges for the future development of the EBA econometric analysis, but also for external assessments more generally, that will require further efforts.

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Annex I. Glossary of Variables in the Current Account and REER Regressions

Note: Most variables in the CA and REER regressions are defined and measured relative, respectively, to the contemporaneous GDP-weighted "world" (sample) average level or to the trade–weighted average of other economies' levels. The treatment used is clearly indicated in each of the regression results tables (Tables 1-10).

- ***NFA/Y* (net foreign assets to GDP ratio).** This enters directly, as in levels as well as interacted with a dummy that takes on the value of one if the NFA is below negative 60 percent of GDP. The Net Foreign Asset data employed in this paper is an updated and extended version of the Lane and Milesi-Ferretti (2007) dataset.

- ***Financial center dummy.*** Dummy variable that equals 1 for The Netherlands and for Switzerland throughout the estimation period, and for Belgium also, but only through 2004.

- ***Output per worker, relative to top 3 economies.*** Ratio of PPP GDP to working age population relative to average of Germany, Japan, and U.S., demeaned. The variable is also interacted with capital account openness.

- ***Oil and gas trade balance, adjusted for 'temporariness.'*** Exports of oil and natural gas minus imports of the same, as percentage of GDP. This enters only when the balance is positive. The balance is multiplied by a measure of temporariness, which is: the ratio of current extraction to proven reserves from the BP Statistical Review to (i.e. the inverse of 'years-till-exhaustion') divided by the same ratio for Norway's oil in 2010. Higher values of the temporariness term indicate that the resource is expected to be exhausted sooner.

- ***Population growth.***

- ***Old age dependency ratio.*** Ratio of population aged over 65 divided by population between 30 and 64 years old.

- ***Aging speed.*** Projected change in the dependency ratio (above), ratio 20 years out, relative to current level.

- ***5-year growth forecast.*** WEO projections of the rate of real GDP growth 5 years ahead. This is expected to measure underlying growth potential (at a time when the output gap is likely to be closed).

- ***Public health spending/GDP.*** A proxy for one type of social protection policy, which tends to reduce private agents' need for precautionary saving.

- ***VIX/VXO, interpreted as a measure of global risk aversion.*** The VXO is an index of implied U.S. stock market volatility (very similar to the VIX, but available for a longer period). Annual average varies between 0.12 and 0.35 during the sample period. The VXO is interacted with capital account openness. Such interacted term is entered alone as well as interacted also with the respective country's share of its own currency in reported reserves held by central banks worldwide (see below).

- ***Own currency share in world reserves.*** Share of the country's own currency in total stock of world reserves, as a proxy for the "exorbitant privilege." Varies somewhat over time. For example, it was 73 percent for the US in 1985, down to 61 percent in 2010. For a country such as Greece, it moves from zero in 1998 to 19 percent in 2001 (when it joined the euro). For Germany, the change between 1998 and 2001 is less dramatic (from 14 percent to 19 percent). This variable enters both alone and interacted with the VIX.

- ***Output gap***. For most countries and years, this reflects estimates from IMF country teams. For those countries and/or years for which such country team estimates are not available, HP filtered estimates of the output gap (based on data over 1980-2018, and using WEO projections for 2012-2018, are used). This variable is also measured relative to the weighted world GDP averaged output gap.

- ***Commodity terms of trade gap, interacted with trade openness*** (in the CA regression). This regressor aims to capture the role of cyclical developments in commodity prices in influencing a country's overall terms of trade, by taking into account for each country the detailed structure of its own trade pattern in commodities and the importance of such trade in relation to its total trade. The regressor is constructed in several stages. The commodity index is the ratio of a geometric weighted average price of 43 commodity export categories to a geometric weighted average price of 43 commodity imports, each relative to advanced economies manufactured goods prices. Weights are given by their share in the countries' export to imports.[42] To produce a cyclical gap measure, the time series is first extended into the medium term (using commodity prices projected as part of the

[42] To illustrate, consider a country that exports no commodities. Then the numerator will be the product of each of the 43 commodity relative price indices to the power of zero which will equal one. Conversely, if a country has a balanced trade in one commodity (say a given foodstuff variety), with exports and imports of that commodity being 20 percent of its total average trade (=(exports+imports)/2). Then country's TOT will not be affected for global relative price of that commodity as the index will deliver $(Pfood/Pman)^{0.2}/(Pfood/Pman)^{0.2}=1$, irrespective of the value of Pfood/Pman. Finally, take a country that the same food commodity accounts for 20 percent of its exports and 20 percent of its imports but overall imports are twice as large exports. Then that TOT index will be $(Pfood/Pman)^{0.1}/(Pfood/Pman)^{0.2} = (Pfood/Pman)^{-0.1}$. Taking logs, it can be seen that the country will experience a TOT deterioration of 1 percent when the price of that commodity rises by 10 percent.

IMF's latest WEO round) and then filtered by the HP procedure for each country, so has a zero country-specific mean. Finally, the resulting gap series is interacted with a measure of the country's trade openness, the ratio of exports plus imports of goods and services in GDP.

- ***Commodity terms of trade*** (in the REER regression). For continuity with the CGER exercise, the commodity terms of trade employed in the REER regression is the ratio of a geometric weighted average price of the main commodity exports to a geometric weighted average price of the main commodity imports (same formula as in the previous bullet). The index is constructed from the prices of six commodity categories (food, fuels, agricultural raw materials, metals, gold, and beverages), measured against the advanced economies manufacturing goods prices from WEO. These relative commodity prices of six categories are weighted by the time average of export and import shares of each commodity category in total trade (exports and imports of goods and services). The terms of trade gap employed in the CA regression was found to be insignificant in the REER regression.

- ***Cyclically-adjusted fiscal balance, instrumented***. For most countries and years, the cyclically-adjusted fiscal balance is based on country team estimates of cyclical adjustment. Otherwise, it is computed as the residual of a regression of the fiscal balance on the output gap. Because of the potential endogeneity of the fiscal balance, the variable is instrumented with the lagged cyclically-adjusted global fiscal balance, a time trend, lagged world GDP growth, lagged domestic and world output gaps, US corporate credit spreads (worked marginally better than the VIX), FX regime, the polity index, and the average cross-sectional fiscal balance (the first stage regression also controls for the independent CA regressors).

- ***Capital controls index***. Quinn index on overall capital controls on the private sector. It is scaled to vary from 0 (no controls) to 1 (full control). Within the sample, the mean across countries for 2011 is 0.17, while the maximum value in 2011 is 0.625. Note that this variable is used in interaction terms with other variables, but not as a standalone regressor.

- ***Changes in reserves, instrumented***. Change in central bank foreign exchange reserves during the year scaled by nominal GDP, both in U.S. dollars. As explained more in detail in the text, it was instrumented via M2/GDP, U.S. interest rates, and global reserve accumulation, with country specific slopes, in order to account for various reserve accumulation motives (the first stage regression also controls for the independent regressors of the respective CA or REER regression).

- ***Real interest rate***. This variable is the difference between the nominal short-term interest rate and the annual inflation rate. The short-term interest rate is more widely and more consistently available than the policy rate, and it is anyhow close to the first step of the monetary transmission mechanism. As described in the text, it is interacted with capital account openness.

- ***Private credit to GDP.*** This variable was demeaned to eliminate cross-country differences in the level of financial development and capture more closely financial excesses. It measures credit provided to the non-financial private sector by domestic non-bank financial and banking institutions.

- ***Safer institutional/political environment.*** This variable is the average of 5 indicators from the International Country Risk Guide dataset: socioeconomic conditions; investment profile; corruption; religious tensions; and democratic accountability. The indicators are drawn from surveys of risk perceptions related to each of these 5 characteristics; higher values signify less risk. (See Annex V for more details.)

- ***Trade openness.*** Average ratio of exports and imports to GDP.

- ***Financial home bias.*** It is proxied by the share of domestic debt owned by residents, from the BIS database.

Annex II. Countries in the EBA Regression Samples

Argentina*	Korea
Australia	Malaysia
Austria	Mexico
Belgium	Morocco*
Brazil	Netherlands
Canada	New Zealand
Chile	Norway
China	Pakistan
Colombia	Peru
Costa Rica*	Philippines
Czech Republic	Poland
Denmark	Portugal
Egypt*	Russia
Finland	South Africa
France	Spain
Germany	Sri Lanka*
Greece	Sweden
Guatemala*	Switzerland
Hungary	Thailand
India	Tunisia*
Indonesia	Turkey
Ireland	United Kingdom
Israel*	United States
Italy	Uruguay*
Japan	

Notes:
Asterisks (*) denote countries included in current account regression but not included in REER regression for data availability reasons.

Annex III. Role of Exhaustible Resources

The 2013 version of the EBA methodology revisits the analysis of the role of exhaustible resources. The main motivation arises from the observations that income from exhaustible resources should generally affect the CA for exporters of such resources, but not necessarily for importers. Resource exporters expect to have these resources temporarily, so should save a fraction of the related income, and the fraction should be an increasing function of the temporariness of the resources.

This implies that the variable measuring income from exhaustible resources should apply only to exporters and would need to capture (i) the temporariness of the resource and (ii) extraction size, relative to GDP. The larger the extraction size, the larger the positive effect on CA/Y. The more temporary the revenues from the resource, the larger the positive effect on CA/Y. Temporary movements in the prices of commodities should be controlled for by a separate regressor, the detrended commodity terms of trade (implicitly the detrending assumes that the trend component of the resource price represents a permanent price change, whose effect is captured by the income variable).

With respect to the 2012 version of EBA, there are two changes in the implementation of the energy resource variable (which bring the number of resource exporting countries from two—Russia and Norway—in the first EBA, to 17 countries in the 2013 EBA).

- The first change is to lower the minimum threshold that defines a resource exporting country, from net resource exports of 10 percent of GDP to 0 percent of GDP.

- The second change is to widen the definition of resources to include natural gas as well as oil.

The oil and natural gas trade balance is defined as the 5-year moving average of the net exports for oil and natural gas, relative to GDP, multiplied by a temporariness index for oil and gas. The variable is constructed as

$$\text{var}_{i,t} = \sum_{k=\{oil,gas\}} \frac{1}{5} \sum_{s=t-4}^{t} \frac{X_{k,i,s}}{Y_{i,s}} * \frac{temp_{k,i,t}}{temp_{oil,NOR,2010}},$$

where the first part captures the average extraction size for oil and gas, while the second represents the temporariness of the resource, relative to the measure for oil in Norway in 2010. The particular normalization was chosen to make the regression coefficient more comparable with the one in the first EBA method. Values for $temp_{k,i,t}$ are computed as the ratio of current extraction to proven reserves (the inverse of 'years-till-exhaustion'), from the BP Statistical Review. Higher values of

the normalized temporariness term in the equation above indicate that the resource is more temporary, i.e., is expected to be exhausted sooner.

The estimated magnitude of the effect implies that a 1 percent of GDP in 'temporariness adjusted' exhaustible resources increases CA by about 0.6 percent of GDP. This coefficient turns out to be similar to the pilot EBA's CA regression, but now applies to 13 economies rather than Russia and Norway only.

We find that the effect of oil and gas extraction on the CA is not driven by Russia and Norway. If these two countries are excluded from the sample, the coefficient remains broadly unchanged (see regression 7 in Table 10). With few exceptions (e.g., Norway, Colombia, Russia), the estimated effects on the CA in recent years are not very large (in the range of 0 to 1.5 percent of GDP), because the size of revenues from exhaustible resources are small for majority of countries.

Annex IV. Financial Factors for EBA Methodology

The EBA methodology now includes a financial variable, based on private credit, seeking to measure two kinds of impacts on CA balances:

- *Financial excesses,* or ideally the policies that drive or allow those excesses. The relationship between financial and economic cycles, such as the impact of credit booms on crises and external imbalances, has been studied extensively in economics literature. For example, Jordà, Schularick, and Taylor (2011) show that the correlation between lending booms and current account imbalances "has grown much tighter" in recent decades.[43]

- Effects of *financial depth*, or of other financial structural characteristics, on saving and investment. Recent theoretical work (e.g., Caballero, Farhi and Gourinchas, 2008) shows how asymmetries in financial development across countries can help to account for global imbalances; these models predict that more financial developed markets will run CA deficits.[44] However, recent empirical research does not find strong or robust support for this hypothesis (Chinn, Eichengreen, and Ito, 2011).

The specification choice was made in light of a number of considerations and constraints. Challenges to capturing the two aforementioned effects empirically include difficulties in measuring financial policies, or their effectiveness, as well as endogeneity issues (as discussed below). Another challenge is the limited clarity of implications of theory: for example, some theories have implications for portfolio (stock) positions in steady state (e.g., Caballero, Farhi, and Gourinchas, 2008), but have no clear implications for capital flows, and CA flows, at any moment in time.

The demeaned private credit-to-GDP ratio is used both as a measure of "financial excesses" and of financial depth. The aim of including this variable as a regressor is to pick up potential excesses which would otherwise show up in the regression residual. The interpretation (for financial excess) is that a large deviation from the country's mean indicates that credit has risen substantially (perhaps dangerously) relative to real activity. Credit/GDP is also relatively easy to measure, and available for all EBA countries as long time series. As it has been used in many research papers, it is a useful benchmark.

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[43] Fratzscher and Straub (2009) also highlight the role of asset prices booms. Housing booms were found to be relevant, among others, by Adam, Kuang, and Marcet (2011) and Aizenman and Jinjarak (2009). Kraay and Ventura (2007) focus on stock market bubbles.

[44] Other contributions relating financial development to current accounts are offered, for example, by Caballero and Krishnamurthy (2009), Maggiori (2011), Mendoza, Quadrini, and Ríos-Rull (2009) and Sandri (2010).

Limitations of using this variable are several. One is the inability to parse out the two possible interpretations (financial excess vs. financial development). Another issue is endogeneity with respect to the current account. Shocks that drive foreign borrowing may also increase domestic credit growth, so that causal interpretation is unclear. Cross-border loans between banks will possibly show up in credit growth (e.g., a German bank lends to a Greek bank, which then uses funds for Greek mortgage lending). Note, however, that to the extent we are interested in proxying for lack of policies that should have limited excessive lending, whether such lending is financed domestically or abroad is of secondary importance (it is more an issue related to how to close the policy gap). As an indirect measure for capturing potential imperfections, credit/GDP does not identify directly the policy weaknesses (e.g., where financial regulations are too lax), but only indirectly suggests them via outcomes. Finally, theory does not provide a clear basis for identifying a desirable P* level of credit/GDP (though there is some relevant work; e.g., Arcand, Berkes, and Panizza, 2012).

Considering the above advantages and disadvantages, a tradeoff is faced. On one hand, we take a step towards removing some of the "financial action" from the regression residual. Inclusion of the private credit variable also allows country desks, by identifying an appropriate "P*" level, to take a stand on financial excesses and policies and their impact on the CA/REER. On the other hand, the credit variable may miss out on other aspects of financial excesses, and interpretation is not straightforward, so the EBA residual is not necessarily "finance free."

Estimates from the EBA panel regression suggest an increase of credit by 10 percentage points of GDP is associated with a CA/GDP that is lower by 0.3 percent of GDP. For some countries that experienced large increases in CA deficits in the run-up to the global crisis, the contribution of this regressor to the CA in the pre-crisis years is notable. Still it does not explain the full deterioration of the CA in such countries in the run-up to the crisis.

A number of other credit specifications were tried in the regressions (see Table 8):

- Other detrending techniques. We opted for demeaned credit level given that no obvious trend was visible across a broad set of countries. Therefore, demeaning was the most parsimonious way of treating the data. Table 8 presents results using linear, cubic, and Hodrik-Prescott detrending methods: all coefficients are insignificant. Indeed, traditional perceptions of apparent upward credit/GDP "trends" are less obviously supported by the recent data, as credit/GDP by now has contracted in some countries. Also recall that the credit/GDP regressor is measured relative to a world average or trading partners in the same year. This means that periods of apparent upward "trend" in one country do not necessarily mean an upward trend in the value of the regressor if the trend in financial innovations and other causes of credit growth contained a strong common component worldwide.

- Possible non-linearities/threshold effects to capture booms: no robust evidence was found, and fit did not improve. A measure of credit growth, see Table 8, was significant when included on its own (a coefficient of -0.043), but was insignificant when including the demeaned measure.

- Interacting credit with the output gap produced inconsistent results across the CA and REER regressions.

- Interacting credit with capital controls yielded no robust results.

Beyond private credit, other financial measures examined include:[45]

- Financial excess measures: stock market growth, bond market growth, housing prices, and corporate leverage. No robust results were found, and the demeaned credit/GDP always dominated. Table 8 presents two regressions including two measures of housing prices. First, we include a measure of the average real housing appreciation in a given country, and its coefficient is insignificant and tiny in economic terms (only -0.003). We also include a nominal measure of housing price growth, which is also insignificant, with a point estimate near zero.

- Financial depth measures: stock market capitalization/GDP, bond market capitalization/GDP, stock market turnover ratio, current liabilities/total liabilities, liabilities/assets, debt/equity. No robust results were found, as Table 9 shows: the coefficient on stock market capitalization is insignificant, though the sign is positive as expected; the coefficient on the measure of private debt markets is positive and significant (0.023), but the data coverage is for only a little over one-third of the baseline sample. Also, when entering the country mean of private credit as a separate variable (whose cross-sectional dimension might capture the arguments of the financial development literature) it was not significant.

- Financial structure measures: prominence of bank vs. market financing. Again results were not robust (see Table 9: the coefficient is marginally significant, with a coefficient of zero).

- Drivers/motivators of precautionary saving: stock market volatility, rolling GDP-per-capita volatility (Table 9). Both are significant and economically important, with coefficients of 0.029 and 0.402, respectively. But, they are difficult to interpret and endogeneity is an issue. First, stock markets vary in coverage across countries, so a measure of monthly

[45] An interesting hypothesis is put forward by Mao and Yao (2012), about the role of the comparative advantage in manufacturing versus financial sector. However, their evidence is based on bilateral current account balances (between country pairs) and so is not comparable to the EBA CA regression.

volatility is difficult to interpret as an economy-wide measure of macro volatility; it also might mainly reflect crisis episodes. Similarly, the output volatility measure may be picking up mainly rare crisis episodes rather than the persistent pattern that we seek to capture with the rolling construction of this variable—indeed, lagging this measure by just one period eliminates the significant result, which suggests not including it in the regression.

Annex V. Role of Structural Factors

It is possible that a country's structural characteristics and policies, such as rules governing product and labor markets, or aspects of institutional quality or of the political environment, could have systematic, non-offsetting effects on investment and saving rates and consequently affect the current account balance. However, empirical analysis in this area confronts two main challenges:

- One challenge in the context of EBA sample and timeframe is data availability. Many structural variables are available for short time series. Available data tend to be limited for earlier sample years, or to end in 2005, pending an update. Some are only available for a subset of the EBA countries. Data for product market regulation, e.g., tend to be limited to OECD countries only.

- Another challenge is ambiguity about expected implications of structural policies. The theoretically identified channels may affect both investment and saving rates, in the same direction, without clear-cut predictions for the CA. Some channels may be relevant only temporarily (e.g., a reform might raise incentives for investment until a new, higher capital stock can be achieved, without raising the investment rate on a sustained basis). Other channels may be relevant only during transition periods, as in a reform that increases price flexibility and speeds the adjustment in response to shocks. Structural factors and policies could thus be important but not lead to clear patterns in current account panel data.

Institutional and political environment. Despite the above challenges, the final EBA CA regression specification does employ a measure of the degree of safety (or risk) associated with the institutional and political environment. This measure is a summary index of five relevant indicators that each were found to have a significant effect on the CA in the expected direction, so that greater safety (less risk) is associated with a lower level of the CA. Five components: (i) Socioeconomic Conditions, (ii) Investment Profile, (iii) Corruption, (iv) Religious Tensions, (v) Democratic Accountability. Each component is in 0 – 1 range, and the aggregate index is a simple average of the five sub-indices. A safer (i.e., less risky) political/institutional environment is assigned higher ratings. The data source is ICRG, which draws on surveys of experts.

The estimated coefficient suggests that an increase by one standard deviation (0.13) in the summary index is associated with a CA that is weaker by 0.13*-0.11 = -1.4 % of GDP. [46] Separate S (saving/GDP) and I (investment/GDP) regressions indicate that a safer institutional and political environment is associated both with more investment and less saving (Table 4).

[46] This result is in line with the findings of Cheung, Furceri, and Rusticelli (2010).

Labor market regulation was another area of investigation (see Table 10). Such regulation could be relevant through multiple possible channels, and in more than one direction. For example, more flexible labor markets could encourage investment. They could also lead to higher unemployment risk, which in turn could lead to precautionary savings. At the same time, if flexible labor markets lead to lower unemployment rates, then the population might be less credit-constrained and save less rather than more. Moreover, there could be further non-linear effects from the interaction of unemployment and employment regulations. For example, effects of employment regulation may depend on the presence and size of unemployment insurance benefits. To further complicate matters, labor market flexibility could have transitional implications for CA adjustment processes, aside from any implications for the steady state.

Thus, there is no clear theoretical prediction in the literature about the role of labor market regulation on the current account. Similarly, it appears that there are no consistent or robust empirical results in the literature.[47] Existing findings seem to be sensitive to the sample and estimation method. Nor are there robust findings about the underlying channels—that is, the behavior of investment and saving rates—for influencing the current account.

We nevertheless explored the possible effect of labor market regulations on the CA using the CA panel regression. We investigated a number of detailed and summary labor market indexes available with EBA sample coverage, including measures of (i) minimum wage, (ii) unemployment insurance and (iii) employment protection.

Key findings from this investigation are summarized in Table 10, columns 2-5. For the EBA sample as a whole, we found some evidence that more flexible labor markets are associated with a lower current account (see below for results based on EFW data). Findings were statistically significant and robust to a number of regression specifications involving a variety of controls. The coefficient of -0.30 on the aggregated index of flexibility suggests that an increase by one standard deviation (0.014) is associated with 0.014*-0.30 = -0.4 % of GDP weaker CA.[48] Labor market indexes from two different sources (OECD/Aleksynska and Schindler, 2011, and EFW) showed similar results within the sample for which both were available (see columns 2 and 5).

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[47] A review of the relevant literature by Ivanova (2012) concludes that "The relationship between structural policies and the current account remains an open one."

[48] The summary index of labor market flexibility employed consists of six components: (i) hiring regulations and minimum wage (de jure), (ii) hiring and firing regulations (survey), (iii) centralized collective bargaining (survey), (iv) hours regulations (de jure), (v) mandated cost of worker dismissal (de jure), (vi) conscription (de jure). Each component is in 0 – 0.1 range: more flexible markets are assigned higher ratings. The summary index is the simple average of sub-indices. In a CA regression entering the sub-indices separately, all six components had negative coefficient point estimates, and four were significant at 10 percent. Data source is the Economic Freedom of the World, which constructs the index drawing on data from WB Doing Business surveys and Global Competitiveness Reports. Note that the validity and interpretation of these data has been controversial and questioned in the past.

However, various reasons pointed to the need for caution in interpreting these results. First, the results did not hold within the 11 EMU country subset of the sample (see column 3): for EMU, the coefficient was instead positive and significant. Second, we were not able to empirically identify a coherent channel through which more labor market regulation would act to boost the CA. For the aggregate labor market index, separate Saving/GDP and Investment/GDP regressions pointed in the direction of more regulations being associated with a higher saving rate, but no significant change in the investment rate. One possibility might be that regulations increase saving by driving up the unemployment rate, with greater risk of future unemployment motivating more saving (on the other hand, a sense of greater protection from unemployment and its financial consequences could act to decrease saving). However, we did not find any statistically significant sign of a link between labor market regulations and the unemployment rate (see column 4). In particular, the effect of the labor market index on the CA is not affected by the inclusion of unemployment rate in the regression. We also could not find evidence that labor market regulations variable works through an interaction between employment/ unemployment policies (see column 5).[49] This lack of a clear result is consistent with the literature. *In that light, it was decided not to include this variable in the final EBA regression specification.*

Product market regulation could not be examined in a satisfactory way, because the available index had a very limited sample coverage (generally including only OECD countries). The coefficient estimated within the available sample was not significant (see column 6 in Table 10).

Other structural characteristics/ policies were also investigated. These included several indicators of governance and institutional quality that were significant. Higher quality was found to be associated with a lower CA. However, these were dropped in favor of including the political/institutional uncertainty and risk variable which has better sample coverage.

[49] For more details on this particular hypothesis see Kerdrain, Koske and Wanner (2010).

Annex VI. Suggested Policy Benchmark for Public Health Spending

Potential policy benchmarks for public health spending, as a share of GDP, are generated using a cross-sectional regression run on 2005-2010 averages of data for 49 EBA countries. As explanatory variables, income, demography, and inequality are used; all have expected signs and are statistically significant:

- For the relative income variable, the log difference between countries' PPP-based GDP per capita and world average is used. (PPP GDP data are from WEO and extended backward using Penn World Table when possible.)

- Old age dependency ratio (as described in Annex I) is based on U.N. data and used to capture the relationship between population aging and public health spending.

- Income inequality is measured by the Gini coefficient (gross income concept) from Solt (2011). Higher income inequality is positively related to higher public health spending per GDP. Note that this variable was not included in the pilot 2012 EBA calculations.

Coefficients are relatively stable when different time periods are used both in averaged and pooled data format. Therefore, we keep same time period, the 2005-2010 average, used in the 2012 pilot EBA exercise.

Recall from Section V that the fitted values from this regression serve as suggested benchmarks, they need not be used to identify P* (desirable) levels in all cases.

	(1)	**(2)**	(3)	(4)	(5)	(6)
Exercise	Pilot	**EBA2.0**	EBA2.0	EBA2.0	EBA2.0	EBA2.0
Data used	2005-2010 Avg.	**2005-2010 Avg.**	2000-2005 Avg.	1995-2000 Avg.	2005-2010 Pooled	1995-2010 Pooled
Log(PPPGDPpc)	0.018					
	[6.54]***					
Log(PPPGDPpc) rel. to World		**0.018**	0.016	0.013	0.017	0.015
		[7.30]* **	[6.67]***	[5.16]***	[16.45]***	[22.97]***
Dependency Ratio	0.094	**0.084**	0.080	0.096	0.086	0.093
	[3.23]***	**[3.49]*** **	[2.94]***	[3.12]***	[8.33]***	[12.98]***
Gini Coefficient		**0.053**	0.040	0.034	0.052	0.042
		[2.77]* **	[2.22]**	[1.70]*	[6.55]***	[8.74]***
Constant	-0.145	**0.010**	0.012	0.007	0.010	0.008
	[7.45]***	**[0.84]**	[1.00]	[0.51]	[1.98]**	[2.55]**
Observations	49	**49**	49	49	289	777
R-squared	0.830	**0.860**	0.850	0.820	0.830	0.810

Robust t-statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 1. EBA CA regression

VARIABLES	Benchmark
L. NFA/Y	0.016**
	(0.019)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.012
	(0.378)
Financial Center Dummy	0.033***
	(0.000)
L.Output per worker, relative to top 3 economies	0.007
	(0.730)
L.Relative output per worker*K openness	0.065***
	(0.003)
Oil and Natural Gas Trade Balance * resource temporariness #	0.615***
	(0.000)
Dependency Ratio #	-0.030
	(0.476)
Population Growth #	-0.629
	(0.107)
Aging Speed (proj. change in old age dependency ratio) #	0.156***
	(0.000)
GDP growth, forecast in 5 years #	-0.471***
	(0.000)
L.Public Health Spending/GDP #	-0.551***
	(0.000)
L.demeaned VIX*K openness	0.068***
	(0.000)
L.demeaned VIX*K openness*share in world reserves	-0.136*
	(0.056)
Own currency's share in world reserves	-0.045***
	(0.000)
Output Gap #	-0.400***
	(0.000)
Commodity ToTgap*Trade Openness	0.230***
	(0.000)
Safer Institutional/Political Environment (index) #	-0.109***
	(0.000)
Demeaned Private Credit/GDP #	-0.026***
	(0.002)
Cyclically adjusted Fiscal Balance, instrumented #	0.324***
	(0.001)
(ΔReserves)/GDP* K controls, instrumented #	0.346**
	(0.040)
Constant	-0.014***
	(0.000)
Observations	1080
Number of countries	49
Root MSE	0.033

P-values of Het-corrected z-statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

"L." denotes one year lag.

Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.

Table 2. EBA CA regression: reserves and capital controls

VARIABLES	Benchmark			
L. NFA/Y	0.016**	0.017**	0.016**	0.017**
	(0.019)	(0.015)	(0.017)	(0.012)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.012	-0.013	-0.013	-0.015
	(0.378)	(0.329)	(0.319)	(0.264)
Financial Center Dummy	0.033***	0.033***	0.035***	0.035***
	(0.000)	(0.000)	(0.000)	(0.000)
L.Output per worker, relative to top 3 economies	0.007	0.008	0.021	0.022
	(0.730)	(0.710)	(0.348)	(0.330)
L.Relative output per worker*K openness	0.065***	0.064***	0.051**	0.050**
	(0.003)	(0.004)	(0.029)	(0.034)
Oil and Natural Gas Trade Balance * resource temporariness #	0.615***	0.614***	0.605***	0.605***
	(0.000)	(0.000)	(0.000)	(0.000)
Dependency Ratio #	-0.030	-0.029	-0.019	-0.018
	(0.476)	(0.496)	(0.651)	(0.679)
Population Growth #	-0.629	-0.620	-0.555	-0.541
	(0.107)	(0.113)	(0.154)	(0.165)
Aging Speed (proj. change in old age dependency ratio) #	0.156***	0.158***	0.154***	0.156***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years #	-0.471***	-0.471***	-0.480***	-0.480***
	(0.000)	(0.000)	(0.000)	(0.000)
L.Public Health Spending/GDP #	-0.551***	-0.560***	-0.542***	-0.554***
	(0.000)	(0.000)	(0.000)	(0.000)
L.demeaned VIX*K openness	0.068***	0.070***	0.067***	0.069***
	(0.000)	(0.000)	(0.000)	(0.000)
L.demeaned VIX*K openness*share in world reserves	-0.136*	-0.144**	-0.137*	-0.147**
	(0.056)	(0.043)	(0.054)	(0.040)
Own currency's share in world reserves	-0.045***	-0.047***	-0.041***	-0.043***
	(0.000)	(0.000)	(0.001)	(0.001)
Output Gap #	-0.400***	-0.401***	-0.397***	-0.398***
	(0.000)	(0.000)	(0.000)	(0.000)
Commodity ToTgap*Trade Openness	0.230***	0.233***	0.229***	0.232***
	(0.000)	(0.000)	(0.000)	(0.000)
Safer Institutional/Political Environment (index) #	-0.109***	-0.109***	-0.107***	-0.107***
	(0.000)	(0.000)	(0.000)	(0.000)
Demeaned Private Credit/GDP #	-0.026***	-0.026***	-0.026***	-0.026***
	(0.002)	(0.002)	(0.001)	(0.001)
Cyclically adjusted Fiscal Balance, instrumented #	0.324***	0.326***	0.330***	0.332***
	(0.001)	(0.000)	(0.000)	(0.000)
(ΔReserves)/GDP* K controls, instrumented #	0.346**	0.403**	0.326*	0.401*
	(0.040)	(0.045)	(0.058)	(0.055)
(ΔReserves)/GDP, instrumented #		-0.061		-0.073
		(0.516)		(0.445)
K controls #			0.016	0.016
			(0.110)	(0.113)
Constant	-0.014***	-0.013***	-0.014***	-0.014***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,080	1,080	1,080	1,080
Number of countries	49	49	49	49
Root MSE	0.033	0.033	0.033	0.033

P-values of Het-corrected z-statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

"L." denotes one year lag.

Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.

Table 3. EBA CA regression: inspecting monetary policy

VARIABLES	Benchmark				
L. NFA/Y	0.016**	0.016**	0.016**	0.017**	0.017**
	(0.019)	(0.021)	(0.018)	(0.013)	(0.016)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.012	-0.011	-0.013	-0.011	-0.012
	(0.378)	(0.428)	(0.335)	(0.437)	(0.375)
Financial Center Dummy	0.033***	0.033***	0.033***	0.033***	0.033***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.Output per worker, relative to top 3 economies	0.007	0.009	0.007	-0.003	-0.002
	(0.730)	(0.682)	(0.724)	(0.892)	(0.944)
L.Relative output per worker*K openness	0.065***	0.064***	0.065***	0.078***	0.075***
	(0.003)	(0.005)	(0.003)	(0.001)	(0.001)
Oil and Natural Gas Trade Balance * resource temporariness #	0.615***	0.613***	0.615***	0.591***	0.599***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dependency Ratio #	-0.030	-0.035	-0.031	-0.051	-0.049
	(0.476)	(0.418)	(0.462)	(0.250)	(0.256)
Population Growth #	-0.629	-0.645	-0.637	-0.653	-0.681*
	(0.107)	(0.106)	(0.101)	(0.114)	(0.090)
Aging Speed (proj. change in old age dependency ratio) #	0.156***	0.157***	0.154***	0.178***	0.176***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years #	-0.471***	-0.496***	-0.485***	-0.525***	-0.537***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.Public Health Spending/GDP #	-0.551***	-0.555***	-0.557***	-0.277*	-0.304*
	(0.000)	(0.001)	(0.000)	(0.086)	(0.054)
L.demeaned VIX*K openness	0.068***	0.067***	0.068***	0.070***	0.070***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.demeaned VIX*K openness*share in world reserves	-0.136*	-0.133*	-0.136*	-0.118	-0.120*
	(0.056)	(0.062)	(0.057)	(0.100)	(0.094)
Own currency's share in world reserves	-0.045***	-0.044***	-0.043***	-0.052***	-0.051***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
Output Gap #	-0.400***	-0.404***	-0.398***		
	(0.000)	(0.000)	(0.000)		
Commodity ToTgap*Trade Openness	0.230***	0.228***	0.230***	0.205***	0.209***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Safer Institutional/Political Environment (index) #	-0.109***	-0.110***	-0.109***	-0.144***	-0.143***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Demeaned Private Credit/GDP #	-0.026***	-0.027***	-0.027***	-0.027***	-0.026***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)
Cyclically adjusted Fiscal Balance, instrumented #	0.324***	0.325***	0.331***	0.314***	0.318***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
(ΔReserves)/GDP* K controls, instrumented #	0.346**	0.337*	0.348**	0.520***	0.491***
	(0.040)	(0.064)	(0.039)	(0.007)	(0.006)
real interest rate differential interacted with K openness ^		0.017		0.029	
		(0.419)		(0.187)	
real interest rate #			-0.009		0.002
			(0.939)		(0.990)
real interest rate * K controls #			0.428		0.494
			(0.447)		(0.415)
Constant	-0.014***	-0.014***	-0.015***	-0.013***	-0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1,080	1,057	1,080	1,057	1,080
Number of countries	49	49	49	49	49
Root MSE	0.033	0.033	0.033	0.034	0.034

P-values of Het-corrected z-statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

"L." denotes one year lag.

Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.

^ this term is constructed exactly as in the REER regression

Table 4. EBA CA regression: savings and investment breakdown

VARIABLES	Benchmark	Current account to GDP plus investment to GDP	Investment to GDP
L. NFA/Y	0.016**	0.012*	-0.001
	(0.019)	(0.082)	(0.921)
L. NFA/Y*(dum=1 if NFA/Y < -60%)	-0.012	0.019	0.028**
	(0.378)	(0.237)	(0.047)
Financial Center Dummy	0.033***	0.023***	-0.011
	(0.000)	(0.007)	(0.102)
L.Demeaned GDPpw/Top3GDPpw (PPP)	0.007	-0.023	-0.022
	(0.730)	(0.371)	(0.391)
L.[Demeaned GDPpw/Top3GDPpw (PPP)]*(1-Kcon)	0.065***	0.138***	0.061**
	(0.003)	(0.000)	(0.027)
Oil and Gas Balance	0.615***	0.619***	-0.010
	(0.000)	(0.000)	(0.932)
Dependency Ratio	-0.030	-0.031	-0.018
	(0.476)	(0.514)	(0.711)
Population Growth	-0.629	-2.000***	-1.376***
	(0.107)	(0.000)	(0.000)
Aging Speed	0.156***	0.373***	0.217***
	(0.000)	(0.000)	(0.000)
GDP growth forecast of 5 year out	-0.471***	0.364***	0.730***
	(0.000)	(0.009)	(0.000)
L.Public Health Spending/GDP	-0.551***	-1.629***	-1.060***
	(0.000)	(0.000)	(0.000)
L.demeaned VIX*(1-Kcon)	0.068***	-0.067***	-0.137***
	(0.000)	(0.000)	(0.000)
L.demeaned VIX*(1-Kcon)*(Res. share)	-0.136*	-0.160*	-0.015
	(0.056)	(0.062)	(0.811)
Own currency's share in world reserves	-0.045***	-0.080***	-0.034***
	(0.000)	(0.000)	(0.008)
Output Gap	-0.400***	0.104***	0.506***
	(0.000)	(0.009)	(0.000)
ToTgap*Openness	0.230***	0.202***	-0.028
	(0.000)	(0.000)	(0.452)
Safer Institutional/Political Envir.	-0.109***	-0.074***	0.033
	(0.000)	(0.001)	(0.123)
Demeaned Credit/GDP	-0.026***	-0.014	0.008
	(0.002)	(0.114)	(0.349)
Cyclically Adjusted Fiscal Balance, instrumented new	0.324***	0.535***	0.178*
	(0.001)	(0.000)	(0.073)
Kcon*(ΔReserves)/GDP, instrumented new	0.346**	0.617***	0.177
	(0.040)	(0.003)	(0.362)
Constant	-0.014***	0.205***	0.220***
	(0.000)	(0.000)	(0.000)
Observations	1080	1080	1080
Number of countries	49	49	49
Root MSE	0.033	0.043	0.042

P-values of Het-corrected z-statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

"L." denotes one year lag.

Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.

Table 5. EBA REER regression

VARIABLES	Benchmark
(ΔReserves)/GDP* K controls, instrumented #	-1.43***
	(0.00)
L.Public Health Spending/GDP #	1.78**
	(0.03)
real interest rate differential interacted with K openness #	0.71***
	(0.01)
Demeaned Private Credit/GDP #	0.13***
	(0.00)
L.Output per worker, relative to top 3 economies	0.81***
	(0.00)
L.Relative output per worker*K openness	-0.58***
	(0.00)
L.demeaned VIX*K openness	-0.24***
	(0.00)
L.demeaned VIX*K openness*share in world reserves	0.84**
	(0.02)
Own currency's share in world reserves	0.03
	(0.69)
L.Financial home bias (share of domestic debt owned by residents) #	0.34***
	(0.00)
Log commodity Terms Of Trade	0.08
	(0.11)
L.Trade openness (avg exp+imp to GDP) #	-0.36***
	(0.00)
GDP growth, forecast in 5 years #	2.32***
	(0.00)
Population Growth #	3.50*
	(0.07)
Share of administered prices	-1.86***
	(0.00)
Dummy south africa apartheid (pre-1994)	0.28***
	(0.00)
Constant	4.30***
	(0.00)
Observations	769
Number of countries	40
RMSE	0.081

Robust pvalues in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%
"L." denotes one year lag.
Note: variables denoted with # are constructed relative to trading partner weighted average

Table 6. EBA REER regression: reserves and capital controls

VARIABLES	Benchmark			
(ΔReserves)/GDP* K controls, instrumented #	-1.433***	-2.323***	-1.028**	-1.682**
	(0.002)	(0.002)	(0.021)	(0.026)
L.Public Health Spending/GDP #	1.783**	1.692**	1.607*	1.572*
	(0.033)	(0.049)	(0.055)	(0.064)
Real interest rate differential interacted with K openness #	0.711***	0.688**	0.685**	0.673**
	(0.009)	(0.013)	(0.011)	(0.014)
Demeaned Private Credit/GDP #	0.128***	0.129***	0.133***	0.133***
	(0.000)	(0.000)	(0.000)	(0.000)
L.Output per worker, relative to top 3 economies	0.809***	0.793***	0.688***	0.696***
	(0.000)	(0.000)	(0.000)	(0.000)
L.Relative output per worker*K openness	-0.580***	-0.561***	-0.473***	-0.476***
	(0.000)	(0.000)	(0.001)	(0.001)
L.demeaned VIX*K openness	-0.241***	-0.248***	-0.243***	-0.248***
	(0.003)	(0.003)	(0.003)	(0.003)
L.demeaned VIX*K openness*share in world reserves	0.839**	0.890**	0.841**	0.874**
	(0.023)	(0.017)	(0.021)	(0.017)
Own currency's share in world reserves	0.025	0.046	0.015	0.030
	(0.687)	(0.482)	(0.817)	(0.647)
L.Financial home bias (share of domestic debt owned by residents) #	0.340***	0.323***	0.331***	0.321***
	(0.000)	(0.000)	(0.000)	(0.000)
Log commodity Terms Of Trade	0.082	0.086*	0.094*	0.095*
	(0.107)	(0.099)	(0.064)	(0.066)
L.Trade openness (avg exp+imp to GDP) #	-0.364***	-0.373***	-0.378***	-0.382***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years #	2.324***	2.277***	2.354***	2.318***
	(0.000)	(0.000)	(0.000)	(0.000)
Population Growth #	3.502*	3.424*	3.380*	3.346*
	(0.067)	(0.073)	(0.072)	(0.076)
Share of administered prices	-1.859***	-1.875***	-1.790***	-1.811***
	(0.000)	(0.000)	(0.000)	(0.000)
Dummy south africa apartheid (pre-1994)	0.276***	0.276***	0.287***	0.286***
	(0.000)	(0.000)	(0.000)	(0.000)
(ΔReserves)/GDP, instrumented #		0.692		0.464
		(0.153)		(0.340)
L.K controls #			-0.071	-0.060
			(0.109)	(0.183)
Constant	4.304***	4.292***	4.309***	4.300***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	769	769	769	769
Number of countries	40	40	40	40
RMSE	0.081	0.081	0.080	0.080

Robust pvalues in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

"L." denotes one year lag.

Note: variables denoted with # are constructed relative to trading partner weighted average

Table 7. EBA REER regression: inspecting monetary and fiscal policy

VARIABLES	Benchmark			
(ΔReserves)/GDP* K controls, instrumented #	-1.433***	-1.438***	-1.081**	-1.426***
	(0.002)	(0.002)	(0.020)	(0.001)
L.Public Health Spending/GDP #	1.783**	1.772**	2.419***	1.595*
	(0.033)	(0.033)	(0.003)	(0.061)
Real interest rate differential interacted with K openness #	0.711***		0.693***	0.642**
	(0.009)		(0.008)	(0.021)
Demeaned Private Credit/GDP #	0.128***	0.130***	0.126***	0.121***
	(0.000)	(0.000)	(0.000)	(0.000)
L.Output per worker, relative to top 3 economies	0.809***	0.771***	0.659***	0.813***
	(0.000)	(0.000)	(0.000)	(0.000)
L.Relative output per worker*K openness	-0.580***	-0.553***	-0.533***	-0.586***
	(0.000)	(0.000)	(0.000)	(0.000)
L.demeaned VIX*K openness	-0.241***	-0.245***	-0.208***	-0.237***
	(0.003)	(0.003)	(0.009)	(0.004)
L.demeaned VIX*K openness*share in world reserves	0.839**	0.851**	0.779**	0.810**
	(0.023)	(0.021)	(0.023)	(0.031)
Own currency's share in world reserves	0.025	0.019	0.003	0.038
	(0.687)	(0.763)	(0.957)	(0.549)
L.Financial home bias (share of domestic debt owned by residents) #	0.340***	0.331***	0.325***	0.353***
	(0.000)	(0.000)	(0.000)	(0.000)
Log commodity Terms Of Trade	0.082	0.085*	0.098**	0.084
	(0.107)	(0.092)	(0.047)	(0.102)
L.Trade openness (avg exp+imp to GDP) #	-0.364***	-0.367***	-0.337***	-0.385***
	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years #	2.324***	2.358***	1.966***	2.348***
	(0.000)	(0.000)	(0.002)	(0.000)
Population Growth #	3.502*	3.763**	3.821**	3.835**
	(0.067)	(0.048)	(0.036)	(0.046)
Share of administered prices	-1.859***	-1.858***	-1.927***	-1.770***
	(0.000)	(0.000)	(0.000)	(0.000)
Dummy south africa apartheid (pre-1994)	0.276***	0.279***	0.277***	0.270***
	(0.000)	(0.000)	(0.000)	(0.000)
real interest rate #		0.739***		
		(0.005)		
real interest rate * capital controls #		-0.885		
		(0.134)		
Output gap #			0.772***	
			(0.000)	
Cyclically adjusted fiscal balance to GDP #				-0.232
				(0.193)
Constant	4.304***	4.314***	4.383***	4.292***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	769	769	769	769
Number of countries	40	40	40	40
RMSE	0.081	0.081	0.079	0.081

Robust pvalues in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

"L." denotes one year lag.

Note: variables denoted with # are constructed relative to trading partner weighted average

Table 8. EBA CA regression: alternative financial indicators (a)

VARIABLES	Benchmark						
L. NFA/Y	0.016**	0.018***	0.018***	0.018***	0.021***	0.009	0.008
	(0.019)	(0.007)	(0.008)	(0.007)	(0.002)	(0.264)	(0.316)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.012	-0.013	-0.013	-0.013	-0.013	0.004	0.005
	(0.378)	(0.329)	(0.349)	(0.354)	(0.339)	(0.795)	(0.719)
Financial Center Dummy	0.033***	0.032***	0.031***	0.031***	0.030***	0.034***	0.034***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.Output per worker, relative to top 3 economies	0.007	0.011	0.009	0.009	0.012	-0.039	-0.034
	(0.730)	(0.606)	(0.686)	(0.675)	(0.556)	(0.290)	(0.353)
L.Relative output per worker*K openness	0.065***	0.062***	0.065***	0.064***	0.061***	0.113***	0.108***
	(0.003)	(0.005)	(0.004)	(0.004)	(0.005)	(0.006)	(0.009)
Oil and Natural Gas Trade Balance * resource temporariness #	0.615***	0.666***	0.664***	0.664***	0.658***	0.655***	0.651***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dependency Ratio #	-0.030	-0.033	-0.029	-0.029	-0.032	0.036	0.029
	(0.476)	(0.433)	(0.496)	(0.489)	(0.439)	(0.483)	(0.581)
Population Growth #	-0.629	-0.783**	-0.778**	-0.780**	-0.776**	0.073	-0.061
	(0.107)	(0.043)	(0.046)	(0.045)	(0.043)	(0.878)	(0.896)
Aging Speed (proj. change in old age dependency ratio) #	0.156***	0.140***	0.137***	0.137***	0.135***	0.243***	0.231***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years #	-0.471***	-0.488***	-0.495***	-0.493***	-0.468***	-0.771***	-0.784***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.Public Health Spending/GDP #	-0.551***	-0.595***	-0.593***	-0.595***	-0.643***	-0.638***	-0.663***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.003)
L.demeaned VIX*K openness	0.068***	0.068***	0.066***	0.066***	0.067***	0.060***	0.056***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.006)	(0.009)
L.demeaned VIX*K openness*share in world reserves	-0.136*	-0.146**	-0.151**	-0.151**	-0.153**	-0.131	-0.124
	(0.056)	(0.042)	(0.036)	(0.036)	(0.036)	(0.129)	(0.145)
Own currency's share in world reserves	-0.045***	-0.046***	-0.047***	-0.047***	-0.044***	-0.052***	-0.052***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Output Gap #	-0.400***	-0.401***	-0.402***	-0.402***	-0.403***	-0.319***	-0.338***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Commodity ToTgap*Trade Openness	0.230***	0.237***	0.240***	0.240***	0.227***	0.311***	0.312***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Safer Institutional/Political Environment (index) #	-0.109***	-0.112***	-0.114***	-0.114***	-0.102***	-0.174***	-0.173***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Demeaned Private Credit/GDP #	-0.026***					-0.030***	-0.029***
	(0.002)					(0.002)	(0.002)
Cyclically adjusted Fiscal Balance, instrumented #	0.324***	0.362***	0.386***	0.382***	0.325***	0.505***	0.496***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
(ΔReserves)/GDP* K controls, instrumented #	0.346**	0.339**	0.339**	0.339**	0.341**	0.473	0.450
	(0.040)	(0.044)	(0.044)	(0.044)	(0.042)	(0.109)	(0.126)
Linear detrended Credit/GDP		-0.012					
		(0.274)					
Cubic detrended Credit/GDP			0.005				
			(0.738)				
HP100 detrended Credit/GDP				0.002			
				(0.893)			
Growth of Credit/GDP					-0.043***		
					(0.003)		
Average housing real appreciation rate						-0.003	
						(0.512)	
Average housing nominal appreciation rate							-0.000
							(0.540)
Constant	-0.014***	-0.014***	-0.014***	-0.014***	-0.013***	-0.012**	-0.012**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.010)	(0.014)
Observations	1,080	1,073	1,073	1,073	1,070	584	594
Number of countries	49	49	49	49	49	35	35
Root MSE	0.033	0.033	0.033	0.033	0.033	0.034	0.034

P-values of Het-corrected z-statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

"L." denotes one year lag.

Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.

Table 9. EBA CA regression: alternative financial indicators (b)

VARIABLES	Benchmark												
L. NFA/Y	0.016**	0.021***	0.019***	0.019***	0.017**	0.015**	0.020***	0.020***	0.020***	0.021***	0.016**	0.020***	0.019***
	(0.019)	(0.003)	(0.005)	(0.006)	(0.022)	(0.043)	(0.005)	(0.005)	(0.006)	(0.002)	(0.019)	(0.002)	(0.005)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.012	-0.016	-0.014	-0.014	-0.016	-0.010	-0.016	-0.014	-0.014	-0.012	-0.012	-0.018	-0.016
	(0.378)	(0.246)	(0.297)	(0.326)	(0.301)	(0.506)	(0.283)	(0.332)	(0.347)	(0.382)	(0.390)	(0.199)	(0.265)
Financial Center Dummy	0.033***	0.032***	0.031***	0.031***	0.034***	0.034***	0.031***	0.030***	0.031***	0.032***	0.034***	0.034***	0.037***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.Output per worker, relative to top 3 economies	0.007	0.026	0.007	0.027	-0.000	0.032	0.027	0.028	0.028	0.003	0.013	-0.009	-0.002
	(0.730)	(0.273)	(0.761)	(0.251)	(0.998)	(0.154)	(0.293)	(0.282)	(0.273)	(0.900)	(0.543)	(0.640)	(0.908)
L.Relative output per worker*K openness	0.065***	0.042*	0.068***	0.044*	0.060*	0.041*	0.060**	0.060**	0.060**	0.066**	0.067***	0.066***	0.070***
	(0.003)	(0.080)	(0.004)	(0.070)	(0.056)	(0.084)	(0.029)	(0.031)	(0.031)	(0.013)	(0.003)	(0.002)	(0.001)
Oil and Natural Gas Trade Balance * resource temporariness #	0.615***	0.677***	0.626***	0.618***	0.565***	0.657***	0.543***	0.543***	0.542***	0.589***	0.585***	0.636***	0.621***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Dependency Ratio #	-0.030	-0.021	-0.031	-0.021	-0.022	-0.030	-0.036	-0.038	-0.039	-0.009	-0.026	-0.023	-0.028
	(0.476)	(0.614)	(0.445)	(0.621)	(0.640)	(0.483)	(0.428)	(0.406)	(0.386)	(0.842)	(0.538)	(0.571)	(0.484)
Population Growth #	-0.629	-0.577	-0.620	-0.679*	-0.280	-0.639	-0.712	-0.745*	-0.752*	-0.554	-0.556	-0.514	-0.427
	(0.107)	(0.162)	(0.102)	(0.091)	(0.598)	(0.125)	(0.113)	(0.099)	(0.096)	(0.199)	(0.164)	(0.172)	(0.260)
Aging Speed (proj. change in old age dependency ratio) #	0.156***	0.139***	0.149***	0.130***	0.154***	0.168***	0.132***	0.131***	0.131***	0.153***	0.167***	0.164***	0.175***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years #	-0.471***	-0.610***	-0.554***	-0.593***	-0.744***	-0.540***	-0.676***	-0.676***	-0.678***	-0.651***	-0.453***	-0.538***	-0.523***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.Public Health Spending/GDP #	-0.551***	-0.690***	-0.629***	-0.669***	-0.730***	-0.695***	-0.754***	-0.761***	-0.760***	-0.670***	-0.584***	-0.526***	-0.508***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
L.demeaned VIX*K openness	0.068***	0.063***	0.063***	0.064***	0.059***	0.055***	0.063***	0.063***	0.063***	0.056***	0.071***	0.056***	0.056***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.004)	(0.001)	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)
L.demeaned VIX*K openness*share in world reserves	-0.136*	-0.117	-0.135*	-0.117	-0.103	-0.130*	-0.126	-0.124	-0.124	-0.095	-0.157**	-0.087	-0.091
	(0.056)	(0.138)	(0.093)	(0.141)	(0.233)	(0.100)	(0.134)	(0.138)	(0.140)	(0.176)	(0.028)	(0.210)	(0.215)
Own currency's share in world reserves	-0.045***	-0.040***	-0.043***	-0.042***	-0.056***	-0.042***	-0.053***	-0.053***	-0.053***	-0.051***	-0.046***	-0.042***	-0.040***
	(0.000)	(0.002)	(0.002)	(0.001)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Output Gap #	-0.400***	-0.419***	-0.416***	-0.410***	-0.493***	-0.402***	-0.439***	-0.430***	-0.430***	-0.423***	-0.371***	-0.415***	-0.412***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Commodity ToTgap*Trade Openness	0.230***	0.206***	0.247***	0.202***	0.173***	0.220***	0.209***	0.214***	0.213***	0.206***	0.239***	0.211***	0.176***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Safer Institutional/Political Environment (index) #	-0.109***	-0.115***	-0.110***	-0.118***	-0.094***	-0.120***	-0.126***	-0.124***	-0.125***	-0.113***	-0.105***	-0.094***	-0.092***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Demeaned Private Credit/GDP #	-0.026***	-0.027***	-0.026***	-0.026***	-0.033***	-0.028***	-0.023**	-0.023**	-0.024**	-0.023**	-0.026***	-0.021**	-0.018**
	(0.002)	(0.002)	(0.003)	(0.003)	(0.001)	(0.003)	(0.011)	(0.011)	(0.010)	(0.013)	(0.002)	(0.013)	(0.033)
Cyclically adjusted Fiscal Balance, instrumented #	0.324***	0.356***	0.332***	0.352***	0.269**	0.378***	0.329***	0.314***	0.315***	0.373***	0.295***	0.260***	0.296***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.015)	(0.000)	(0.002)	(0.003)	(0.003)	(0.000)	(0.002)	(0.004)	(0.001)
(ΔReserves)/GDP* K controls, instrumented #	0.346**	0.411**	0.347*	0.407**	0.501*	0.411**	0.472**	0.466**	0.466**	0.483**	0.339**	0.392**	0.394**
	(0.040)	(0.034)	(0.052)	(0.035)	(0.064)	(0.050)	(0.022)	(0.023)	(0.023)	(0.014)	(0.044)	(0.029)	(0.029)
Financial structure (log(stmkt/credit))		0.000*											
		(0.081)											
Bank concentration			-0.000										
			(0.949)										
Stock market capitalization/GDP				0.005									
				(0.278)									
Private bond market capitalization/GDP					0.023**								
					(0.019)								
Stock market turnover ratio						-0.001							
						(0.621)							
Current liabilities in % of total liabilities							0.021						
							(0.304)						
Liabilities in % of assets								-0.011					
								(0.549)					
Debt in % of equity									-0.000				
									(0.881)				
Stock market volatility										0.029***			
										(0.001)			
sd(Y/L growth)											0.402***		
											(0.002)		
Life insurance												0.059	
												(0.261)	
Non-life insurance													-0.257
													(0.130)
Constant	-0.014***	-0.012***	-0.013***	-0.012***	-0.004	-0.014***	-0.013***	-0.014***	-0.014***	-0.012***	-0.016***	-0.009***	-0.013***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.450)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)
Observations	1,080	950	970	957	730	942	847	848	848	848	1,068	1,019	993
Number of countries	49	49	49	49	38	49	45	45	45	46	49	49	49
Root MSE	0.033	0.032	0.032	0.033	0.032	0.033	0.033	0.033	0.033	0.032	0.033	0.031	0.032

P-values of Het-corrected z-statistics in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
"L." denotes one year lag.
Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.

Table 10. EBA CA regression: structural indicators

VARIABLES	Benchmark						Dropping Norway and Russia
L. NFA/Y	0.016**	0.016**	0.017***	0.019***	0.017**	-0.004	0.017**
	(0.019)	(0.015)	(0.009)	(0.005)	(0.017)	(0.763)	(0.013)
L. NFA/Y*(dummy if NFA/Y < -60%)	-0.012	-0.012	-0.014	-0.015	-0.024	-0.014	-0.013
	(0.378)	(0.347)	(0.286)	(0.261)	(0.100)	(0.485)	(0.327)
Financial Center Dummy	0.033***	0.033***	0.031***	0.034***	0.024***	0.031***	0.030***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.003)	(0.000)
L.Output per worker, relative to top 3 economies	0.007	0.003	0.002	0.005	0.024	0.086	0.018
	(0.730)	(0.896)	(0.907)	(0.826)	(0.248)	(0.349)	(0.416)
L.Relative output per worker*K openness	0.065***	0.069***	0.068***	0.072***	0.047**	0.094	0.064***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.030)	(0.345)	(0.004)
Oil and Natural Gas Trade Balance * resource temporariness #	0.615***	0.595***	0.595***	0.605***	0.678***	0.183	0.729**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.291)	(0.013)
Dependency Ratio #	-0.030	-0.031	-0.032	-0.018	-0.077*	0.326***	-0.037
	(0.476)	(0.470)	(0.473)	(0.687)	(0.098)	(0.001)	(0.388)
Population Growth #	-0.629	-0.427	-0.428	-0.429	-0.821*	-1.064	-0.502
	(0.107)	(0.280)	(0.270)	(0.303)	(0.057)	(0.109)	(0.172)
Aging Speed (proj. change in old age dependency ratio) #	0.156***	0.182***	0.191***	0.199***	0.146***	0.207***	0.135***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth, forecast in 5 years #	-0.471***	-0.494***	-0.497***	-0.494***	-0.475***	-0.321	-0.438***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.396)	(0.000)
L.Public Health Spending/GDP #	-0.551***	-0.558***	-0.557***	-0.640***	-0.842***	0.102	-0.567***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.734)	(0.000)
L.demeaned VIX*K openness	0.068***	0.069***	0.069***	0.074***	0.034	0.050	0.067***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.117)	(0.297)	(0.000)
L.demeaned VIX*K openness*share in world reserves	-0.136*	-0.145**	-0.147**	-0.160**	-0.023	-0.137	-0.120*
	(0.056)	(0.036)	(0.031)	(0.026)	(0.799)	(0.436)	(0.093)
Own currency's share in world reserves	-0.045***	-0.044***	-0.045***	-0.046***	-0.029**	-0.069***	-0.052***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.021)	(0.001)	(0.000)
Output Gap #	-0.400***	-0.402***	-0.401***	-0.378***	-0.416***	-0.030	-0.414***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.851)	(0.000)
Commodity ToTgap*Trade Openness	0.230***	0.232***	0.232***	0.237***	0.338***	0.392***	0.163***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)
Safer Institutional/Political Environment (index) #	-0.109***	-0.111***	-0.109***	-0.117***	-0.089***	-0.084	-0.101***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.105)	(0.000)
Demeaned Private Credit/GDP #	-0.026***	-0.024***	-0.024***	-0.024***	-0.021*	-0.032**	-0.020**
	(0.002)	(0.005)	(0.003)	(0.006)	(0.056)	(0.017)	(0.016)
Cyclically adjusted Fiscal Balance, instrumented #	0.324***	0.311***	0.301***	0.363***	0.126	0.727***	0.353***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.217)	(0.002)	(0.000)
(ΔReserves)/GDP* K controls, instrumented #	0.346**	0.330*	0.340*	0.425**	0.355	0.803	0.337**
	(0.040)	(0.059)	(0.051)	(0.035)	(0.154)	(0.509)	(0.043)
Less labor regulations		-0.296**	-0.384**	-0.236*			
		(0.022)	(0.029)	(0.076)			
Less labor regulations * EMU dummy			0.603**				
			(0.040)				
EMU dummy			0.011*				
			(0.061)				
unemployment rate				0.001*			
				(0.084)			
Unemployment insurance					0.027**		
					(0.050)		
Employment protection legislation					0.004***		
					(0.004)		
Unemp. Insurance * empl. Protection					0.003		
					(0.662)		
Product Market Regulation						0.010	
						(0.343)	
Constant	-0.014***	-0.015***	-0.015***	-0.016***	-0.021***	-0.072***	-0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	1080	1053	1053	975	813	220	1040
Number of countries	49	49	49	49	49	20	47
Root MSE	0.033	0.032	0.032	0.033	0.031	0.025	0.032

P-values of Het-corrected z-statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

"L." denotes one year lag.

Note: variables denoted with # are constructed relative to a (GDP-weighted) country sample average, in each year.