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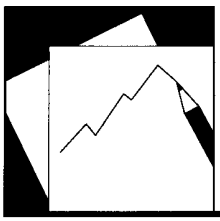

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Are Middle Eastern Current Account Imbalances Excessive?

Samya Beidas-Strom and Paul Cashin

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Abstract

Employing a dynamic panel regression, this study estimates the medium-term current account position for three subgroups of emerging market and developing countries with shared economic characteristics. The fundamental determinants of the macroeconomic balance approach to current account determination (arising from the IMF's Consultative Group on Exchange Rate (CGER)) are augmented by determinants relevant to Middle Eastern economies' current account positions. The study also assesses the deviation of the actual medium-term current account position of three Middle Eastern subgroups of countries (emerging markets; low-income and fragile economies; and net oil exporters) from their medium-term current account norms. Key findings are that: augmentation of the fundamental determinants yields plausible Middle Eastern current account norms; and in comparison with the medium-term current account norm, the actual and projected current account imbalances of each of the three subgroups are typically not excessive.

JEL Classification Numbers: F21, F31, F32, F34, E62, F42

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I. INTRODUCTION

As one of the leading indicators of the future behavior of an economy, understanding the determinants of current account (CA) imbalances has important macroeconomic policy implications. The design of an effective set of policies to adjust (large) CA imbalances, in order to achieve internal and external stability, has been a key motivator of this literature, including assessing exchange rate misalignment. While large CA deficits do not necessarily lead to a subsequent balance of payments crisis, when they are caused by persistent terms of trade (TOT) shocks or coincide with other exogenous shocks, they are often an omen of a looming crisis (Imam, 2008).

A recent study (IMF, 2009) found that overheating economies (in the wake of the current global financial crisis) were often associated with appreciating currencies and widening CA deficits, with cross-country evidence indicating a statistically-significant relationship between the output gap and the size of the CA deficit. Moreover, according to this study, large and persistent CA deficits were reliable predictors of crisis countries with IMF programs in 2007. These deficits were also much higher than in previous crises. Jordà *et al* (2011) also find that external imbalances have played a role in predicting financial crises, although more so in eras of low financialization than today. Reducing the CA deficit is therefore a precautionary tool to avoid: hard economic landings; abrupt exchange rate depreciations that generate balance sheet haircuts; asset and liability mismatches; increases in interest rates to contain inflation; and falls in investment and consumption that reduce economic activity and raise unemployment. At the same time, the onset of the global financial turmoil in late 2007 led some to question whether CA surpluses were excessive (Bems and de Carvalho Filho, 2009a) and identify policies for adjustment (Arezki and Hasanov, 2009). While this issue is linked to the debate on global imbalances and reserve adequacy, which strives for a more stable global financial system free of large external imbalances, in a globalized world, there is no reason for CA positions characterized by large capital flows to be balanced. Indeed, it is desirable for savings to move to where they are most productive, and imbalances can therefore emerge naturally from differences in: national saving behavior; the rate of return on capital; or the degree of risk or liquidity of different assets. Accordingly, imbalances, even large ones, are not necessarily bad (Blanchard and Milesi-Ferretti, 2009).

The Middle East and Central Asia (hereafter denoted Middle East) encompasses a diverse group of economies. At the polar ends are economies that have run, for many years, very large CA (surplus) imbalances—in the order of a 25–50 percent of GDP (Kuwait, Libya, and Saudi Arabia)—and others that have run large CA (deficit) imbalances—in the order of 10–25 percent of GDP (Armenia, Djibouti, Jordan, Lebanon, Georgia, and Mauritania). Since Hasanov and Senhadji (2008) last assessed CA norms for this region, the global financial crisis has unfolded and Saudi Arabia has become a member of the G-20 Mutual Assessment Process designed to address global external imbalances.

This empirical study of CA imbalances builds on past studies by: extending the sample set to embrace many more emerging and developing countries; the addition of several new influential fundamental determinants of the current account; and use of more recent data. The paper is organized as follows: Section II reviews the empirical literature on the determinants of CA imbalances. Section III calculates the steady-state CA position (or CA norm) for three subgroups

of economies (which include Middle Eastern countries) using augmented determinants, calculates the CA norms and their main contributors by subgroup, and tests in-sample and out-of-sample robustness. Finally, Section IV draws conclusions as to whether Middle Eastern CA imbalances are excessive, and identifies the most effective fundamentals to secure any needed adjustment.

II. SURVEY OF THE EMPIRICAL LITERATURE

Using large cross-country data sets, several studies have examined the determinants of the CA to find the CA level that may be considered "normal" for a country, based on a number of its structural and macroeconomic attributes—its economic fundamentals. These fundamentals often include the stage of development, demographic profile, government budget balance, and initial wealth. These studies incorporate intertemporal aspects of the balance of payments with dynamic saving and investment expectations, which play an important role in driving CA movements (Obstfeld and Rogoff 1995, 1996). Key studies focusing on *short run (SR) fluctuations of the CA* share the basic idea that the CA acts as a shock absorber in the face of temporary income shocks, helping to smooth consumption and maximize welfare. Hence, a country encountering a temporary negative TOT shock would smooth consumption by running a CA deficit and borrowing externally—undertaking *portfolio rebalancing*. The main papers in this category of analysis are: Ghosh (1995), Ghosh and Ostry (1995), Glick and Rogoff (1995), Nason and Rogers (1999), and Kraay and Ventura (2000, 2002).

Another group of studies employs reduced form models to focus on the *medium- to long-run (MLR) determinants of the CA* from an empirical perspective. It is this group that is of most relevance to the present study, and thus we follow their approach. In particular, Debelle and Faruqee (1996) and later the IMF's CGER (2006) and Lee *et al* (2008) empirically study the saving-investment perspective of the structural determinants of CA balances in industrial countries. Calderón *et al* (2002, 2007), Chinn and Prasad (2003), and Chinn and Ito (2007) extended this analysis to include developing countries. By and large, this group of studies employs dynamic panel data estimation techniques, with some drawing a distinction between the different SR versus MLR responses of the CA to key fundamentals. The latter is usually gauged from basic correlation analysis to draw out some stylized facts of CA balances with their fundamental regressors.[2] The main findings of this literature are in line with theory, with most regressors' displaying the expected signs (in the MLR), although with differing magnitudes or intensities across particular geographic regions.

The main findings of industrial and developing-country-based empirical studies can be summarized as follows (Table 1, columns 2–13):

- CA imbalances are significantly and strongly persistent (based on a lagged dependent variable);

[2] Definitions and descriptions of typical explanatory variables can be found in Appendix Table A.1.

Table 1. Determinants of the Current Account – Coefficients of the Empirical Literature

	Pooled or OLS estimation							GMM estimation 1/				
	CGER, IMF (2006)	Chinn & Prasad (2003) Full sample	Chinn & Prasad (2003) Developing	Chinn & Ito (2007)	Rahman (2008)	Lee *et al* (2008)	Christiansen *et al.* (2009)	Hasanov & Senhadji (2008) Oil exporters	Hasanov & Senhadji (2008) Oil importers	Morsy (2009)	Arezki *et al* (2009)	Bems and de Carvalho
Lagged dependent	0.37***	not reported	not reported	not reported	not reported	N/A	not reported	0.02	0.24	0.41***	0.13***	0.59**
Fiscal balance	0.19***	0.31***	0.26***	0.15**	0.39***	0.20***	0.24**	0.78***	0.40***	0.51**	0.58***	0.39**
Initial net foreign assets	0.02***	0.05***	0.04***	0.05***	0.04***	0.02***	-0.01	0.02***	0.06***	0.02	0.02***	
Relative income	0.02*	0.04	-0.1	0.03	0.03**	0.02*	0.1	0.15***		-0.01	0.05	0.07
Relative income squared		-0.02	0.27**	0.02								
Old age dependency	-0.12**	-0.05	-0.16	-0.21**	-0.14**	-0.14**	-0.27			-0.25**	-0.05	
Population growth	-1.03**				-0.79**	-1.12***	-1.63***	-0.88**	1.49	-0.55		
Young age dependency		-0.03	-0.06*	-0.06***		…						
GDP growth	-0.16**	-0.05		-0.15	-0.05	-0.21**	0.15		0.24	-0.04	-0.07	
Oil trade balance/price	0.17***				0.15***	0.23***	0.18	5.54***		0.35**		0.46***
Trade openness											-0.07**	
Oil exporting country dummy		0.02**	0.01	0.05***								
Oil wealth										0.0005**		
Degree of maturity in oil production										-0.28**		
Financial deepening		0.03**	0.04**	0.00								
Terms of trade (or its volatility)		0.02	0.03*	-0.01			0.02**		4.24		1.83	
REER									-7.74**		-1.50	
Capital controls in current account		0.01	0.01									
Capital controls in capital account		0.00	-0.01									
Financial center	0.03***				0.01	0.03***						
Banking crisis dummy	0.01				0.02***	0.01*						
Asian crisis dummy	0.04***				0.03***	0.06***						
FDI					-0.13*			-0.75***	-0.78***			
Remittance dummy					0.02***							
Long-term fiscal balance (calculated)								0.80***	0.53**	0.86***	0.67***	
Adjusted R-square	0.62	0.42	0.45	0.42	0.42	0.52	0.73					0.74
Number of observations		305	155	502	470		139	83	76	582	91	510
Sample countries	22 industrial & 32 developing	18 industrial & 71 developing	developing excluding Africa	19 industrial & 70 developing	21 industrial & 38 developing	22 industrial & 32 developing	134 LICs	13 oil exporters	15 oil importers	2 industrial oil exporters & 26 developing oil exporters	20 oil exporters	13 oil exporters & 51 others
Time period	1973-2004	1971-1995	1971-1995	1971-2004	1971-2006	1973-2004	1981-2005	1971-2006	1971-2006	1970-2006	1980-2007	1969-2007
Data	4-year average	5-year average	5-year average	5-year average	4-year average	4-year average	4-year average	4-year average	4-year average	4-year average	4-year average	4-year average

Note: *, ** and *** indicates statistical significance at 10, 5 and 1 percent levels respectively.

1/ Calderón *et al* also employ GMM estimation (but since their model has a different specification it is not directly comparable for the purpose of this table). See Appendix Table A.2 for details.

2/ Unlike other columns, Bems and de Carvalho Filho (2009) calculate the *non-oil* fiscal balance. Unreported coefficients are due to the fact that these are indistinguishable across oil exporter and importers.

- Higher fiscal balances significantly and strongly raise national savings, and thereby increase the CA balance—although this seems to have a lower impact when looked at in comparison to the average fiscal stance of trading partners, rather than a country's own fiscal position;
- Initial stocks of net foreign assets significantly and strongly increase the CA balance—from an intertemporal perspective a country that has a significant stock of net foreign liabilities (NFL) relative to its GDP would eventually have to run CA (or trade) surpluses, in order to reduce its liabilities or at least stabilize the NFL-to-GDP ratio;
- Neither relative income nor GDP growth generate higher deficits in developing countries, indicating weak evidence for the "stages of development" hypothesis on the CA balance;
- The larger the size of the dependent population (relative to the working-age population), the larger the CA deficit;
- The oil trade balance is significantly and positively linked to the CA deficit;
- Higher TOT volatility is weakly associated with larger CA surpluses for developing countries in the short run, but not for industrialized countries;
- There is a strong positive relationship between average output growth rates and CA balances in industrialized countries, but not in developing countries;
- Among developing countries, there is a negative relationship between openness and CA balances—indicating perhaps the capacity of more open economies to service external debt through foreign exchange earnings; and
- Financial deepening (usually proxied by the ratio of a monetary aggregate—such as M2—to GDP) does have a significant and robustly positive influence on the CA in developing countries but not in industrialized countries;

In addition, recent empirical studies have examined region-specific determinants of the CA. Calderón *et al* (2007) focus on emerging market economies (EMEs) and low-income countries (LICs) and find that there is a significant and positive relationship between the real effective exchange rate (REER) and CA deficits, in line with the predictions of standard open-economy models (such as Mundell-Fleming).[3] Hasanov and Senhadji (2008) also include the real effective exchange rate (REER) and TOT in their CA model for Middle-Eastern economies, and find these regressors to be significant only for non-oil economies (given the inclusion of an oil-price regressor for oil economies) (Table 1, columns 9 and 10). Broadly speaking, shocks that appreciate the REER are linked with higher CA deficits. Rahman (2008) pins down the larger CA deficits of emerging Europe through additional MLR determinants (foreign direct investment (FDI), remittances and a transition index) and SR fluctuations (cyclical position of the economy, prevailing exchange rate regime, and the competitiveness of the financial and export sectors) (Table 1, column 6). She finds that FDI

[3] See Appendix Table A.2 for details.

and the transition index—a proxy for the investment climate—significantly and negatively affect CA balances (through increased imports), while private remittances (larger than 5 percent of GDP) significantly and positively affect CA balances.[4] Christiansen *et al*. (2009) focus on additional fundamental determinants of LIC CA norms, such as the quality of policies and institutions, official external financing, and the role of shocks. They find that domestic financial liberalization is associated with higher CA balances and net foreign asset (NFA) positions, while capital account liberalization is associated with lower CA balances and NFA positions. Moreover, they find that negative exogenous shocks tend to raise (reduce) the CA balance in countries with closed (open) capital accounts, while foreign aid is progressively absorbed over time through net imports (Table 1, column 8). Imam (2008) examines CA adjustment of LIC microstates and finds unique features—namely that these countries typically run budget surpluses and CA deficits concurrently, and that the REER does not affect CA balances.

A few studies examine CA determinants for net oil exporters. Morsy (2009) reveals that the key fundamentals in determining the equilibrium CA are not only fiscal and oil balances, but also oil wealth, low age-dependency and the maturity of oil production (Table 1, column 11). Arezki and Hasanov (2009) find fiscal policies of oil-exporters to have a stronger effect on the CA relative to other economies (Table 1, column 12). Thomas and Bayoumi (2009) find that long-term wealth considerations and changes in the return on oil wealth (the non-oil CA balance) provide significant explanatory power. They also show that the private sector is considerably more forward-looking than the public sector in these economies, thus underscoring the importance of taking into account intertemporal decisions when analyzing movements in macroeconomic aggregates of most major oil-exporting countries. To better fit oil-exporters within the CGER framework and in response to the questions such as "are CA fluctuations in oil-exporting countries excessive and how should their real exchange rate respond to the evolution of external (and domestic) fundamentals?", a third study by Bems and de Carvalho Filho (2009a) proposes methodologies tailored to the specific features of oil-exporting countries that help address these questions. While they identify a strong link between the equilibrium real exchange rate—a price-based approach—and the TOT, the model has relatively limited explanatory power. They also define an empirical model of the CA norm—a quantity-based approach—which fits oil-exporting countries' data well (Table 1, column 13), and an intertemporal model—a balance sheet approach—that takes into account the stock of oil reserves[5] which provides a useful benchmark for oil exporters' external balances over the long run.

[4] Medina et al. (2010) find FDI to be broadly statistically insignificant but with the same impact on the current account regression under various specifications when applied to an emerging market country data set (which includes oil and non-oil exporters).

[5] Bems and de Carvalho Filho (2009a) also note that NFA estimates are severely hampered by the limited availability of the International Investment Positions (IIP) of some oil exporters, and suggest that including oil reserves could be a partial remedy.

III. ECONOMETRIC ESTIMATION

A. Methodology and Data

For the Middle East's relatively heterogeneous group of countries, Hasanov and Senhadji (2008) adapted the benchmark CGER's macroeconomic balance approach (Lee et al. 2008) to better fit the data constraints and economic characteristics of the countries concerned. While they found considerable overlap with the MLR determinants shown in the first five columns of Table 1, for non-oil-exporting economies, these yielded implausible CA norms. Therefore, they augmented the CGER's macroeconomic balance approach (IMF, 2006) for non-oil-exporting economies to include FDI, TOT and the REER as fundamental determinants of the CA balance. In what follows, we proceed to build on this work, along with that of Bems and de Carvalho Filho (2009a), Arezki and Hasanov (2009), and Morsy (2009), and further fine-tune the set of CA determinants (on the basis of the findings of the empirical literature surveyed above)[6] and more recent data from the IMF's *World Economic Outlook* (WEO) database.[7] Furthermore, a key innovation of this paper is to break down the Middle East and Central Asia Department's (MCD) countries into three subgroups which share common economic characteristics (for estimation and policy implication purposes): net oil exporters,[8] net oil-importing emerging-market economies (EMEs),[9] and low-income and fragile economies (LIFEs).[10] After we estimate these three models, we calculate CA norms using the regression coefficients and projected medium-term (2016) values of the explanatory variables to control for cyclical influences.

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[6] This approach builds on that of Hasanov and Senhadji (2008), where only MCD economies were included and the sample period ended at 2006. Moreover, several additional regressors—beyond those included by Hasanov and Senhadji (2008)—are included and others removed in our estimation.

[7] The econometric estimation of this study uses the IMF's Fall 2010 World Economic Outlook (WEO) data, while the calculation of Middle Eastern current account norms employs its Spring 2011 WEO vintage.

[8] Comprised of Algeria, Azerbaijan, Bahrain, Iran, Iraq, Kazakhstan, Kuwait, Libya, Oman, Qatar, Saudi Arabia, Turkmenistan, United Arab Emirates and Uzbekistan. Net oil exporters are those countries where oil production less consumption is positive as of end 2009. (Source: U.S. Energy Information Administration, http://www.eia.doe.gov/.) Note that Azerbaijan, Turkmenistan and Uzbekistan are included in this group despite being low-middle income countries. The rationale for their inclusion is that they are not only net-oil exporters but also that they share the net-oil exporter subgroup characteristics of having positive fiscal balances (in the steady state) and initial NFA positions. Neither Mauritania, Sudan nor Yemen share these characteristics.

[9] Comprised of Egypt, Jordan, Lebanon, Morocco, Syria and Tunisia. Net oil importers are those countries where oil consumption less production is positive as of end 2009. (Source: U.S. Energy Information Administration, http://www.eia.doe.gov/). These countries are all middle-income countries, and all but Syria form part of the Fund's Vulnerability Index (VEE).

[10] Comprised of Afghanistan, Armenia, Djibouti, Georgia, Mauritania, Kyrgyz Republic, Pakistan, Sudan, Tajikistan and Yemen. While Mauritania, Sudan and Yemen are oil exporters, their fiscal balances in the steady state are negative as were their initial NFA positions. Moreover, they are PRGT-eligible (low-income countries able to avail themselves of concessional Fund financing), hence their inclusion in this LIFE subgroup. It should be noted that since the estimation was carried out, Armenia and Georgia have been added to the VEE.

An equilibrium relationship between CA balances (as a share of GDP) and a set of fundamentals is estimated in levels, using an unbalanced panel dataset of annual frequency for 24 net oil-exporting economies, of which 13 are MCD economies; 39 net oil-importing EMEs, of which 6 are MCD economies; and 43 LIFEs, of which 10 are MCD economies. The IMF's CGER methodology specifies that these explanatory variables should be expressed as deviations from the weighted average of each country's trading partners, thus imposing global consistency. However, Hasanov and Senhadji (2008), argue that this specification is less tractable at the forecasting stage and while subject to multilateral inconsistency, nonetheless employ it and contrast it with the specification in levels. They find broadly similar results that support the use of CA equations in levels for assessing the extent of CA misalignment. Moreover, an application of the methodology of Bems and de Carvalho Filho (2009a)—which incorporates multilateral consistency—for a few oil-exporting countries yielded very small modifications to estimated norms.[11]

The time span of estimation (1989–2009) was chosen to minimize structural breaks—for many MCD economies, the past two decades have yielded appreciably more diverse economic structures (relative to prior decades). The large sample of countries with similar economic characteristics is expected to deliver more reliable estimates of the equilibrium relationship between the CA balance and the CGER-augmented set of macroeconomic fundamentals, tailored to three sub-groups:

- The 24 **net oil exporters** included in this study are: *Algeria*, Angola‡*, *Azerbaijan*‡, *Bahrain*, Colombia, Republic of Congo‡*, Ecuador, Equatorial Guinea‡, Gabon, Indonesia, *Iran*, *Kazakhstan*, *Kuwait*,[12] *Libya*, Mexico, Nigeria‡, *Oman*, *Qatar*, Russia, *Saudi Arabia*, Trinidad and Tobago, *Turkmenistan*‡, *United Arab Emirates*, *Uzbekistan*‡, and Venezuela.[13]
- The 39 **net oil-importer EMEs** included are: Argentina, Bosnia & Herzegovina*, Brazil, Bulgaria, Chile, China, Costa Rica, Croatia, Czech Republic, Dominican Republic, *Egypt*, El Salvador, Estonia, Guatemala, Hungary, India, Israel, Jamaica, *Jordan*, Latvia, *Lebanon*, Lithuania, Malaysia, *Morocco*, Panama, Peru, Philippines, Poland, Romania, Serbia, Slovak Republic, Sri Lanka, *Syria*, Thailand, *Tunisia*, Turkey, Ukraine, Uruguay and Vietnam.[14]

[11] Results of this application are available upon request.

[12] Observations for Kuwait during the Gulf War (1990–92) were removed.

[13] As explained in footnote 8, a net oil-exporter is defined as a positive oil production-less-consumption position. The subgroup includes all net oil-exporting countries except for Norway (since it is an advanced economy (WEO definition)) and Iraq (for which there are no appropriate data). Note that ‡ denotes a LIC and * denotes a fragile economy. MCD countries are listed in italics.

[14] These 39 countries were all part of the IMF's VEE October 2009 vintage, which comprised 50 countries. The remainder (11 countries) were either net oil-exporters (Algeria, Colombia, Ecuador, Indonesia, Mexico and Venezuela) or advanced economies (Korea, Iceland and South Africa) or LICs (Armenia and Pakistan) and were thus excluded. Syria was added to this group because it is a middle-income country and thus not eligible for PRGT assistance. Note that * denotes a fragile economy. MCD countries are listed in italics.

- The 43 **LIFEs** included are: Albania, *Afghanistan**, *Armenia,* Bangladesh, Bhutan, Bolivia, Cambodia, *Djibouti**, Dominica, Eastern Caribbean Currency Union, El Salvador, *Georgia*,* Grenada, Guatemala, Guyana, Haiti***, Honduras, Kiribati***, *Kyrgyz Republic*, Lao PDR, the Maldives, *Mauritania*, Moldova, Myanmar***, Nepal***, Nicaragua, North Korea, *Pakistan*, Palau, Panama, Papua New Guinea***, Samoa, Solomon Islands***, Sri Lanka, St. Lucia, St.Vincent and The Grenadines, *Sudan**, Suriname, *Tajikistan**, Timor Leste***, Tonga***, Vietnam, and *Yemen**.[15] [16]

Debelle and Faruqee (1996), Chinn and Prasad (2003), and Rahman (2008) employed pooled OLS and fixed-effects techniques to estimate the equilibrium CA balance (Table 1, first six columns). However, pooled OLS and fixed-effects estimations assume strict exogeneity of explanatory variables, which entails that the error terms are presumed to be uncorrelated with all past and future values of the regressors. This assumption is rather strong and unlikely to hold. Alternatively, and as noted in other studies—Calderón *et al* (2007), Hasanov and Senhadji (2008), Arzeki and Hasanov (2009), and Morsy (2009)—generalized method of moments' (GMM) estimation controls for potential endogeneity of the regressors in a dynamic panel setting. Moreover, individual country and panel unit root tests reveal that cointegration methods for either micro-dynamic panels or Pedroni-type macro-dynamic panels are not appropriate because the CA balance (in percent of GDP) is a stationary series for all countries during the sample period.

Following other cited studies, this paper applies the GMM-IV system estimator of Blundell and Bond (1998), which uses additional moment conditions as follows to explain equilibrium movements in the CA balance:

$$ca_{it} = \propto_0 + \propto_1 ca_{it-1} + \beta X_{it} + \mu_i + \varepsilon_{it} \qquad (1)$$

where ca_{it} is the CA to GDP ratio for country *i* at time *t*; X_{it} is a vector of explanatory variables or regressors as specified below; and μ_i is the country fixed effect. We also experiment with dropping the lagged current account ($\propto_1 ca_{it-1}$), following the CGER

[15] There were 86 PRGT-eligible countries as of end 2009. To work with a smaller sample, we exclude all African LICs. (However, as shown in Table 2.B, last two columns, we offer an alternative specification for this subgroup's CA regression which "tops up" the sample with an additional 24 African LICs (selected by a random draw). These are: Benin, Burkina Faso, Cameroon, Chad, Democratic Republic of Congo, Cote d'Ivoire, Ethiopia, The Gambia, Ghana, Guinea, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Rwanda, Senegal, Sierra Leone, Swaziland, Tanzania, Togo and Uganda.) Of those remaining, 14 are MCD countries. Three of these were excluded as being net oil exporters (Azerbaijan, Turkmenistan and Uzbekistan)—with fundamentals (i.e. fiscal balances and initial NFA positions) which better fit this paper's net oil-exporter subgroup—and one was excluded for lack of data (Somalia). MCD countries are listed in italics.

[16] A "fragile economy" is denoted by $*$, as defined by the Fragile and Conflict-Affected Countries Group (OPCFC), World Bank. A "fragile economy" has either: (i) a harmonized CPIA country rating of 3.2 of less; or (ii) the presence of a UN and/or regional peacekeeping or peace-building mission during the past three years. This paper's LIFE subgroup includes 16 (out of a total of 37) fragile economies—see "Harmonized List of Fragile Situations FY10", World Bank. Kosovo and Somalia are excluded here due to lack of data.

(IMF, 2008). Equation (1) is differenced to remove country fixed effects and the instruments are used as lagged levels of regressors,[17] yielding:

$$ca_{it} - ca_{it-1} = \propto_1 (ca_{it-1} - ca_{it-2}) + \beta(X_{it} - X_{it-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (2)$$

The moment conditions arising from equation (2) are:

$$E[(\varepsilon_{it} - \varepsilon_{it-1})z_{it-1}] = 0 \quad (3)$$

where z_{it-1} is the instrument set of lagged levels regressors. The Hansen *J*-test of overriding restrictions is employed to test the overall validity of these instruments in the estimation.

These equations in levels have a weak assumption that the country fixed-effects are uncorrelated with differenced regressors, amounting to a restriction on initial conditions, as follows:

$$E[(\mu_i + \varepsilon_{it})\Delta z_{it-1}] = 0 \quad (4)$$

Now the estimated equation is specified in levels but the instruments, which are lagged levels of the regressors, are differenced.[18] The instruments employed are a subset of the regressors lagged one period, with the exception of the REER which has two lags.[19]

Core CGER variables (plus two)

Building upon the work undertaken in recent empirical studies (as described above in Section II), the following core CGER variables are common across all subgroups:

Fiscal balance. In the absence of full Ricardian equivalence, a higher government budget balance raises national saving and increases the CA balance. The impact of the fiscal balance on the CA balance would depend on the degree of liquidity constraints the private sector faces in an economy. A country with a more developed financial system and fewer constraints would allow for a higher private-sector savings offset, hence lowering the impact

[17] We extracted the country fixed effects from the constants and regressed these on the residuals for the oil exporters and found no significant coefficients.

[18] See Bond *et al* (2001) for a discussion of why the GMM-IV system has better small-sample properties in the presence of persistent regressors. See also Pedroni and Urbain (2006) for a critique of micro-panel techniques, including GMM, due to problems arising in the analysis of data that are potentially heterogeneous across members of the panel. In particular, correcting for endogeneity—induced by latent heterogeneity—leads to inconsistency of the estimated coefficients in typical panels with large *N* (number of countries) and small *T* (number of years). We believe that this critique does not apply to this study, given its large *T* and stationary series.

[19] The number of instruments varies for each regression. See Table 2.A and 2.B. The main effect of additional instruments was a higher Hansen *J*-test *p*-value (in the order of 0.78 to 1.0) throughout all specifications. Collapsing the instruments into one vector yielded much more reasonable *p*-values (ranging between 0.46 and 0.89). We experimented with adding a time effect, but the impact of this specification was a larger constant, with little else varying.

of the fiscal balance on the CA balance. The variable is captured by the general government balance (excluding grants) expressed as a share of GDP. Following Bems and de Carvalho Filho (2009a), in order to separate the effects of oil revenues and fiscal policy conduct on the current account of net oil exporters, the relevant fiscal variable for this subgroup is the non-oil fiscal balance. (Data sources: IMF's IFS and WEO databases).[20]

Demographics. A higher share of economically inactive (i.e. dependent) population reduces national saving and decreases the CA balance. Two variables are used to capture dependency: (i) population growth, which affects the young-age dependency; and (ii) population older than 65 years as a ratio of economically active population (ages 30-64), which reflects old-age dependency. (Data sources: World Bank's WDI and IMF's WEO databases).

Net foreign assets (NFA). The level of NFA or wealth of a nation can affect the CA balance in two opposite ways. On one hand, economies with higher NFA can afford to run lower trade balances without jeopardizing their solvency. On the other hand, higher NFA implies higher net foreign income flows from abroad. The impact on the CA balance would depend on the relative importance of these two effects, and empirical studies tend to find in favor of the latter. The variable is measured as the stock of foreign assets net of liabilities (including external debt) relative to GDP. To avoid any reverse link with the CA balance, its value is taken at the beginning of each period (i.e. lagged one period). (Data source: WEO database).

Oil trade balance. Higher oil prices increase the CA balance of oil exporters and decrease the balance of oil importers, all else held constant. The variable used here is oil trade balance as a share of GDP. (Data sources: IFS and WEO databases).

Economic growth. Among countries at a similar stage of development, stronger growth is likely to lower CA balances if faster growth relies on foreign-financed investment or if current higher growth is perceived to be of a permanent nature, with a likely negative impact on savings. This variable is measured as real per capita GDP growth. (Data sources: IFS and WEO databases).

Relative per capita income. Relatively poor countries are expected to import capital (both physical and financial) for domestic investment, which tilts to exporting capital with rising income. The variable is calculated as income per capita relative to the United States in purchasing power parity terms. (Data sources: IFS and WEO databases).

Crisis and financial center dummies. Financial crises can have sharp contractionary effects on CA balances due to the drop in output as well as reduction in access to financing. Two separate time dummies are used to capture the Asian financial crisis (1997–98) and the current global turmoil (2007–10). Episodes of banking crisis in individual countries (Laeven

[20] Bems and de Carvalho Filho (2009a) argue that it is crucial to use the fiscal balance net of oil revenues (i.e. the non-oil fiscal balance) because the overall fiscal balance is highly correlated with the oil balance. While we follow this approach under our specifications II-IV, we do not under specification I, but rather drop the oil trade balance all together, following Hasanov and Senhadji 2008 (see Section III.B below).

and Valencia, 2008) are also controlled for. Financial centers tend to run large CA surpluses and have net creditor positions (IMF, 2006).

First-order lagged dependent variable. Following IMF (2008), Hasanov and Senhadji (2008), Arezki and Hasanov (2009), and Morsy (2009), the first-order lagged dependent variable is also included in some specifications of the empirical model for two reasons as noted in Arezeki and Hasanov (2009). First, habit formation in the consumption and saving behavior of countries would suggest some inertia or persistence in the lagged dependent variable. Second, the existence of serial correlation if the specification is static or if there is persistence of omitted variables would also suggest the need to use a lagged dependent variable (or a dynamic specification). Since we use a dynamic specification by virtue of the instruments, omitted variables would be our main concern. Therefore, when NFA or the proxy for unreported IIP are included, the lagged current account is not, which is consistent with Lee et al (2008), who remove the lagged dependent variable in specifications which include NFA.

Terms of trade (TOT). While this is not a core-CGER variable for the macroeconomic balance approach—since it is a "price-based" fundamental employed to estimate imbalances via the equilibrium real exchange rate approach—TOT account for both export and import prices and thus are an important determinant of the CA. Positive TOT shocks, all else held constant, would improve the CA (Calderón *et al*, 2007; Hasanov and Senhadji, 2008). However, a key theoretical implication of the intertemporal approach to the determination of the CA is that the response of the CA to TOT shocks depends on the persistence of such shocks. The greater the persistence, the more dominant is the investment effect (relative to the saving effect), leading the CA to move in the opposite direction (Kent and Cashin, 2003).

The real effective exchange rate (REER). While this is also not a core-CGER variable[21]—as it is another "price-based" fundamental employed to estimate imbalances via the equilibrium real exchange rate approach—both theory and developing country empirical studies suggest that depreciation of the REER will make exports more attractive (by making them cheaper for foreigners) and imports less attractive (by making them more expensive to residents). The overall effect on the trade balance depends on the relative size of the import and export volume elasticities, assuming full pass-through of the exchange rate to relative prices (Calderón *et al*, 2007; Hasanov and Senhadji, 2008).

The REER can also be insignificant and small for price-taking gross exporters of primary commodities (including small oil economies), because they tend to have inelastic demand for imports (fuel, food, and capital goods). Imam (2008) finds this to be the case for microstates. In contrast, Hasanov and Senhadji (2008) find the REER effect to be large and significant for non-oil-exporting Middle Eastern economies, but small and insignificant for oil-exporting economies.[22]

[21] Indeed the REER is not considered a CA norm fundamental, as in theory it is an endogenous variable.

[22] The REER is not considered a fundamental determinant of net oil-exporters' CAs. Nevertheless, it was added to some regression specifications and indeed was statistically insignificant for net oil-exporters (a finding

(continued)

When the REER is small and insignificant, the implication would be that exchange rate policy is an ineffective external adjustment tool, thus violating the Marshall-Lerner condition—which states that when imports and exports are elastic, changing the exchange rate can lead to large changes in the trade balance.[23] If this is the case, a flexible exchange rate would not help absorb shocks because there is virtually no ability to substitute imports with domestically-produced inputs.[24] Thus, after devaluation, import prices rise and there is no substitution effect, only an income effect. Often, because these tradables are inputs to the production of nontradables, domestic inflation rises as well, in extreme cases triggering an inflation spiral. In larger and more diversified economies—such as the EMEs subgroup of this study—producers using foreign inputs will replace them with domestically-produced inputs, so inflation does not rise with currency depreciation. Unlike LIFEs, these developing economies would likely benefit from a flexible exchange rate, given that it acts as a shock absorber (Imam, 2008). The REER measure used here is an index of the natural logarithm of the REER. (Data sources: IMF's INS and IFS.)

Other augmented variables[25]

As noted in the more recent empirical literature, in addition to the above "core-CGER plus two" variables, there is a need to augment the specification to better capture the fundamentals of the CA of certain regions or countries with similar economic structures.

The following set (X_{it}) of explanatory variables are expected to better underpin CA fundamentals of the **"net oil exporters" subgroup:**

Oil (and gas) wealth. For many oil exporters, oil (and gas) wealth far surpasses their current NFA. This is particularly true for countries with large oil reserves (such as Saudi Arabia), and countries at an early stage of oil (and gas) production (such as Kazakhstan), where NFA is negative partly owing to large infrastructural imports. The variable is constructed as the remaining proven oil reserves at each year, valued at the oil price of the relevant year, and is

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similar to Hasanov and Senhadji, 2008). See IMF (2008), Khan (2009), and IMF (2010) for a discussion of exchange rate policy options for Gulf Cooperation Council net oil-exporters.

[23] It could be argued that for oil-exporting economies, the sufficient condition for the Marshall-Lerner condition to be valid is that the REER elasticity of import demand be positive (i.e. that imports be higher when the domestic currency is more appreciated).

[24] In contrast, Cashin and McDermott (2003) measure income and substitution effects of transitory TOT shocks for five industrial countries. They find that these shocks do induce large substitution effects.

[25] The objective is to estimate medium- to long-run determinants of the CA, rather than short-run cyclical deviations of the CA position from equilibrium. If we were interested in the latter, and in examining how actual CA norms vary from estimated norms, we would need to fine-tune our estimation results to address cyclical factors (such as the output gap), country specific shocks, structural factors that have an impact on export capacity, and economic policy (such as the efficiency of the financial sector and its regulation). To abstract from (noisy) cyclical fluctuations of the explanatory variables, we experimented with: (i) the MacDonald and Ricci (2003) approach of applying a smoothing technique—the Hodrick Prescott (HP) filter; and (ii) taking a four-year moving average to approximate the CGER approach. We found that both approaches yielded very similar results.

measured relative to GDP. The expected sign of this regressor would be negative—a country with a higher oil (and gas) wealth can afford to run higher CA deficits or smaller surpluses and remain solvent. In the empirical model here, the variable is lagged one period, in order to avoid endogeneity problems with the CA (Morsy, 2009; and Bems and de Carvalho Filho, 2009a).[26] (Data source: BP *Statistical Bulletin*, 2010.)

Degree of maturity in oil production. The degree of maturity in oil production influences the CA. For example, a new oil producer would have higher oil infrastructure investments and import needs, and would consequently have a less favorable CA balance relative to a well-established oil producer. That is, established producers might have higher surpluses because they do not need to invest as much. Moreover, a country that has been producing oil for many decades would have accumulated more financial wealth—as measured by its International Investment Position (IIP)—and thus be able to run lower CA surpluses or even CA deficits.[27] Hence, the sign of the variable would be ambiguous, depending on which effect dominates. As a proxy for this underreported IIP data, we employ the number of oil production years after first reaching the production level of 200 thousand barrels or more a day (Morsy, 2009), and this production is valued at WEO oil prices. (Data source: BP *Statistical Bulletin*, 2010 and WEO databases.)[28]

The following set (X_{it}) of explanatory variables are expected to better underpin CA fundamentals of *both* the **"net oil-importer EMEs" and "LIFEs" subgroups:**

Private remittances dummy. For certain developing countries, workers' remittances and compensation provide a significant source of income, which can be either saved or spent. To account for that and minimize interaction with the dependent variable, a dummy variable is included for countries where annual remittance inflows are positive as a ratio of GDP. Rahman (2008) employs a similar dummy when these flows exceed 5 percent of GDP. (Data source: WDI and WEO databases).

Foreign Direct Investment (FDI). Increased FDI often signals improvement in the investment climate of the receiving country. It also provides for a more stable source of financing CA deficits in such countries, as often a country's ability to run deficits is restricted by the availability of external financing. Higher FDI also tends to affect the CA balance also through increased imports. For these reasons, a negative relationship between FDI inflows and the CA balance is expected. Prior to the recent crisis in Eastern Europe, large deficits

[26] While Bems and de Carvalho Filho (2009a) include oil and gas wealth as a "stock" in their balance sheet (external sustainability) approach, they do not extract the "flow" component for their quantity (macroeconomic balance) approach.

[27] However, as noted in Bems and de Carvalho Filho (2009a), "only a few oil-exporting countries publish their IIP (and typically for only a few recent years), and lack of data severely hampers estimation of NFA positions for those countries that do not publish official estimates."

[28] We neither gross up these extracted oil reserves by their rate of return (to reflect their conversion to financial assets) nor do we discount future wealth. The latter is also due to the very short projection horizon (2010-16) of the macroeconomic balance approach, which is unlike the external sustainability approach. We assume 20 percent of extracted oil reserves are saved.

were generally not considered excessive—often because of stable Western European FDI financing. Since then, it is becoming increasingly recognized that FDI implies net external liabilities accumulation and thus merits CA savings. Moreover, the impact of FDI on the CA should be already captured by other fundamentals (such as higher economic growth, and larger NFA accumulation). The coefficient is likely to depend on the import content of FDI and whether FDI increases investment or acquires existing capital stock (see Calderón *et al*, 2007; Hasanov and Senhadji, 2008; Rahman, 2008; and Pineda *et al*, 2009). The variable included here is direct investment in the reporting country as a share of GDP, lagged one period. (Data source: Haver Analytics, WDI and WEO databases).

Foreign aid. For many developing countries, CA deficits significantly improve with persistent aid inflows and net of this variable, arguably, countries could run larger deficits, or at least deficits that are financed with some predictability. Thus, a negative relationship between external aid flows and the CA balance is expected. This regressor is proxied by official current transfers as a share of GDP (Calderón *et al*, 2007; Imam, 2008). (Data source: WDI and WEO databases).

The following set (X_{it}) of explanatory variables are experimented with to better underpin CA fundamentals of the **"net oil-importer EMEs" subgroup alone:**

Transition dummies. A transition dummy is used to capture EU accession, which is expected to lower the CA balance through increased domestic absorption, and so raise divergence from the CA norm (Rahman, 2008).

Investment climate. Following Rahman (2008) we search for a proxy for the investment climate, and employ the World Bank's Doing Business Index, which measures the regulatory environment conducive to the operation of both foreign and domestic businesses. The index averages percentile rankings on ten topics—Starting a Business, Dealing with Construction Permits, Employing Workers, Registering Property, Getting Credit, Protecting Investors, Paying Taxes, Trading Across Borders, Enforcing Contracts, and Closing a Business—giving equal weight to each indicator. Although Rahman (2008) finds a negative and strong impact on the CA balance, the impact on the CA could be ambiguous—as more investment could either deteriorate or improve the CA depending on whether it finances more tradables or nontradables. (Data source: World Bank's Doing Business Index, WDI—available from 2004 onward).

Asset price proxies. Two additional regressors should allow us to shed light on the nontradable versus tradable components of the CA. The rationale is that "sustainable" CA deficits that do not require adjustment of domestic absorption would favor financing the latter (tradables), otherwise they could lead to REER appreciation and the creation of domestic asset price bubbles. Aizenman and Jinjarak (2008) find a robust and strong negative relationship between CA balances and the appreciation of asset prices (both real estate and stock market) in industrialized economies, but a weaker pattern in EMEs. Therefore, we expect the sign of the two asset price proxies below to be ambiguous; a positive sign would improve the CA through a wealth effect (and higher consumption), but a negative sign could imply that asset prices deteriorate the CA because of higher importation and the substitution effects of asset ownership from residents towards non-residents.

- *Real house or rental index.* Using the available house price or CPI rental index, deflated by the CPI, partially captures asset price appreciation fueled by capital inflows and financial liberalization. We take the one period lagged value of the natural logarithm of the real growth rate, and also square the regressor to capture any nonlinear behavior due to cyclicality. (Data source: Beidas-Strom *et al*, 2009; Haver Analytics).

- *Stock market index*. Developments in equity markets provide a picture of investor expectations, and data are readily available. We deflate the equity index by CPI and lag it one period. The evolution of EME stock markets since 1991 has trended upwards, with the exception of crisis periods. We take the natural logarithm of the real growth rate and also square the regressor to capture any nonlinear behavior due to cyclicality. (Data source: Haver Analytics).

B. Estimation Results

The estimated coefficients of the determinants of CA balances are, in general, statistically and economically significant, demonstrating their expected signs, with a few exceptions.[29]

Net oil exporters

Four specifications were estimated (see Table 2.A):

- Specification I excludes the oil trade balance but includes the lagged dependent variable and initial NFA (consistent with Hasanov and Senhadji, 2008, but not the CGER for the former).[30]
- Specification II excludes the lagged dependent variable, includes the oil trade balance (both consistent with CGER) and the non-oil fiscal deficit (rather than the overall fiscal deficit) and excludes initial NFA[31] (consistent with Bems and de Carvalho Filho, 2009a). In addition, oil and gas reserves under the ground (oil wealth hereafter) is included. This specification is suitable for oil economies which report a complete unified NFA series (i.e. do not withhold NFA data separately held by sovereign wealth funds (SWFs)).

- Specification III is identical to Specification II, except that it excludes NFA and adds the proxy for underreported IIP. This specification is suitable for oil economies which do not report NFA held by SWFs.

[29] See Appendix Table A.3 for more details.

[30] This specification aims to replicate that of Hasanov and Senhadji (2008) with our data set, as these results were widely used in the Middle East and Central Asia Department during 2009-10.

[31] While Bems and de Carvalho Filho (2009a) do include initial NFA in their regression for their oil economies subgroup, its sign switches to negative and is statistically insignificant. Since we include oil and gas reserves and a proxy for underreported NFA and IIP, as well as the lagged dependent variable, including initial NFA here (in specifications III and IV) could slightly overestimate the regressor's impact on the CA norm. Indeed this was carried out and the coefficient was found to be small, insignificant and negative.

- Specification IV is identical to Specification III, except that it includes the lagged dependent variable. This specification is also suitable for oil economies which do not report NFA held by SWFs.

The main results are as follows:

CA persistence (measured by the lagged CA) indicates a moderate speed of adjustment (coefficient ranges between 0.33 and 0.38) and mean reversion of the CA—implying that the half-life of transitory shocks to the CA is about 2.4 to 2.8 years.[32]

- Fiscal balance and non-oil fiscal balance emerge as highly influential CA fundamentals (coefficient is 0.36 to 0.85, respectively). This suggests that a 1 percentage point improvement in the fiscal balance ratio is associated with a 0.4 to 0.9 percentage point of GDP increase in the CA balance of net oil exporters, respectively.
- The CA balance responds positively to the inclusion of the oil balance as a regressor, consistent with past studies and the notion that, because oil is an exhaustible natural resource, the propensity to save out of an oil price windfall is higher. The coefficient implies that a 1 percentage point improvement in the oil balance ratio is associated with an increase in the medium-term CA balance by about 0.5 percentage points of GDP and vice versa—a negative oil price shock would decrease the CA surplus and imply adjustment costs to consumption and investment decisions.

[32] The half-life is computed as log (0.5)/log (β), where β is the coefficient estimate of the lagged dependent variable (Rogoff 1996). This is then multiplied by four because the time dimension of the regression is four years per observation.

Table 2.A Current Account---GMM Estimation and Implied Norms: Net Oil Exporters
(Dependent variable: Current account balance, as a share of GDP)

	Specification I		Specification II		Specification III		Specification IV	
	GMM coefficients	Contribution to CA norm 6/	GMM coefficients	Contribution to CA norm 6/	GMM coefficients	Contribution to CA norm 6/	GMM coefficients	Contribution to CA norm 6/
Core CGER Regressors 1/								
Constant	0.039	3.92%	0.035	3.50%	0.043	4.30%	0.044	4.40%
Lagged dependent	0.330	4.09%					0.383	4.74%
Fiscal balance/GDP 2/	0.851	5.22%	0.385	-5.50%	0.363	-5.18%	0.391	-5.58%
Oil trade balance/GDP			0.454	13.50%	0.469	13.95%	0.459	13.65%
Old age dependency 3/	-0.053	-0.29%	-0.059	-0.32%	-0.034	-0.19%	-0.034	-0.19%
Population growth	-0.693	-1.31%	-0.930	-1.75%	-0.632	-1.19%	-0.589	-1.11%
NFA/GDP	0.023	0.36%	0.022	0.35%				
Relative income	-0.017	-0.95%	0.044	2.43%	0.071	3.96%	0.073	4.07%
Economic growth	-0.053	-0.21%	-0.069	-0.27%	-0.064	-0.25%	-0.056	-0.22%
Net Oil-Exporter Specific Regressors								
Oil wealth 4/			0.0002	0.37%	0.0006	1.11%	-0.0004	-0.74%
Degree of maturity in oil production					0.1601	2.02%	-0.1701	-2.15%
Additional Regressors								
REER 5/	0.073	0.58%						
Terms of trade	4.269	0.21%						
Estimated Current Account Norm (2016)		**11.62%**		**12.31%**		**18.53%**		**16.88%**
Underlying Current Account (2016)		*13.20%*						
Hansen's J test of overidentifying restrictions		0.46		0.61		0.64		0.62
Arellano-Bond test for AR(1)		0.07		0.09		0.07		0.08
Arellano-Bond test for AR(2)		0.67		0.71		0.7		0.69
Number of instruments		6		5		5		6
Number of countries		24		24		24		24
Observations (4-year non-overlapping average)		82		82		82		82

1/ Based on annual data from 1989-2009 from the WEO database Autumn 2010 vintage, 4-year non-overlapping averages. Projections are from the WEO Spring 2011 database. Unreported core-CGER regressors (which are available upon request) were small, positive and significant (between 0.00-0.005), thus contributing marginally to the estimated norm. The level of significance of each regressor is reported in Appendix Table A.3. We ran these specifications with time effects. The result was larger constant terms, with little else varying. Higher order-lags/instruments did not yield tangible benefits or significantly alter the coefficients.

2/ The full fiscal balance is enmployed for specification I, while the non-oil fiscal balance is used for specifications II, III and IV.

3/ There is no 2016 projection for old age-dependency, and therefore 2009 (latest available) is used.

4/ In the absence of projections on oil and gas reserves, reserves are held constant (i.e. no new discoveries and no depletion) from end 2009 onward.

5/ In the absence of projections, REER growth is set to the 2000-09 annual average.

6/ Contribution to CA norm=coefficient*medium-term projection/steady state value (in percent).

- The effects of demographics are most appreciably felt for net oil-exporting countries, where the population is relatively young and old-age-dependency ratios are low, reducing the norm surplus for net oil-exporters (but this is not the case for the two other subgroups).
- When the lagged dependent is dropped from the regression and NFA is included, the NFA coefficient is small and positive for this subgroup. This could be due to the existence of sovereign wealth funds. Given how small it is, most studies either drop it (IMF 2008) or include it along with the lagged dependent.
- An interesting finding is that relative income can switch signs and statistical significance across specifications—from a negative sign which is statistically insignificant, to a positive sign which is statistically significant. As found and explained by Bems and de Carvalho Filho (2009a), this could be due to the high correlation between high-income oil economies and a larger share of future income from volatile exhaustible oil resources, leading to larger precautionary savings and thus CA balances.[33]
- The oil and gas reserves under the ground or *oil wealth* variable has a statistically significant but small impact on the CA balance switching from a negative to a positive impact with the removal of the lagged current account (coefficient of -0.004 to 0.0006). When the lagged current account is included in the regression, the results imply that economies with rich oil and gas reserves, everything else held constant can run larger CA deficits or lower surpluses. This result is close to those estimated by Morsy (2009).
- When the lagged current account is included in the regression, the degree of maturity in oil production has a negative influence on the CA balance. The coefficient of -0.17 suggests that, all else constant, a country that has been producing oil for 10 years after having reached the production level of 200,000 barrels or more a day, will have on average a CA balance that is 1.7 percentage points of GDP lower. This is within the range estimated by Morsy (2009). When the lagged dependent variable is dropped from the regression, like the oil wealth variable above, the degree of maturity in oil production has a positive influence on the CA balance.
- The inclusion of price-based regressors yields mixed results. Similar to Hasanov and Senhadji (2008), we find that the REER does not demonstrate the expected (negative) sign, nor is it statistically significant for this subgroup of net oil exporters.[34] The coefficient suggests that a 1 percent increase in the REER is related to only a 0.07 percentage point increase in the CA balance (as a share of GDP). The terms of trade impact on the CA is strongest for this subgroup, implying that a 1 percent increase in TOT would increase the CA balance by 4.3 percentage points of GDP.

[33] Note that these norms do not capture the precautionary savings motive, which would lead to larger norms, all else being equal (Bems and de Carvalho Filho, 2009b), or leave norms of economies with adequate NFA positions relatively unchanged (Sandri, 2011).

[34] While this result is also consistent with Arezki and Hasanov's (2009) GMM-estimated REER coefficient for oil exporters (which include advanced economy oil exporters), it is inconsistent with their fixed effects and pooled OLS estimates.

Finally, in all four regressions, the Hansen and second-order serial correlation test statistics, which examine the validity of the internal instruments used, are in line with conventional significance levels.

Emerging market net oil-importer economies

Two models are presented. Specification I (Table 2.B, first unshaded column), does not include asset price and investment climate regressors; while specification II (Table 2.B, second unshaded column) does and also removes non-core-CGER regressors such as FDI and the REER and TOT.[35] Key results are:

- The fiscal balance is an important (but much less so than other subgroups) CA fundamental, perhaps reflecting an increased level of financial market development in these economies, which relaxes the consumption-smoothing budget constraint from public savings decisions and thus the overall economy. The coefficient estimate suggests that a 1 percentage point improvement in the fiscal balance ratio is associated with a 0.14 to 0.21 percentage point of GDP increase in the CA balance for EMEs (relatively small when compared with the coefficient of 0.4 to 0.8 for net oil exporters or 0.2 to 0.5 for LIFEs).
- The CA balance responds positively to the oil balance, although less than other subgroups. The estimated coefficient implies that a 1 percentage point improvement in the oil balance ratio is associated with an increase in the medium-term CA balance of 0.21 to 0.32 percentage points of GDP.
- The effect of relatively higher population growth (compared to other subgroups) improves the CA norm deficit for EMEs, however relatively higher old-age dependency (compared to net oil exporters) deteriorates the CA norm (by increasing the deficit). This regression result could be due to the inclusion of many Eastern European EMEs in this subsample.
- Similar to other empirical studies, the NFA coefficient is positive but small, albeit larger than that for the net oil-exporter subgroup.

[35]We also experimented with dropping NFA and including the lagged CA to measure the latter's persistence. We found it to be stronger in EMEs (coefficient is 0.59 to 0.61) compared to that of net-oil exporters, implying that the half-life of transitory shocks on the CA deficit is relatively slow at about 5.2 years. This indicates low mean reversion (of the CA) and a slower speed of adjustment.

Table 2.B Current Account---GMM Estimation and Implied Norms: EMEs and LIFEs
(Dependent variable: Current account balance, as a share of GDP)

	Emerging-Market Net-Oil Importer Economies				LICs and Fragile Economies					
	Specification I		Specification II		Specification I		Specification II		Specification III	
	GMM coefficients	Contribution to CA norm 6/	GMM coefficients	Contribution to CA norm 6/	GMM coefficients	Contribution to CA norm 6/	Christiansen *et al*. (2009) coefficients 7/	Contribution to CA norm 6/	GMM coefficients 8/	Contribution to CA norm 6/
Core CGER Regressors 1/										
Constant	-0.016	-1.60%	-0.021	-1.63%	-0.020	-2.00%	-0.020	-2.00%	-0.018	-1.80%
Fiscal balance/GDP	0.140	-0.74%	0.213	-1.12%	0.530	-1.75%	0.243	-0.80%	0.421	-1.39%
Oil trade balance/GDP	0.210	-1.17%	0.321	-1.79%	0.230	-2.25%	0.182	-1.78%	0.178	-1.74%
Old age dependency 2/	-0.012	-0.09%	-0.012	-0.09%	-0.006	-0.05%	-0.267	-2.32%	-0.004	-0.03%
Population growth	1.210	2.03%	1.211	2.03%	0.310	0.59%	-1.628	-3.11%	0.281	0.54%
NFA/GDP	0.040	-0.02%	0.036	-0.02%	0.035	-0.77%	-0.010	0.23%	0.023	-0.50%
Relative income	0.040	0.71%	0.041	0.73%	-0.020	-0.13%	0.102	0.66%	-0.018	-0.12%
Economic growth	-0.051	-0.28%	-0.112	-0.62%	-0.210	-1.18%	0.145	0.81%	-0.043	-0.24%
Additional Regressors										
REER 4/	-0.085	-0.31%			-0.001	0.01%				
Terms of trade	0.031	-0.04%			0.412	1.85%	0.023	0.10%	0.467	2.10%
Remittance inflows/GDP dummy	0.060	0.35%	0.056	0.33%	0.200	1.68%				
FDI_{t-1}/GDP_{t-1}	-0.730	-4.09%			-0.603	-3.47%				
Aid/GDP	0.030	0.01%	0.025	0.01%	0.160	0.39%	-0.113	-0.28%	0.094	0.23%
dln (Investment climate index)$_{t-1}$ 5/			0.046	0.02%						
dln (Rental/House price index)$_{t-1}$ 5/			-0.031	0.06%						
dln (Stock market index)$_{t-1}$ 5/			-0.062	-0.42%						
Estimated Current Account Norm (2016)		**-5.25%**		**-3.03%**		**-7.08%**		**-8.49%**		**-2.96%**
Underlying Current Account (2016)	*-4.02%*				*-7.00%*					
Hansen's J test of overidentifying restrictions	0.87		0.89		0.73		…		0.77	
Arellano-Bond test for AR(1)	0.03		0.03		0.09		…		0.02	
Arellano-Bond test for AR(2)	0.93		0.92		0.86		…		0.89	
Number of instruments	8		8		8		…		8	
Number of countries	39		39		42		…		66	
Observations	127		127		132		139		207	

1/ Based on annual data from 1989-2009 from the WEO database Autumn 2010 vintage, 4-year non-overlapping averages. Projections are from the WEO Spring 2011 database. Unreported core-CGER regressors (which are available upon request) were small, positive and significant (between 0.00-0.005), thus contributing marginally to the estimated norm. The level of significance of each regressor is reported in Appendix Table A.3. We ran these specifications with time effects. The result was larger constant terms, with little else varying. Higher order-lags/instruments did not yield tangible benefits or significantly alter the coefficients.

2/ There is no 2016 projection for old age-dependency, and therefore 2009 (latest available) is used.

3/ In the absence of projections on oil reserves, reserves are held constant (i.e. no new discoveries and no depletion) from end 2009 onward.

4/ In the absence of projections, REER growth is set to the 2000-09 annual average.

5/ In the absence of projections, steady state growth is set to the annual average of 2007-09.

6/ Contribution to CA norm=coefficient*medium-term projection/steady state value (in percent).

7/ Taken from the specification of Christiansen *et al*. (2009) shown in Table 1. column 1, page 33. No constant is shown but we assume it is 2 percent to be able to compare norms across LIFE specifications.

8/ Sample as per main specifiction plus an additional 24 African LICs from a random draw. These are: Benin, Burkina Faso, Cameroon, Chad, Democratic Republic of Congo, Cote d'Ivoire, Ethiopia, The Gambia, Ghana, Guinea, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Rwanda, Senegal, Sierra Leone, Swaziland, Tanzania, Togo and Uganda.

- The sign of the FDI coefficient is negative and very close to that of Hasanov and Senhadji (2008), albeit a little larger that estimated by Rahman (2008) (and within the range of estimates by Pineda *et al*, 2009). A 1 percentage point increase in the FDI ratio decreases the CA balance by 0.73 percentage points of GDP, implying a high import content of FDI, a small contribution to the existing capital stock, a small contribution to export industries, and a high contribution to the production of domestic (nontradable) goods and services.
- Similar to Calderón et al. (2007) and Hasanov and Senhadji (2008), we find that the REER coefficient in EMEs demonstrates the expected sign (negative). The coefficient implies that a 1 percent appreciation in the REER leads to a 0.09 percent decline in the CA as a ratio to GDP, confirming the importance of exchange rate policy in external adjustment in EMEs (i.e. a relatively high elasticity of imports and exports to relative prices movements). The impact of TOT on the CA is less pronounced than in the LIFE subgroup (see below), implying lower vulnerability to commodity price shocks, perhaps owing to more diverse economic structures. A 1 percent increase in TOT would increase the CA by about 0.03 percentage points of GDP.
- Unlike Rahman (2008), we find that an improvement in the investment climate index has a positive impact on the CA balance—narrowing CA deficits or widening surpluses. This implies that an improvement in the investment climate results in more net exports.
- On the other hand, adding the domestic asset indices, which are all negative, suggests that CAs have indeed financed the non-tradable sector (more so than the tradable sector: because the cumulative sum of the two asset price coefficients is larger than that of the investment climate index) and this has a negative impact on the CA balance. This result is consistent with Aizenman and Jinjarak (2008) for industrial economies (and contrary to their results for EMEs).[36]

Finally, in both EME regressions, the Hansen and second-order serial correlation test statistics, which examine the validity of the internal instruments used, are in line with conventional significance levels.

Low-income and fragile economies

Three models are presented. Specification I (Table 2.B, third unshaded column) is our own estimation from a sample of 43 LIFEs; specification II (Table 2.B, fourth unshaded column) employs a specification from Christiansen *et al*. (2009);[37] and specification III (Table 2.B,

[36] Interestingly, when these variables are squared their impact turns positive, implying a non-linear behavior such that they deteriorate CA balances at an increasing rate. A similar result was obtained by Collyns and Senhadji (2002).

[37] It should be noted that the above specification from Christiansen et al. (2009) is not the authors' preferred choice, as they augment it with other regressors (such as concessional loans, net grants, domestic financial intermediation, capital account liberalization, and natural disasters). However, we do not have all the data necessary to opt for their preferred specification and hence use their first—which has a lower R-squared (0.73

(continued)

fifth unshaded column) is our own estimation from a sample of 66 LIFEs, while also removing non-core CGER regressors such as FDI and the REER. [38] Key results are:

- The fiscal balance again emerges as an influential CA fundamental for this subgroup (coefficient is 0.24 to 0.53)—although less influential than the net oil exporter subgroup. This suggests that a 1 percentage point improvement in the fiscal balance ratio is associated with a 0.24 to 0.53 percentage point increase in the CA balance as a share of GDP.
- The CA balance responds positively to the oil balance. The estimated coefficient implies that a 1 percentage point improvement in the oil balance ratio is associated with an increase in the medium-term CA balance of 0.18 to 0.23 percentage points of GDP.[39]
- The response of the CA to economic growth is the strongest across subgroups; these economies have the lowest income elasticity for foreign goods, implying that domestic absorption is increasing much more than exports. This is inconsistent with the intertemporal approach to the CA, such that transitory growth decreases (private and public) savings and widens the CA deficit.[40]
- In our estimation, foreign aid (coefficient of 0.09 to 0.16) does not demonstrate the expected sign and is considerably more important to the determination of the CA norm of LIFEs than the EME subgroup. However, this is not the case in Christiansen *et al*. (2009), where the sign is reversed as expected in the literature.[41] Moreover, while we find the coefficient on remittances to be insignificant, there could be multi-colinearity between remittances and aid.
- Unlike Calderón *et al* (2007) and Hasanov and Senhadji (2008)—but like Imam (2008)—we find the REER coefficient in LIFEs to be statistically insignificant and small. This suggests that although many LIFEs are gross exporters of primary commodities (including oil), they are largely price takers on world commodity

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versus 0.85). We calculated the CA norm that would result from opting for their preferred specification, as well as those of Calderón et al. (2007), but these yielded much smaller norms (by 2 to 4 percent of GDP for both EMEs and LIFEs) than those generated from our own estimation.

[38]We also experimented with dropping NFA and including the lagged CA to measure the latter's persistence. We found CA persistence to be relatively low (coefficient is 0.10). The high mean reversion of the CA implies that the half-life of transitory shocks to the CA deficit is about 1.2 years—perhaps attributable to the greater likelihood of CA reversals in LICs (Calderon et al 2007) and fragile economies, as higher levels of external debt relative to other regions may be linked to policies that generate CA reversals with the aim of speeding up external adjustment.

[39] However, this is not the case in the preferred specification of Christiansen et al. (2009), where the sign of the coefficient is reversed and is very small in size.

[40] This is not the case in the preferred specification of Christiansen et al. (2009), where the signs of the economic growth and relative income coefficients are reversed.

[41] However, it is the case in their preferred specification when they employ net grants (rather than aid) to GDP.

markets and have inelastic demand for imports (fuel, food, and capital goods). The impact of the TOT on the CA is relatively strong and influential. The coefficient implies that a 1 percent increase in the TOT would increase the CA by 0.41 to 0.47 percentage points of GDP. This suggests that, as expected, this sub-group is buffeted relatively more than others by (persistent) commodity price shocks.

- The sign of the FDI coefficient is negative and smaller than that estimated for the EMEs sub-group: a 1 percentage point increase in the FDI ratio decreases the CA balance by 0.60 percentage points of GDP, implying a larger import content of FDI compared to EMEs, and a smaller contribution of FDI to the existing capital stock and export (tradable) industries.

Finally, in the two LIFE regressions, the Hansen and second-order serial correlation test statistics, which examine the validity of the internal instruments used, are in line with conventional significance levels.

C. Calculating Current Account Norms, Contributions and Divergence from the Steady State

Divergence

We now examine what the estimated coefficient results from the GMM modeling framework imply for the determination of CA norms. Using the regression (GMM) coefficients[42] of a range of specifications (as shown in Tables 2.A and 2.B) and the projected 2016 medium-term values of the explanatory variables,[43] steady state CA norms are calculated for each subgroup (Figures 1.A and 1.B).[44] [45] [46] Key results are:

[42] GMM estimation for the period 19892009 is carried out using the IMF's Autumn 2010 WEO database.

[43] CA norms in the steady state (2016) are calculated using the IMF's Spring 2011 WEO database.

[44] As discussed above, the CGER-based rationale for using the medium-term values of the explanatory variables is that it allows existing output gaps to close and the explanatory variables to reach their sustainable steady-state levels. At the same time, some assumptions have had to be made about oil reserves, the REER, and EME asset price and investment climate indicators, due to the absence of medium-term projections for these variables. For oil reserves we assume that they remain constant from 2009 onwards; for REER we use the annual average of 1989-2009 outturns for projections; for asset prices and investment climate we employ the annual average of 2007-09 for projections.

[45] We also calculated norms, contributions to norms and the persistence of any divergence using WEO Spring 2010 data, with a higher oil price. The results are broadly similar (as a ratio of GDP), but with a larger norm surplus for net-oil exporters ; an almost unchanged norm deficit for EMEs ; and a slightly smaller norm deficit for LIFEs .

[46] See Appendix Table A.4 for country-by-country projected and estimated CA norms.

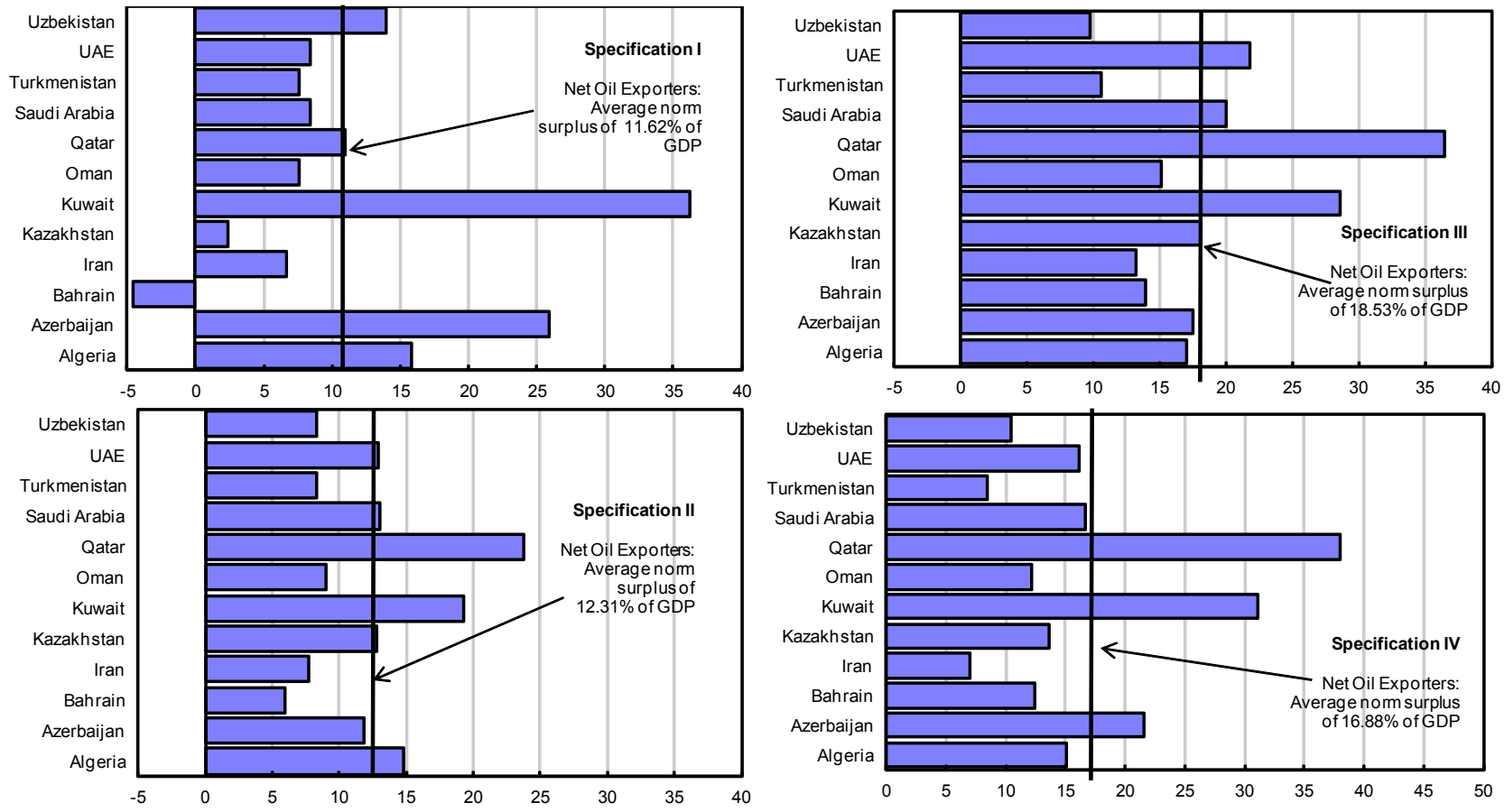
- **For net oil exporters, we find an average CA norm (surplus) that is relatively close to the actual CA balance for 2016,** as projected by the IMF's WEO—between 11.62 to 18.53 percent of GDP (norm) versus 13.20 percent of GDP (projected).[47] [48] However, relative to the WEO projection, both specifications I and II yield smaller estimated norms (11.62 and 12.31 percent of GDP, respectively, Table 2.A, first and second shaded columns), while both specification III and IV yield larger estimated norms (18.53 and 16.88 percent of GDP, respectively, Table 2.A, third and fourth shaded columns). A closer look (Figure 1.A) suggests that under specification I's estimation, Azerbaijan, Bahrain, Iran, Kazakhstan and Kuwait lie well beyond the subgroup average, while under specification II, Bahrain, Kuwait and Qatar lie beyond the subgroup prediction, and finally, under specifications III and IV, Kuwait and Qatar emerge as the two economies which lie well beyond the average prediction. While these economies might appear to be running excessive imbalances relative to the subgroup average, the relevant test is the individual country norm estimates. Should these 2016 projections lie beyond +/- two standard errors of the individual-country norm estimates, these projected imbalances would then be deemed to be excessive.

- **For emerging market net oil-importer economies (EMEs), we find an average CA norm (deficit) that is close to the actual CA balance for 2016,** as projected by the IMF's WEO—3.03 to 5.25 percent of GDP (norm) versus 4.02 percent of GDP (projected) (Table 2.B, first two shaded columns). A closer look (Figure 1.B, first column) suggests that most countries lie close to the CA norm, with the exception of Lebanon, whose larger norm deficit is presumably induced by its very low NFA position or high external debt. No other country lies beyond the +/- two standard error band of the predicted subgroup norm in the medium term (2016) under either specification.

[47] Projections exclude Libya, which has historically tended to run large current account surpluses.

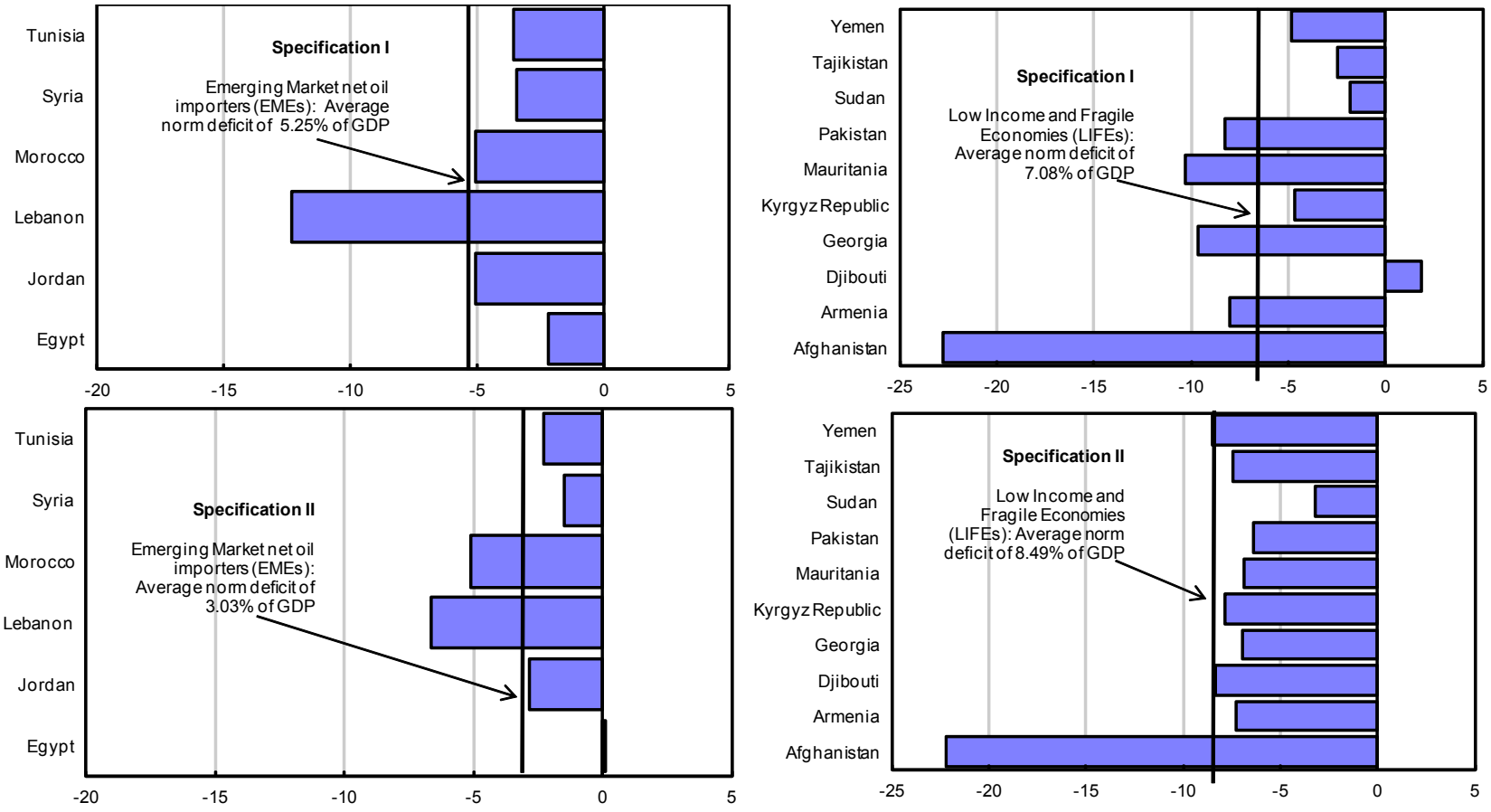
[48] As noted in Blanchard and Milesi-Ferretti (2010), this reduction in imbalances is directly linked to a substantial decline in oil prices from their average 2008 levels, implying a very large contraction in the CA surplus of oil exporters and a corresponding improvement in the CA of oil-importing countries.

Figure 1.A Middle Eastern Medium-term Current Account Norms--Net Oil Exporters (in percent of GDP)



Source: Authors' calculations.

Figure 1.B Middle Eastern Medium-term Current Account Norms--EMEs and LIFEs (in percent of GDP)



Source: Authors' calculations.

- **For low income and fragile economies (LIFEs), we find an average CA norm (deficit) that is close to the actual CA balance for 2016**, as projected by the IMF's WEO—in the range of 7.08 to 8.49 percent of GDP (norm) versus 7.00 percent of GDP (projected) (Table 2.B, third and fourth shaded columns).[49] Broadly speaking and focusing on specifications I and II (Figure 1.B, second column) suggests that more than half the countries in this subgroup lie close to the estimated CA norm, with some variation. There is one clear outlier under both specifications: Afghanistan and two additional countries under specification I only, which lie well beyond the +/- two standard error band of the predicted subgroup norm in the medium term (2016). For Afghanistan, this is presumably due to the ongoing conflict (and subsequently large external financing requirements).

We shall revisit these results again (see below), by calculating historical CA norms (1990-2016)—rather than just the steady state (2016) norm—to determine whether there is persistence over time in these differences. If there is persistence, then the cyclical position of the economy, prevailing exchange rate regime, and competitiveness could be some of the leading causes. We shall also examine (see below) a few country examples to shed light on how the CA norm estimation fits their particular data, and to ascertain whether the differences (in 2016) shown above still prevail.

Contributors

Next we turn to the main contributors to annual Middle Eastern CA norms.[50] The CA norms are primarily driven by a few fundamentals, as follows:

- **For net oil exporters**, the full fiscal balance and the non-oil fiscal deficit have two opposite effects on the CA surplus—the first improves it while the latter deteriorates it (Table 2.A). The oil trade balance (or an improvement in terms of trade) has been equally influential contributors to the CA surplus since 2000, and more recently initial NFA. Oil wealth and the proxy for IIP improve the CA when the lagged dependent is excluded and deteriorate it when it is included.[51] Higher relative income also tends to improve the CA balance. Country-specific annual norms and their main contributors are also shown for Algeria, Kuwait, and Saudi Arabia (Figure 2.A). The influential contributors of the subgroup remain evident across country-specific norm estimates, albeit with varying intensities depending on fiscal and oil dominance of

[49] We discard specification III, which encompasses a much broader sample of countries, as its norm is significantly lower than observed data.

[50] We show annual norms and actual outturns for a subset of our full sample. Earlier years are available upon request.

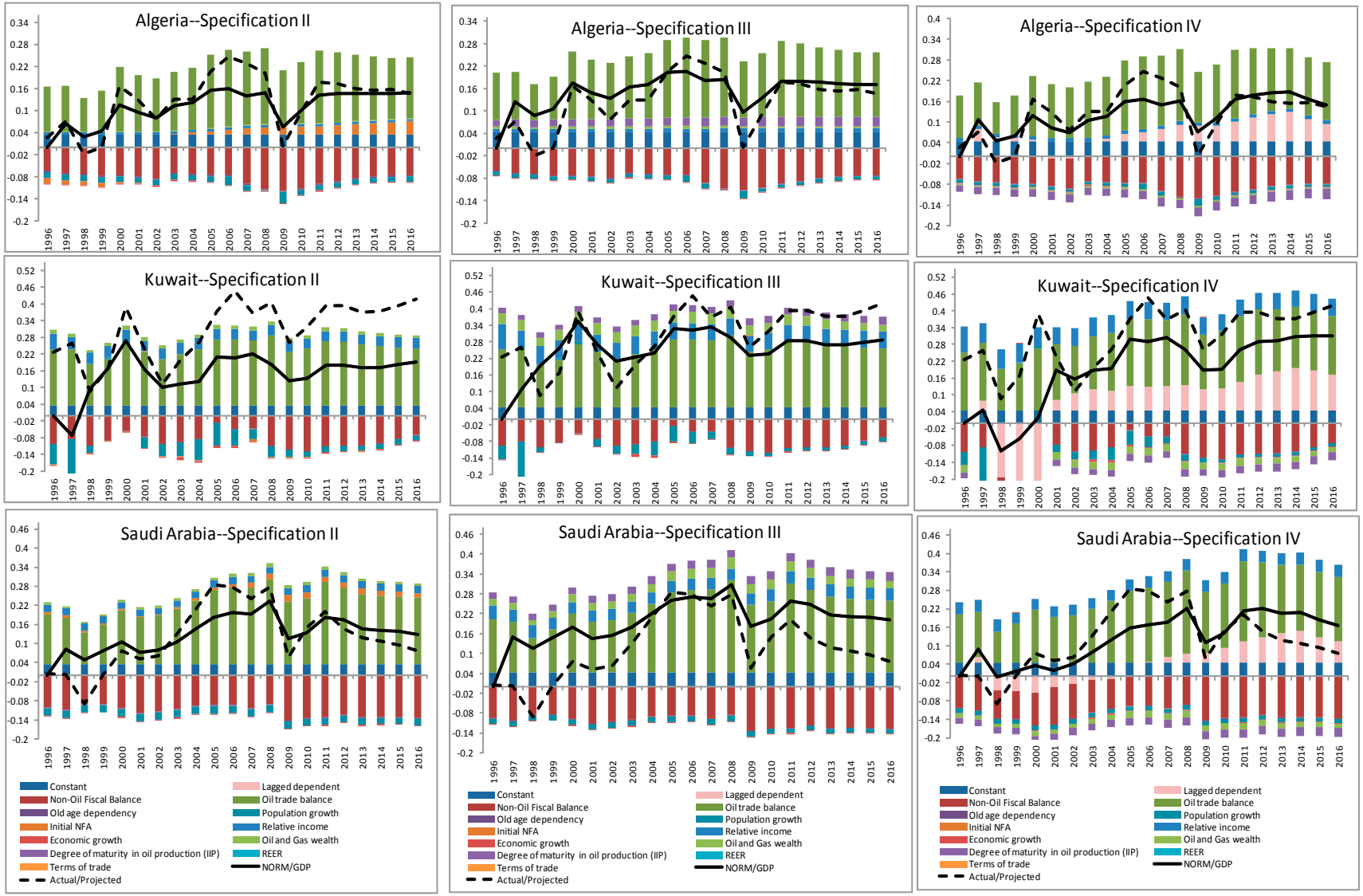
[51] Proven oil and gas reserves are valued at each year's WEO oil price, and are defined as a share of GDP. As mentioned above, the other oil wealth variable is a proxy for underreported IIP, and captures 25 percent of the pumped production and conversion into financial wealth—estimated at an average stock of US$58 billion at end 2009 per net-oil-exporting economy. Clearly some economies (e.g. Algeria and Libya—about US$150 billion, and Kuwait—about US$330 billion) have much larger IIP positions relative to this estimated subgroup average.

each economy, and on whether NFA data are fully captured. For example, given that Kuwait holds a larger part of its NFA within its SWF, it benefits from the inclusion of the lagged dependent variable or the proxy for underreported IIP as contributors to its CA norm.

- **For EMEs**, population growth, relative income and remittances have contributed most to narrowing CA norm deficits, along with house/rental prices (specification II), while NFA during the 1990s and early 2000s and the oil trade balance in the late 2000s, along with FDI (specification I) and stock market growth (specification II), have been broadly persistent contributors to widening CA norm deficits (Table 2.B). For this subgroup, we also show Egypt, Jordan and Morocco's country-specific annual norms and main contributors, with the influential contributors of the subgroup remaining evident—except that the oil trade balance is less influential, given that Egypt is an oil and gas producer (Figure 2.B).

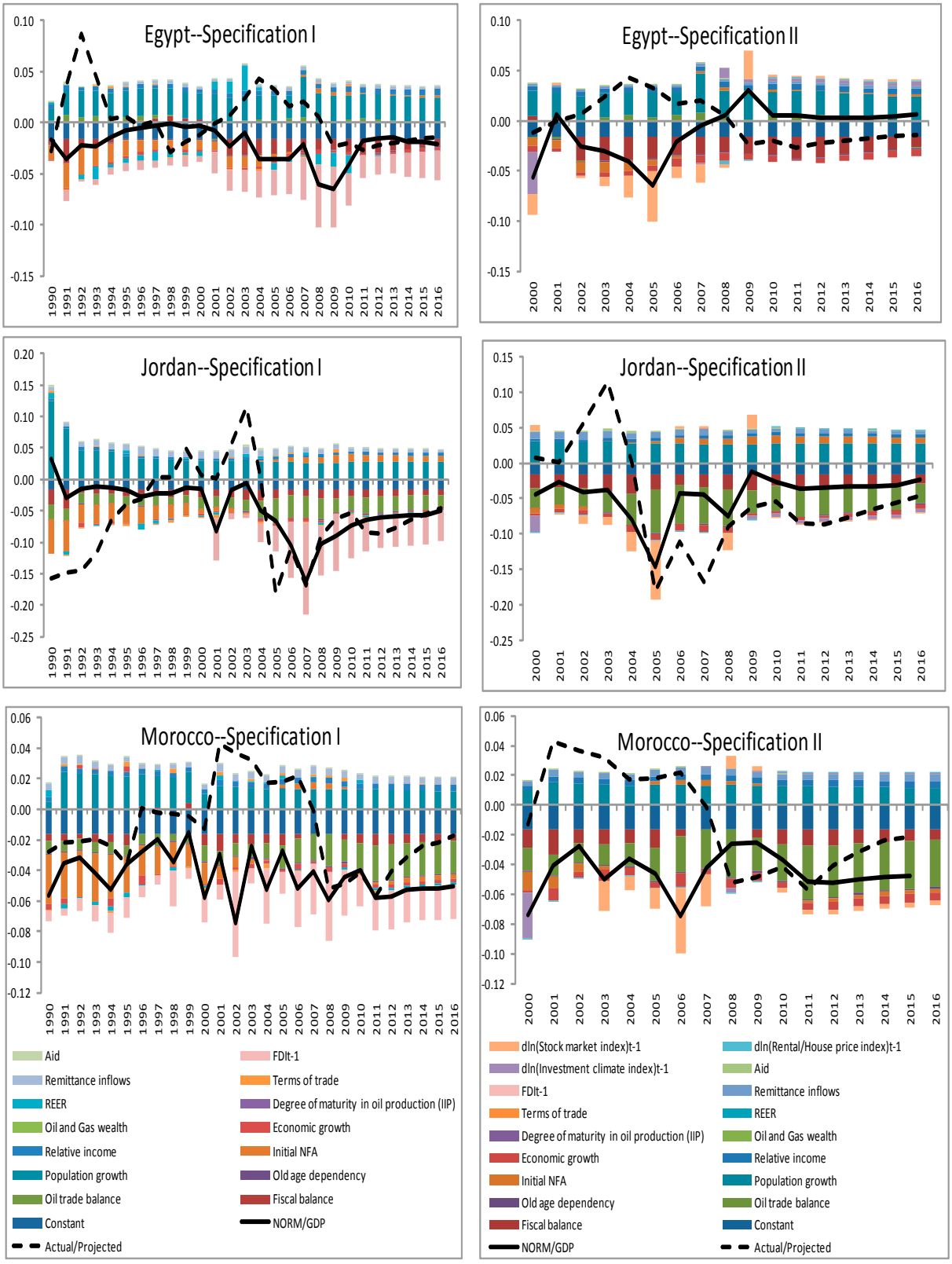
- **For LIFEs**, improving terms of trade, remittances, population growth and foreign aid (specification I) or initial NFA, relative income, economic growth and TOT (specification II) have been the main contributors to narrowing the CA norm deficit, while the fiscal and oil trade deficits (except in Sudan), as well as FDI (specification I only), have contributed to widening CA norm deficits under both specifications I and II (Table 2.C). For this subgroup, we also show Pakistan and Sudan's country-specific annual norms and main contributors (Figure 2.C), with the influential contributors of the subgroup remaining evident.

Figure 2. A Middle Eastern Current Account Norms and Contributions: Oil Exporters, 1996-2016 (share of GDP)



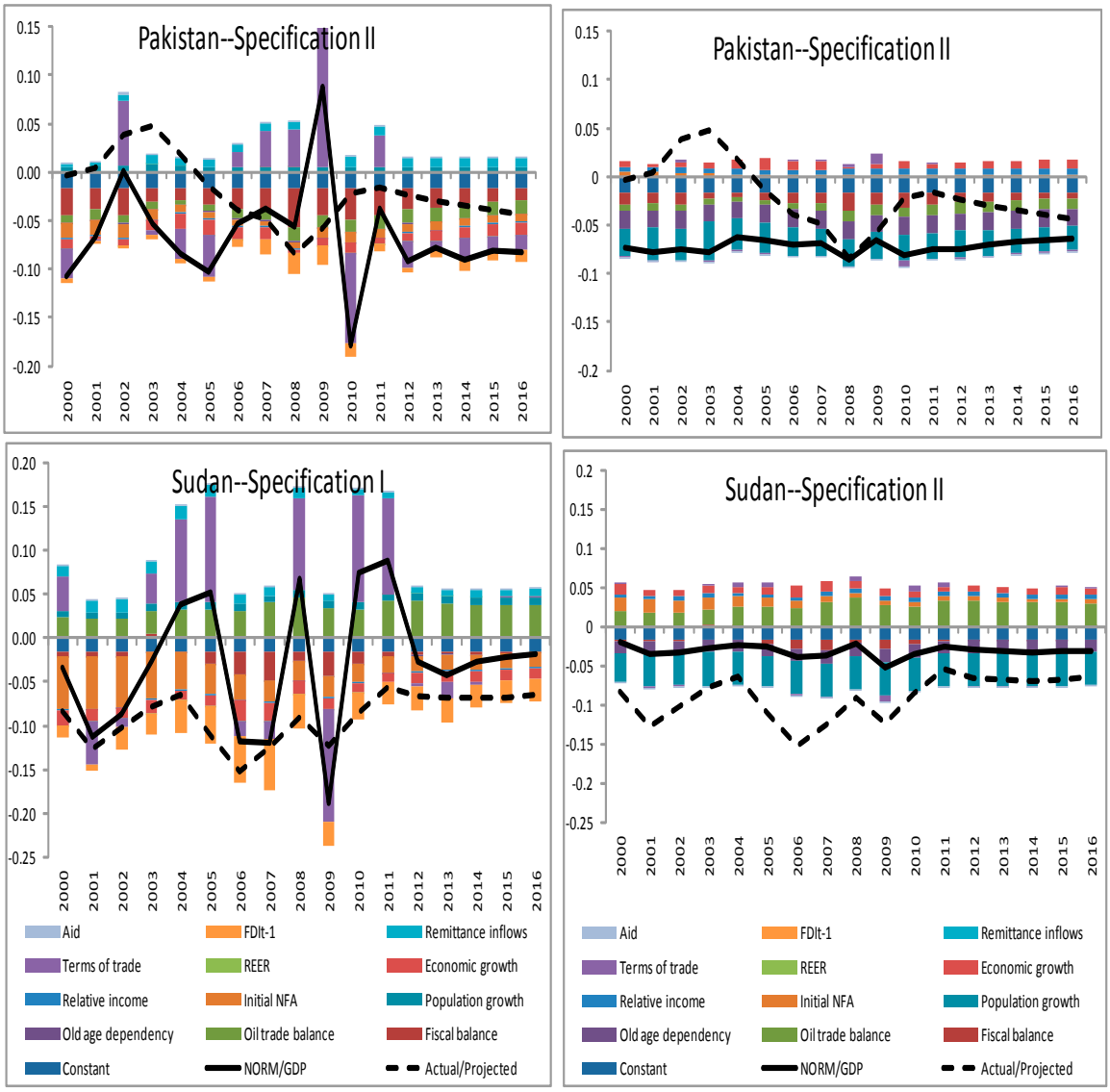
Source: Authors' calculations.

Figure 2.B Middle Eastern Current Account Norms and Contributions: EMEs, 1990–2016
(share of GDP)



Source: Authors' calculations.

Figure 2.C Middle Eastern Current Account Norms and Contributions: LIFEs, 2000–16
(share of GDP)



Source: Authors' calculations.

Persistence of divergence

As mentioned, so far we have examined CA norms for Middle-Eastern economies in the steady-state (2016) within the three subgroups. We have also shown annual historical deviations of actual CA positions from estimated subgroup CA norms (Figures 2.A, 2.B and 2.C), whereby annual norms are calculated using regression coefficients (reported in Tables 2.A and 2.B) and annual historical values of the explanatory variables (1996-2010) and annual projections of explanatory variables (2011-16). Annual divergences are defined here as the deviation of the actual (1996-2010) and projected (2011-16) CA balances from annual CA norms. Finally, we next apply a four-year moving average to remove the cyclical fluctuations in the annual explanatory variables (Figures 3.A, 3.B and 3.C).[52] The CA norm is close to the actual/projected CA position, and therefore this methodology provides a useful tool for assessing the level of the real exchange rate assessment (whether they are above or below the equilibrium real exchange rate). Looking at the divergences across subgroups, we examine whether there has been persistence in imbalances over time, and find as follows:[53] [54]

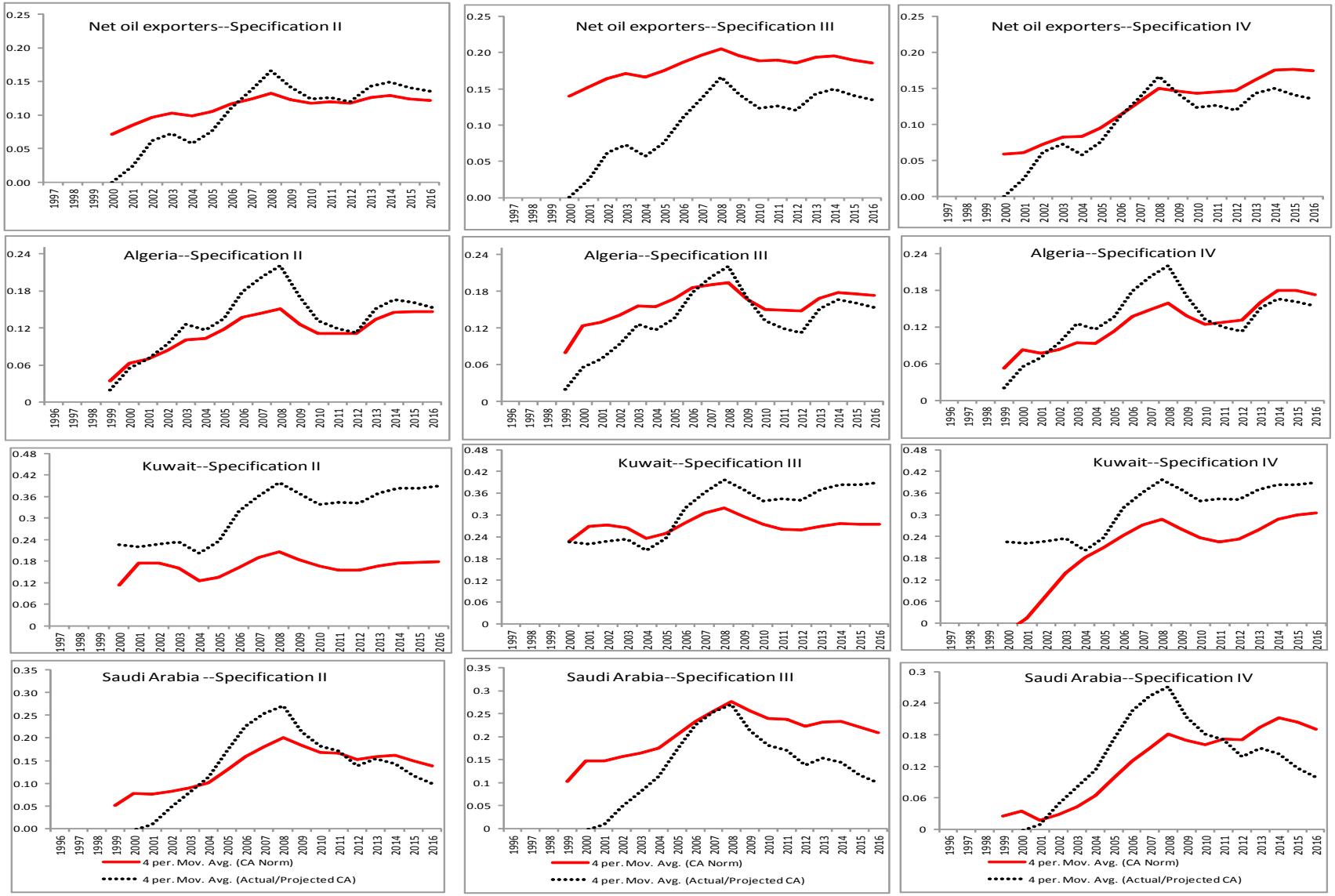
- **For net oil exporters as a subgroup, the estimation of the subgroup yields a CA norm which is close to the actual/projected CA position, and persistent excessive imbalances are not evident—although this is not the case for a few countries.** The subgroup norm estimate is a surplus in the range of 11.62 to 18.53 percent of GDP; against a projection of 13.20 in 2016. Persistent imbalances were evident (i.e. beyond +/- two standard errors of the prediction of the CA norm regression) only during the late 1990s and early 2000s (Figure 3.A, first row). For this subgroup, the persistence of divergences for three countries are examined in more detail. The divergences vary across specifications, depending on whether NFA data are fully captured or are substituted for by the inclusion of the lagged current account and other proxies of wealth (oil wealth and underreported IIP). For example, specification II fits Algeria and Saudi Arabia best, since all NFA is held at the central bank and the data are fully reported (Figure 3.A, second and last rows). Regarding Algeria, an excessive CA imbalance (indicating a potential undervalued real exchange rate) is evident during the mid-2000s, while no excessive imbalances are evident in Saudi Arabia (Figure 3.A, second and last row). In contrast, specifications III and IV fit Kuwait well because a larger part of its NFA is held at the SWF and not reported, and suggests real exchange rate undervaluation from the late 2000s onward (Figure 3.A, penultimate row).

[52] We experimented with the HP filter and found a smaller lambda than in the literature, similar to the Aguiar and Gopinath (2007) result. However, we chose four-year moving averages for consistency with the CGER.

[53] In this paper "excessive imbalance" is defined as persistently (during 1990-2016) running CA imbalances greater than +/- two standard errors of all explanatory variables of each subgroup. In other words, our benchmark is not just the annual steady state but rather persistent divergences over time.

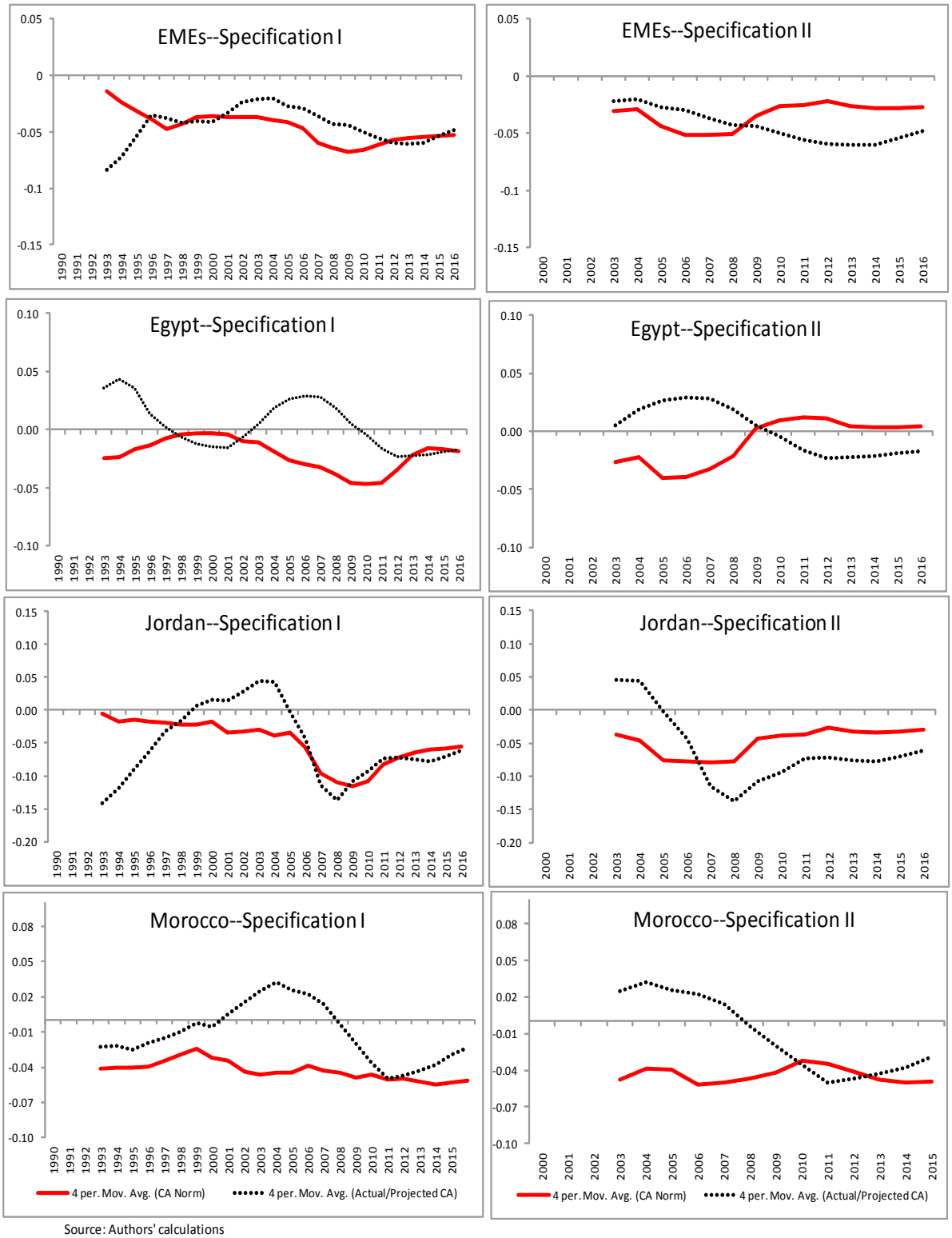
[54] Appendix Table A.4 shows all country-by-country projected and estimated CA norms for the period 2011-16.

Figure 3.A Estimated Middle Eastern Current Account Norms (Smoothed): Oil Exporters, 1996–2016
(share of GDP)



Source: Authors' calculations.

Figure 3.B Estimated Middle Eastern Current Account Norms (Smoothed): EMEs, 1990–2016
(share of GDP)

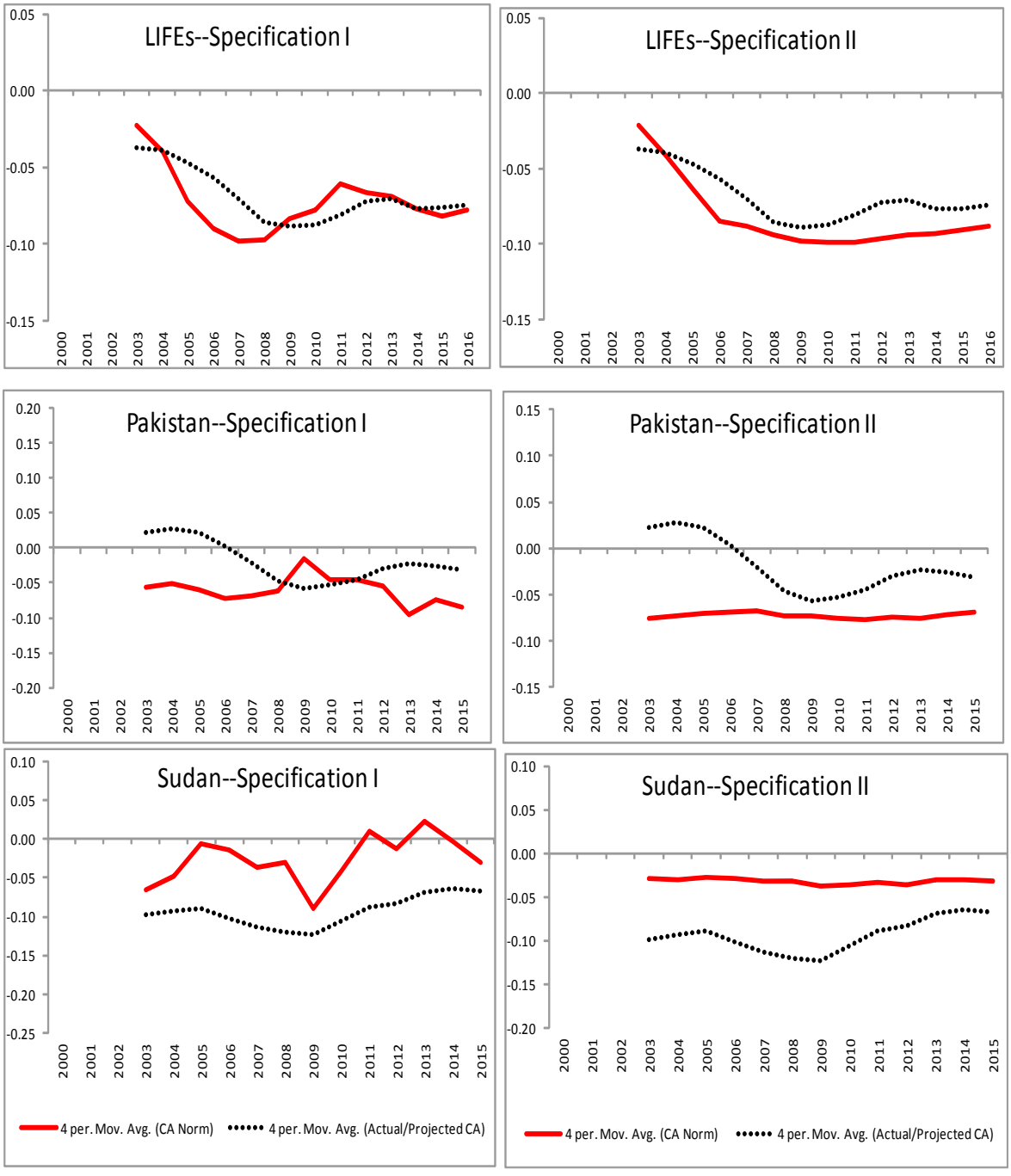


Source: Authors' calculations

- **For EMEs, the estimation of the subgroup yields CA norms which are close to the actual/projected CA position, and no persistent imbalances are evident across time—although this is not the case for a few countries.** The subgroup CA norm deficit is estimated at 3.0 to 5.3 percent of GDP under specifications I and II, respectively; against a projected deficit of 4.0 percent of GDP in 2016. No imbalances are evident beyond +/- two standard errors of the prediction of the CA norm regression (Figure 3.B, first row). For this subgroup, the persistence of CA divergences for Egypt, Jordan and Morocco are examined in more detail. Under specification I which includes FDI, Egypt appears to have an undervalued real exchange rate during the 2000s (as the CA norm exceeds the actual CA position), while under specification II (which excludes FDI but includes asset prices) the undervaluation flips into overvaluation beginning in 2009 (Figure 3.B, second row). When FDI is included Jordan's CA norm is close to the actual/projected CA position, however under specification II which excludes FDI, it appears to be running larger CA deficits (excessively so during 2008). Finally, Morocco appears to have run smaller CA deficits than the CA norm, suggesting an undervalued real exchange rate until very recently.

- **For LIFEs, the estimation of the subgroup yields CA norms that are close to the actual/projected CA position, and no excessive imbalances are evident across time and specifications—although this is not the case for a few countries.** The subgroup CA norm deficit is estimated at 7.1 to 8.5 percent of GDP; against a projected deficit of 7.0 percent of GDP in 2016. No imbalances are evident beyond +/- two standard errors of the prediction of the subgroup CA norm regression. Actual CA deficits were persistently below the CA norm (indicating an undervalued real exchange rate) during the mid-2000s; however, since 2008 divergences have narrowed (Figure 3.C, first row).We also examine the persistence of Pakistan and Sudan's annual CA divergences. Pakistan has been running excessively small CA deficits, with the exception of the 2008-10 period, implying some episodes of an undervalued real exchange rate (Figure 3.C, second row). Finally, Sudan appears to running excessively large CA deficits, evidence of an overvalued real exchange rate (Figure 3.C, last row).

Figure 3.C Estimated Middle Eastern Current Account Norms (Smoothed): LIFEs, 2000–16
(share of GDP)



Source: Authors' calculations

D. Robustness of Results

To assess the robustness of the estimation results, we use four time-series models to perform: (i) an in-sample forecast of CA norms for 2008-10 and compare them to actual CA outturns;

and (ii) an out-of-sample forecast of CA norms for 2011-16 and compare them to WEO CA projections. Both approaches yield very similar results in terms of the ordering of the most robust specifications.[55] However, since the in-sample forecast period is chosen to be three years due to the relatively short sample length (21 years in total) and the dynamic nature of the model, this precludes assessing the robustness of our LIFE estimation and the EME specification II (both with only 11 years of CA data in total). The four forecasting models are as follows:

- Random walk with drift (FRW):

$$ca_{it} = \propto_0 + \propto_1 ca_{it-1} + u_{it} \qquad u_{it} \sim NI(0, \sigma^2) \tag{5}$$

- Trend model (FTREND):

$$ca_{it} = \propto_0 + \propto_1 trend + u_{it} \qquad u_{it} \sim NI(0, \sigma^2) \tag{6}$$

- VAR(3) model[56]:

$$ca_{it} = \propto_0 + \propto_1 ca_{it-1} + \propto_2 ca_{it-2} + \propto_3 ca_{it-3} + \beta_1 X_{it-1} + \beta_2 X_{it-2} + \beta_3 X_{it-3} + \mu_i + \varepsilon_{it} \tag{7}$$

- This study's various estimated model specifications (FEST), repeated for convenience:

$$ca_{it} = \propto_0 + \propto_1 ca_{it-1} + \beta X_{it} + \mu_i + \varepsilon_{it} \tag{1}$$

For net oil exporters, a graphical presentation of the out-of-sample forecast (Figure 4, first panel) suggests that two specifications lie inside the forecast error band of the estimated CA norm (FEST I and II), with the random walk (FRW), trend (FTREND) and model specifications III and IV (FEST III and IV) being the exceptions. These results suggest that the most robust medium-term CA norm for net oil exporters lies between 11.6 and 12.3 percent of GDP. Any subgroup CA imbalances below or above this range would not meet the robustness check herein, and thus would be considered excessive.[57] For EMEs, a graphical presentation of the forecast (Figure 4, second row) suggests that the out-of-sample forecast for specification I (FEST I) lies within the forecast error band of the estimated CA norm. As

[55] See Appendix Tables A.5 and A.6 for the in-sample forecast results.

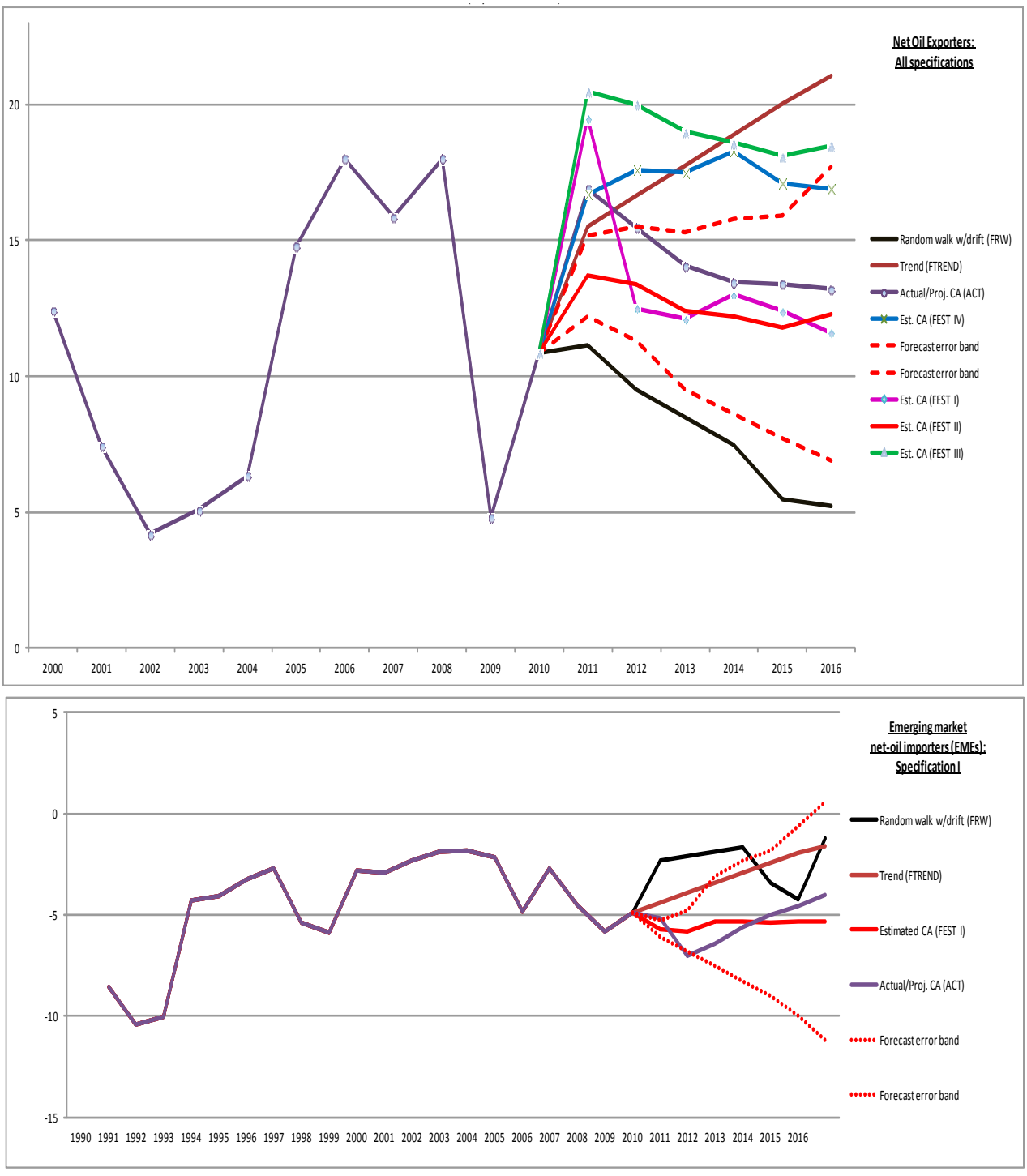
[56] Normally, VECMs are employed for non-stationary data. However, our model is stationary since all variables are expressed as a ratio to GDP or as real growth rates (for the three EMEs indices). Moreover, the estimated model (equation (1)) has only one lagged regressor (FDI), and the CA itself: this is the only difference between our model and a VAR(1). Indeed the forecasting ability of the estimated model is only marginally better than the VAR(1).

[57] In CGER terminology, a CA surplus balance smaller than this range provides for an assessment of "above equilibrium" which indicates an overvalued real exchange rate, implying that the currency is expected to depreciate (with more savings/exports) over the medium term. A CA surplus balance larger than this range provides for an assessment of "below equilibrium", which indicates an undervalued real exchange rate, and implies that the currency is expected to appreciate (with more spending/imports) over the medium term. Finally, a CA balance within this range provides for an assessment of "equilibrium", which indicates that there is no evidence that the real exchange rate deviates from its equilibrium level.

mentioned, this test was not performed on specification II or the LIFE subgroup given the shorter samples. On the other hand, both the random walk (FRW) and trend (FTREND) models for the EME subgroup of specification I lie outside of the band for at least two out of three of the forecast years.

Statistical results of the in-sample forecasts corroborate the out-of-sample graphical robustness checks of the estimated specifications, delivering the best forecast of the CA norm across the net oil exporter and EME subgroups (Table A.5). In particular the estimated models FEST I and II have the lowest root mean square error (RMSE), bias and standard error, and as noted above, lie well within the forecast error band shown graphically (Figure 4). The estimated models FEST III and IV have the second-lowest RMSE, bias and standard error—yet are outside the forecast error band shown graphically (Figure 4). The VAR(1) model has the third-lowest RMSE, bias and standard error. The VAR(3) model outperforms the trend and random walk models, but is still inferior to the VAR(1). This implies that current-period fundamentals, rather than their lags, are key predictors of the CA. The *Theil U* statistic was also run and further corroborates our findings (Table A.6), with the most robust estimated specifications delivering the lowest *Theil* statistic (well below 1), of which the variance is lowest and covariance highest.

Figure 4. Comparison of Middle Eastern Current Account Forecasting Models, 2011–16
(in percent of GDP)



Source: Authors' calculations.

IV. Conclusions and Policy Implications

When estimating the medium- to long-run determinants of emerging and developing economies' current account (CA) imbalances, Middle Eastern CA positions do not appear to be determined differently from those of other developing regions. However, augmenting the core fundamental determinants of CA norms traditionally employed in the literature with those that are relevant to the Middle East region's three most typical economic structures—net oil exporters, net oil-importer emerging market economies (EMEs), and low-income and fragile economies (LIFEs)—does yield improved CA norm regressions. The CA norms calculated using these regressions are plausible norms which do not suffer from inconsistency and endogeneity bias, and hence can be used to assess the extent of exchange rate misalignment.

On average the most robust estimate of the CA norm (2016) surplus for the Middle East's net oil exporters lies within the range of 11 to 12 percent of GDP. We found that this subgroup as a whole was not running excessive CA (surplus) balances, yet there were some exceptions for a few countries. For these countries, two further specifications were estimated to capture the omitted variable problem (due to non-reporting of full net foreign asset positions) and the results appear to perform well. The three examples of "good imbalances"[58] of saving, investment or depth of financial markets do not appear to underpin these Middle Eastern surpluses, but inter-generational equity, under-developed skills, and infrastructural needs are often cited as barriers to greater CA adjustment in these countries. Oil wealth dissavings and smaller fiscal surpluses would be the most influential policy tools in any attempt to reduce CA surpluses. However, fiscal expansion during an oil boom could induce Dutch-disease type phenomena if public expenditures are predominantly oriented towards nontradables. Finally, an appreciation of the REER does not appear to have a significant impact on this subgroup's CA surpluses.

On average the most robust estimate of the CA norm (2016) deficit for the Middle East's EMEs lies between 3 to 5 percent of GDP, with the range dependent on whether foreign direct investment is or is not considered to be a fundamental determinant of the current account. This subgroup's actual/projected CA imbalances do not appear to be excessive; rather they are in line with the fundamentals-based estimation of the CA norm of this study. For the Middle Eastern EMEs with CA imbalances which do diverge from the CA norms, higher relative income and remittances, lower FDI and oil importation, stronger regulation of asset bubbles, and exchange rate flexibility are likely to be the most influential adjustment tools. Fiscal consolidation and improving the investment climate also matter, and should be

[58] The three familiar examples of "good imbalances" are as follows (see Blanchard and Milesi-Ferretti, 2009). First, saving behavior: it makes good sense for countries whose population is aging faster than their trading partners' to save and run CA surpluses (or smaller CA deficits) in anticipation of the dissaving that will occur once the workforce shrinks and the share of the dependent population rises. Second, investment behavior: a country with attractive investment opportunities may want to finance part of its current investment through foreign saving, thus running a CA deficit (or smaller CA surplus). Third, portfolio behavior: a country that has deeper and more liquid financial markets may well attract investors, generating currency appreciation and a CA deficit (or smaller CA surplus).

carefully monitored. This would imply policy actions such as increasing debt repayments, removal of existing oil price subsidies (and fuel efficiency policies), and allowing greater exchange rate flexibility. Assuming low to moderate capital mobility and the prevalence of fixed exchange rate regimes, CA persistence was found to imply a relatively slow response to adjustment, with the implication that these policy tools would most likely be required in large doses and for long periods. However, should either capital mobility or exchange rate flexibility increase, lower doses could bring about the necessary adjustment, as fiscal policy becomes more effective in the former and monetary policy in the latter.

We were unable to ascertain the robustness of our estimated CA norm specifications for Middle Eastern LIFEs, given the short data sample. However, while excessive imbalances were evident in the 2000s, these disappear from 2008 onwards—with a few country exceptions. We found this subgroup to have the least persistent CA deficits, implying the ability to narrow imbalances faster than other Middle East subgroups. However, the menu of potential policy tools was found to be much wider than for other subgroups, and therefore more subdued or dispersed in terms of the magnitude of adjustment delivered, namely: improving the terms of trade, greater remittances and grants, fiscal and debt consolidation, lower oil importation and FDI. Exchange rate flexibility was found likely to make only a small contribution to adjustment. On average this subgroup's CA deficit was found to be broadly in line with its estimated CA norm.

Appendix

Table A.1. Determinants of CA Imbalances (as a share of GDP): Expected Signs and SR and MLR Correlations of the Empirical Literature

Category	Variable/Regressor		Expected Sign	Correlation: Pooled SR	Correlation: Cross-country MLR
Domestic determinants					
Persistence	Current account deficit lagged one period	1/	+		
Income	Domestic output		+	-ve**	-ve**
	Domestic output growth		+	-ve**	-ve
Saving/Investment	Private savings	1/	-	-ve**	-ve**
	Public savings	1/	-	-ve**	-ve**
Fiscal policy	Public savings	1/	-	-ve**	-ve**
	Budget surplus	1/	-	-ve**	-ve**
	Government spending shocks: Temporary/Permanent		+/0		
External determinants					
	Degress of openness		ambiguous	-ve**	+ve
	Real effective exchange rate		+ (Marshall-Lerner) ambiguous (Intertemporal) non-monotonic	+ve**	-ve
	Terms of trade		- non-monotonic	-ve**	-ve
	Exchange controls		+	+ve	+ve
	Aid	1/		+ve**	+ve**
Global determinants					
	Industrialized countries' output growth rate		-	-ve**	+ve**
	World real interest rate		Net debtor: - Net creditor: +	+ve	+ve

Note: ** denotes found to be statistically significant.
1/ Measured as a share of GDP.

Table A.2. Alternative Determinants of the Current Account--GMM Estimates

	Calderón et al (2007)			
	Savings model		Investment model	
	Developing	Africa	Developing	Africa
Regressors 1/				
Constant	-0.012	0.383	-0.4501**	-0.5877**
CA deficit lagged 2/	0.476**	0.021	0.2286**	0.2189**
Domestic determinants				
Domestic GDP growth	0.086	0.116	-0.0848	-0.3581**
Private savings 2/	-0.278**	-0.618**		
Public savings 2/	-0.24**	-0.531**		
Private investment 2/			0.5757**	0.6413**
Public investment 2/			0.8386**	0.8762**
External determinants				
Exports/GNI	0.073**	0.046	-0.1091**	-0.2488**
REER	0.017	-0.045	0.0732**	0.1241**
Terms of trade	-0.029**	-0.027**	-0.0632**	-0.0631**
Black market permium	0.009	0.014	-0.0323**	-0.0638**
Balance of payment controls	0.000	0.012	0.001	-0.0207
Effective development assistance	-0.033**	-0.010	0.1367**	0.0305
Debt/GNP lagged	-0.011	-0.100**	0.0400**	0.026
Global determinants				
Industrial output growth	-0.311*	0.152	-0.2536**	-0.3301**
International interest rates	-0.289*	-0.294*	-0.0036	-0.1169
Number of observations	739	302	861	346
Sample countries	63	30	65	29
Time period	1975-95	1975-95	1975-97	1975-98

Note: *, ** and *** indicates statistical significance at 10, 5 and 1 percent level, respectively.

1/ The CA imbalance as defined here implies that positive (negative) numbers indicate a deficit (surplus).

2/ Measured as a share of GDP.

Table A.3. Current Account--GMM Regression Estimates: Net Oil Exporters (1989 - 2009, four-year average)

	Specification I	Specification II	Specification III	Specification IV
Core CGER Regressors				
Lagged dependent	0.33***			0.383**
	(0.04)			(0.03)
Fiscal balance	0.851**	0.385***	0.363***	0.391**
	(0.10)	(0.11)	(0.09)	(0.12)
Oil trade balance		0.454***	0.469***	0.459*
		(0.07)	(0.05)	(0.08)
Old age dependency	-0.053	-0.059	-0.034	-0.034
	(0.05)	(0.05)	(0.03)	(0.03)
Population growth	-0.693*	-0.93*	-0.632*	-0.589
	(0.61)	(0.63)	(0.64)	(0.57)
Initial NFA	0.023	0.022***		
	(0.007)	(0.008)		
Relative income	-0.017	0.0436*	0.071**	0.073
	(0.02)	(0.04)	(0.03)	(0.03)
Economic growth	-0.053	-0.069	-0.064	-0.056
	(0.01)	(0.01)	(0.01)	(0.02)
Net Oil-Exporter Specific Regressors				
Oil wealth			0.0006**	-0.0004*
			(0.0001)	(0.0002)
Degree of maturity in oil production			0.1601**	-0.1701*
			(0.02)	(0.04)
Additional Regressors				
REER	0.073			
	(0.03)			
Terms of trade	4.269***			
	(3.89)			

Notes: Robust standard errors in parentheses. *** significant at 1%; ** significant at 5%; and * significant at 10% level.
Source: Authors' calculations.

Table A.3. Current Account--GMM Regression Estimates: EMEs and LIFEs (1989 - 2009, four-year average)

	EMEs		LIFEs	
	Specification I	Specification II	Specification I	Specification III
Core CGER Regressors				
Fiscal balance	0.14**	0.213**	0.53***	0.421**
	(0.05)	(0.06)	(0.04)	(0.06)
Oil trade balance	0.21*	0.321*	0.23***	0.178***
	(0.06)	(0.05)	(0.07)	(0.06)
Old age dependency	-0.012*	-0.012	-0.006	-0.004
	(0.01)	(0.00)	(0.01)	(0.01)
Population growth	1.21**	1.21**	0.31***	0.281***
	(1.12)	(1.15)	(0.02)	(0.01)
Initial NFA	0.04**	0.036***	0.035***	0.023***
	(0.01)	(0.01)	(0.02)	(0.01)
Relative income	0.040	0.041	-0.020	-0.018
	(0.007)	(0.006)	(0.01)	(0.00)
Economic growth	-0.051	-0.112	-0.21*	-0.043*
	(0.006)	(0.11)	(0.13)	(0.004)
Additional Regressors				
REER	-0.084***		-0.001	
	(0.04)		(0.000)	
Terms of trade	0.031**		0.412***	0.467
	(0.004)		(0.05)	(0.05)
Remittance inflows	0.06**	0.06	0.20	
	(0.06)	(0.04)	(0.02)	
FDI_{t-1}	-0.73***		-0.603*	
	(0.10)		(0.09)	
Aid	0.03	0.03	0.16**	0.09
	(0.004)	(0.004)	(0.11)	(0.07)
dln (Investment climate index)$_{t-1}$		0.046***		
		(0.02)		
dln (Rental/House price index)$_{t-1}$		-0.031**		
		(0.02)		
dln (Rental/House price index^2)$_{t-1}$		0.001**		
		(0.001)		
dln (Stock market index)$_{t-1}$		-0.062***		
		(0.04)		
dln (Stock market index^2)$_{t-1}$		0.0025**		
		(0.002)		

Notes: Robust standard errors in parentheses. *** significant at 1%; ** significant at 5%; and * significant at 10% level.
Source: Authors' calculations.

Table A.4. Projected and Estimated Middle Eastern Current Account Norms: All Specifications, 2011-16

	2016	2016	2015	2014	2013	2012	2011	2016	2015	2014	2013	2012	2011	2016	2015	2014	2013	2012	2011	2016	2015	2014	2013	2012	2011
	Projected	Specification I						Specification II						Specification III						Specification IV					
Net-oil exporters	**16.9**	**11.6**	**12.4**	**13.0**	**12.1**	**12.5**	**19.5**	**12.3**	**11.8**	**12.2**	**12.4**	**13.4**	**13.7**	**18.5**	**18.1**	**18.6**	**19.0**	**20.0**	**20.5**	**16.9**	**17.1**	**18.3**	**17.5**	**17.6**	**16.7**
Algeria	14.6	15.9	17.0	17.6	16.2	16.1	31.0	14.8	14.6	14.6	14.7	14.6	14.2	17.1	17.1	17.4	17.8	17.9	17.9	15.1	16.6	18.9	18.5	17.7	16.5
Azerbaijan	17.2	25.9	24.0	21.0	14.8	13.1	19.8	11.9	12.3	13.5	12.0	12.5	13.2	17.5	18.0	19.2	17.7	18.2	19.0	21.5	21.0	20.1	12.3	8.8	5.2
Bahrain	10.3	-4.5	-4.0	-2.5	-2.4	-1.1	3.8	5.9	5.8	6.4	6.6	6.6	6.4	14.0	13.4	14.5	14.7	14.6	14.7	12.4	13.3	14.7	14.5	13.3	12.4
Iran	6.8	6.6	6.7	7.6	6.1	8.4	15.3	7.8	7.7	8.3	8.2	8.7	8.7	13.2	13.3	14.0	14.0	14.7	15.0	7.0	7.3	8.3	7.4	7.2	6.4
Kazakhstan	1.5	2.3	2.7	3.5	3.1	2.8	-3.2	12.8	13.4	14.0	14.8	15.9	16.8	18.1	18.7	19.3	20.1	21.2	22.2	13.7	13.6	14.2	14.5	16.1	17.0
Kuwait	41.8	36.3	35.4	33.5	32.0	32.3	37.6	19.2	18.2	17.0	17.0	18.1	17.9	28.6	27.8	26.8	27.0	28.2	28.2	31.1	31.1	30.8	29.2	29.0	26.2
Oman	12.3	7.5	9.7	10.4	11.4	15.2	23.2	9.1	10.0	10.3	11.6	13.2	14.0	15.1	16.2	16.6	18.1	19.7	20.7	12.1	13.6	15.5	16.6	18.4	18.2
Qatar	26.2	10.9	13.1	15.7	16.5	18.5	25.0	23.7	25.1	26.8	28.5	30.5	29.0	36.5	37.9	39.7	41.4	43.4	42.0	38.0	40.1	43.8	44.8	46.7	45.3
Saudi Arabia	7.6	8.4	11.9	15.1	15.1	18.5	26.4	13.0	13.8	14.1	14.5	17.6	18.3	20.0	20.8	21.1	21.7	24.9	25.9	16.6	18.5	20.8	20.4	22.0	21.4
Turkmenistan	6.1	7.7	10.4	12.0	10.9	9.7	18.3	8.3	4.4	5.6	6.9	8.2	9.8	10.6	7.1	8.5	9.8	11.2	12.7	8.4	6.8	9.9	9.4	9.3	9.2
UAE	11.2	8.5	8.4	8.4	7.5	8.4	11.2	12.9	12.4	11.1	9.9	10.3	10.2	21.8	21.5	20.3	19.2	19.8	19.9	16.2	16.6	16.1	14.7	15.5	14.5
Uzbekistan	2.7	14.0	13.7	14.0	13.8	8.5	25.1	8.3	3.7	4.1	4.6	5.0	5.4	9.8	5.5	5.9	6.4	6.8	7.2	10.4	6.1	7.1	7.5	7.6	7.8

Source: Authors' calculations.

Table A.4. Projected and Estimated Middle Eastern Current Account Norms: All Specifications, 2011-16

	Projected	Specification I						Specification II					
	2016	2016	2015	2014	2013	2012	2011	2016	2015	2014	2013	2012	2011
EMEs	**-4.0**	**-5.3**	**-5.3**	**-5.4**	**-5.3**	**-5.3**	**-5.8**	**-2.5**	**-2.7**	**-2.8**	**-2.8**	**-2.9**	**-2.8**
Egypt	-1.4	-2.1	-1.9	-1.8	-1.4	-1.5	-1.8	0.6	0.4	0.3	0.3	0.3	0.5
Jordan	-4.6	-5.0	-5.6	-5.8	-5.9	-6.1	-6.4	-2.3	-3.1	-3.2	-3.4	-3.5	-3.6
Lebanon	-9.8	-12.3	-12.4	-12.4	-12.5	-12.2	-14.1	-6.1	-6.2	-6.3	-6.4	-6.7	-6.7
Morocco	-1.8	-5.1	-5.2	-5.2	-5.3	-5.7	-5.8	-4.6	-4.8	-4.8	-5.0	-5.2	-5.1
Syria	-5.0	-3.4	-3.1	-3.0	-2.6	-2.2	-1.6	-1.0	-0.5	-0.1	0.4	0.8	1.1
Tunisia	-1.6	-3.5	-3.8	-4.0	-4.2	-4.3	-4.9	-1.7	-2.1	-2.5	-2.9	-3.2	-3.2

	Projected	Specification I						Specification II						Specification III					
	2016	2016	2015	2014	2013	2012	2011	2016	2015	2014	2013	2012	2011	2016	2015	2014	2013	2012	2011
LIFEs	**-7.0**	**-7.1**	**-7.4**	**-8.1**	**-8.5**	**-8.7**	**-5.4**	**-8.5**	**-8.7**	**-8.9**	**-9.2**	**-9.5**	**-9.6**	**-3.0**	**-3.5**	**-4.1**	**-4.6**	**-5.4**	**-2.2**
Afghanistan	-7.4	-22.7	-21.6	-22.0	-23.0	-22.5	-19.8	-22.2	-23.3	-24.7	-26.7	-27.6	-26.3	-14.7	-15.1	-15.7	-16.8	-17.0	-15.1
Armenia	-8.5	-8.0	-9.4	-9.5	-9.9	-10.4	-10.3	-7.3	-7.5	-7.5	-7.6	-7.8	-8.4	-3.8	-5.3	-5.3	-5.5	-5.7	-4.9
Djibouti	-17.4	1.9	2.3	0.1	-1.7	-2.9	-4.9	-8.4	-8.4	-8.7	-9.0	-9.1	-9.8	-13.8	14.3	12.0	10.1	9.0	2.2
Georgia	-6.1	-9.6	-10.0	-10.5	-10.9	-11.0	-11.8	-6.9	-7.1	-7.2	-7.3	-7.5	-7.7	-4.6	-4.9	-5.4	-5.8	-6.2	-7.4
Kyrgyz Republic	-3.8	-4.4	-5.8	-6.5	-7.4	-7.7	-10.7	-7.8	-8.1	-8.2	-8.4	-8.9	-10.4	-5.4	-6.0	-6.2	-7.1	-8.6	-10.6
Mauritania	-7.3	-10.3	-11.3	-11.8	-10.8	-5.9	-2.1	-6.9	-6.9	-6.9	-6.7	-6.8	-7.0	-3.3	-4.7	5.3	5.2	-1.6	1.8
Pakistan	-4.4	-8.3	-8.1	-9.0	-7.7	-9.2	-3.7	-6.3	-6.5	-6.8	-7.0	-7.4	-7.5	-6.1	-6.0	-7.3	-5.9	-8.2	-1.8
Sudan	-6.5	-1.8	-2.2	-2.8	-4.3	-2.7	8.8	-3.2	-3.1	-3.3	-3.2	-3.0	-2.5	0.8	0.5	-0.2	-1.8	0.0	12.7
Tajikistan	-4.3	-2.5	-2.9	-2.5	-2.6	-9.2	-4.5	-7.5	-7.6	-7.7	-8.0	-8.7	-8.8	-3.9	-4.6	-4.2	-4.7	-12.9	-8.1
Yemen	-4.4	-4.8	-5.4	-6.1	-6.3	-5.7	4.9	-8.5	-8.6	-8.4	-8.0	-7.9	-7.1	-2.3	-2.7	-3.4	-3.6	-2.7	9.0

Source: Authors' calculations.

Table A.5. Comparison of Robustness of Current Account Norm Forecasts, 2007-09

	Net Oil Exporters			Net Oil-Importer EMEs		
	Bias*100	SE*100	RMSE*1000	Bias*100	SE*100	RMSE*1000
Random walk with drift						
ca_{it}	14.52	5.161	225.21	15.06	5.203	215.78
Δca_{it}	3.515	2.183	7.73	4.178	2.013	8.21
Trend						
ca_{it}	46.62	4.681	3001	56.91	5.68	2961
Δca_{it}	5.64	10.89	194.29	6.03	12.59	189.62
VAR(1)						
ca_{it}	7.33	2.651	53.21	6.89	2.264	48.49
Δca_{it}	1.462	2.012	4.01	1.132	1.792	3.76
VAR(3)						
ca_{it}	21.03	3.815	67.58	24.58	4.151	74.59
Δca_{it}	4.32	2.982	6.03	4.51	4.062	7.06
			Estimated models:			
FEST I				*FEST I*		
ca_{it}	5.79	2.561	41.62	7.02	2.405	44.25
Δca_{it}	0.935	1.862	3.16	1.013	1.782	3.59
FEST II				*FEST II*		
ca_{it}	5.98	2.528	43.74	6.872	2.625	42.01
Δca_{it}	0.944	1.824	3.67	1.001	1.513	3.19
FEST III						
ca_{it}	6.06	2.699	46.08			
Δca_{it}	0.964	2.922	3.88			
FEST IV						
ca_{it}	10.24	3.251	55.02			
Δca_{it}	1.948	2.512	4.54			

Source: Authors' calculations.

Note: "SE" denotes standard error and "RMSE" denotes root mean square error.

Table A.6. Alternative Comparison of Robustness of Current Account Norm Forecasts, 2007-09

	Net Oil Exporters			Net Oil-Importer EMEs		
	Theil Statistic	o.w. variance	o. w. covariance	Theil Statistic	o.w. variance	o. w. covariance
Random walk with drift						
ca_{it}	0.879	0.549	0.348	0.902	0.623	0.109
Δca_{it}	0.645	0.478	0.174	0.715	0.498	0.155
Trend						
ca_{it}	0.713	0.481	0.302	0.813	0.519	0.302
Δca_{it}	0.549	0.348	0.206	0.599	0.698	0.216
VAR(3)						
ca_{it}	0.698	0.256	0.461	0.702	0.326	0.456
Δca_{it}	0.549	0.214	0.381	0.581	0.371	0.356
VAR(1)						
ca_{it}	0.319	0.118	0.862	0.321	0.020	0.845
Δca_{it}	0.121	0.062	0.827	0.111	0.015	0.852
	Estimated models:					
FEST I				*FEST I*		
ca_{it}	0.362	0.147	0.792	0.013	0.019	0.9690
Δca_{it}	0.196	0.092	0.781	0.012	0.005	0.9280
FEST II				*FEST II*		
ca_{it}	0.175	0.004	0.912	0.011	0.017	0.9730
Δca_{it}	0.060	0.002	0.910	0.004	0.005	0.9331
FEST III						
ca_{it}	0.421	0.184	0.658			
Δca_{it}	0.243	0.108	0.614			
FEST IV						
ca_{it}	0.305	0.111	0.881			
Δca_{it}	0.117	0.054	0.868			

Source: Authors' calculations.

Note: The smaller the Theil U statistic the more robust the result, which should always be < 1. The decomposition of the statistic is also of importance, with the most robust forecast having the lowest variance and highest covariance.

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