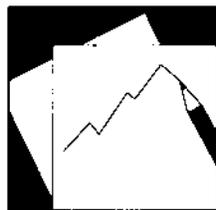


# Working Paper

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# IMF Working Paper

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## Current Account Determinants for Oil- Exporting Countries

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**IMF Working Paper**

Middle East and Central Asia Department

**Current Account Determinants for Oil-Exporting Countries**

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**Abstract**

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The paper aims at characterizing the main determinants of the medium-term current account balance for oil-exporting countries using dynamic panel estimation techniques. Previous studies included a very limited number of oil-exporting countries in their samples, raising concerns about the applicability of the estimated coefficients for oil countries. Furthermore, current approaches are not specifically tailored to oil-producing countries because they fail to capture the effects of oil wealth and the degree of maturity in oil production. This paper explores the underlying determinants of the current account balance for a large sample of oil-exporting countries, and extends the specifications commonly used in the literature to include an oil wealth variable, as well as a proxy for the degree of maturity in oil production. The paper therefore contributes to the existing literature both in terms of the sample studied as well as the variables considered. The results reveal that factors that matter in determining the equilibrium current account balance of oil-exporting countries are the fiscal balance, the oil balance, oil wealth, age dependency, and the degree of maturity in oil production.

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## I. INTRODUCTION

The current account position in oil-exporting countries shows high degree of volatility due to fluctuations in oil prices, and in some countries in production volumes and oil sector-related imports. Assessing the appropriate current account level in oil-exporting countries is further complicated by a number of factors. First, the fact that oil resources are exhaustible raises the need for intergenerational equity considerations. This can be an especially pressing issue for countries close to the depletion of their oil resources. Second, the presence of the Dutch disease phenomenon, where an oil boom leads to a real appreciation of the domestic currency reducing the competitiveness of non-oil exports and increasing imports, adversely impacts the current account position and its prospects.

As a result, properly assessing current account sustainability is becoming an increasingly important issue for policymakers. A better understanding of the medium-term factors driving the current account is necessary for assessing the compatibility of current macroeconomic policies with the goal of ensuring a sustainable external position. To this end, policymakers would need to determine the level of current account that could be viewed as ‘normal’ for a certain country given its macroeconomic characteristics such as stage of development, demographics, macroeconomic policies, wealth etc.

In the literature, dynamic macroeconomic models are widely used in theories of current account determination. Such dynamic models are best able to analyze current account developments, especially in the medium and long term. They incorporate the intertemporal aspects of the current account<sup>2</sup>, where future expectations play a key role in driving current account movements. The basic idea is that the current account can act as a shock absorber in the face of temporary shocks to smooth consumption and maximize welfare. Therefore, a country encountering a temporary negative terms of trade shock would smooth consumption by running a current account deficit and borrowing externally.

Several empirical studies have utilized this theoretical framework to examine the determinants of current accounts. However, they have only focused on advanced and emerging market countries. For example, Debelle and Faruquee (1996) empirically studied from a saving-investment perspective the ‘structural’ determinants of current account balances for advanced countries. Chinn and Prasad (2003) and Lee et al (2008) extended the analysis to include emerging market countries, adding some further specifications to the model.

Most empirical studies have only included a few oil-exporting countries, which limits the applicability and robustness of the estimated coefficients for these countries. In addition, models have included only net foreign assets as a proxy of wealth which fails to capture the oil wealth that has not been extracted yet. Including an estimate of the underground oil wealth would more appropriately reflect wealth in oil-exporting countries. Moreover, the

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<sup>2</sup> See Williamson (1994) and Sachs (1981) for detailed discussion of dynamic macroeconomic models of the current account.

level of maturity in oil production influences the current account behavior. For instance, a new oil producer would need much more oil infrastructure investments and imports, and would consequently have a worse current account position relative to a well-established oil producer. On the other hand, a country that has been longer in oil production would have accumulated more wealth to be able to afford running a higher current account deficit. Available specifications fall short of capturing this aspect.

This paper attempts to fill this gap in the literature by exploring the determinants of the medium-term current accounts for a large sample of oil-exporting countries and extending the specifications commonly used in the literature to include an oil wealth variable as well as a proxy for the degree of maturity in oil production. The paper therefore contributes to the existing literature both in terms of the sample studied as well as the variables considered.

## II. METHODOLOGY AND VARIABLE DEFINITIONS

The large body of literature on the subject points to a number of determinants of the current account balance over the medium term, such as fiscal balance, demographic factors, net foreign assets, oil balance, and economic growth. Drawing on this strand of research, the current account balance, expressed as a ratio to GDP, will be regressed on the robust determinants identified in the literature as well as additional factors that would be relevant in case of oil-exporting countries. Pooled, fixed effects, and generalized method of moments estimation models will be used.

The determinants used in this paper are as follows:

**Fiscal balance.** Generally a higher government fiscal balance rises national saving and improves the current account balance, except in case of a full Ricardian equivalence where higher public saving is fully offset by lower private saving. However, there is very limited empirical evidence for full Ricardian equivalence both in industrial and developing countries<sup>3</sup>. So, a higher government fiscal balance would be expected to have a positive effect on the current account. The fiscal balance is calculated here as the ratio of the general government budget balance to GDP in deviation from the weighted average budget balance of trading partners. In concept, if the fiscal balance of a country strengthened by the same degree as the enhanced fiscal balance of its trading partners, there would be a macroeconomic impact of such a fiscal effort but no impact on the current account of that country. The current account would be affected only to the extent that the fiscal balance of a country improved relative to its trading partners, other things being equal.

**Demographic factors.** Demographic trends have life-cycle implications that influence developments in the current account. A higher share of the economically dependent population would increase national consumption and reduce national savings, resulting in a lower current account. The demographic profiles, however, matter for the current account only to the extent they vary across countries and, accordingly, affect cross-country differences in saving. The model specification here includes two variables to proxy for this,

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<sup>3</sup> See Bernheim (1987).

the age dependency ratio and population growth both measured in deviation from trading partners weighted averages. The age dependency ratio is defined as the share of young and old age population (below 15 and above 65) to working age population (between 15 and 64). While in Lee et al., (2008), only old-age dependency ratio was used, the total dependency ratio is more relevant for the sample countries as the share of young population in oil exporters tends to be high in contrast to the aging population in many of the advanced countries in their sample.

**Net Foreign Assets (NFA).** The level of the NFA can influence the current account in two ways. First, countries with a higher NFA can sustain a higher trade deficit while remaining solvent, which results in a negative association between the NFA and the current account. Second, countries with higher NFAs consequently enjoy higher foreign income flows leading to a positive association between NFA and the current account. Empirically, the second effect would be expected to dominate. The NFA variable is measured as the lagged NFA to GDP ratio to avoid endogeneity problems with the current account. The NFA data are obtained from the revised database on external assets and liabilities of Lane and Milesi-Ferretti (2007).

**Oil Balance.** The oil balance captures both changes in oil prices, as well as changes in oil production and consumption patterns. Higher oil export revenues would increase the current account balance. The oil balance is therefore expected to have a positive relationship with the current account. The variable used here is constructed as the ratio of the oil trade balance to GDP.

**Economic Growth.** The stage of economic development of a country has implications for the current account. At an early stage of development, a country would require higher investment and need to import capital. Therefore, it is expected to run current account deficits. As the country achieves a higher level of economic development, its current account balance would improve and it would be able to repay its external liabilities. Two variables are used to capture the stage of economic development, namely economic growth and relative income. Economic growth is measured as the real per capita GDP growth rate in deviation from its trading-partner weighted average, while relative income is measured as the ratio of PPP-based per-capita income to the U.S. level. Relative economic growth is expected to have a negative relationship with the current account, whereas relative income is expected to have a positive relationship.

**Oil wealth.** The underground oil wealth is a very important component for oil-exporting countries. Actually, for many oil exporters the oil wealth far surpasses their current net foreign assets. This is particularly true for countries with huge oil reserves such as Saudi Arabia, and countries at an early stage of oil production such as Kazakhstan where NFA is even negative partly due to the large imports needed to build the required oil infrastructure. The variable is constructed as the remaining proven oil reserves at each year valued at oil price of the relevant year relative to GDP. It is worth noting that using the net present value of the reserves instead of the undiscounted valuation would not affect the results of the regression as long as the same extraction and discount rates are used for all countries. The expected sign of the oil wealth variable would be negative as a country with higher oil wealth

can afford to run higher current account deficits and remain solvent. In the empirical model here, the variable is lagged one period, in order to avoid endogeneity problems with the current account.

**Degree of maturity in oil production.** The degree of maturity in oil production influences the current account behavior. For example, a new oil producer would have higher oil infrastructure investments and imports needs, and would consequently have a worse current account position relative to a well-established oil producer. Established producers might have higher surpluses because they do not need to invest as much. On the other hand, a country that has been longer in oil production would have accumulated more wealth to be able to afford running higher current account deficit. Hence, the sign of the variable would be a priori ambiguous depending on which effect dominates. As a proxy for this factor, I use the number of oil production years after first reaching the production level of 200 thousand barrels or more a day.

First order lagged dependent variable is also included in the specification of the empirical model for two reasons. First, there is a habit formation aspect in the saving behavior that suggests the need for including a lagged dependent. Second, the existence of serial correlation in the static specifications also suggests the need to use a lagged dependent variable.

### III. ESTIMATION RESULTS

An equilibrium relationship between current account balances and a set of fundamentals is estimated using a panel dataset of annual frequency for 28 oil-exporting economies over the 1970–2006 period, including Algeria, Angola, Azerbaijan, Bahrain, Colombia, Republic of Congo, Ecuador, Equatorial Guinea, Gabon, Indonesia, Iran, Kazakhstan, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Qatar, Russia, Saudi Arabia, Sudan, Syria, Trinidad and Tobago, Turkmenistan, United Arab Emirates, Venezuela, and Yemen.<sup>4</sup> On average, there are 25 observations per country. This large sample of oil-exporting countries will help to obtain more accurate and reliable estimates of the equilibrium relationship between current account positions and the set of fundamentals.<sup>5</sup>

Individual and panel country unit root tests reveal that cointegration methods are not appropriate because the current account balance (in percent of GDP) is a stationary series in all countries during the sample period. DeBelle and Faruquee (1996), Chinn and Prasad (2003), and Lee et al., (2008) employed pooled OLS and fixed effects techniques to estimate the equilibrium current account balance. However, pooled OLS and fixed effects estimations assume strict exogeneity of explanatory variables, which entails that the error terms are

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<sup>4</sup> The main data sources are World Economic Outlook (WEO) and World Development Indicator (WDI) data. Data on oil production and reserves is obtained from BP Statistical Review of World Energy June 2007.

<sup>5</sup> To account for outliers, observations for Kuwait during the first gulf war 1990-92 were dropped as well as all observations with a  $DFBETA_{i,t}$  statistic, for country  $i$  at time  $t$ , with an absolute value above  $2/\sqrt{n}$ , ( $n$  is the number of observations in the original sample).

uncorrelated. In the proposed specification, this assumption is too strong and unlikely to hold. Alternatively, the generalized method of moments (GMM) controls for endogeneity and corrects for the bias arising from including the lagged dependent variable in the fixed effects estimation. The paper applies the GMM-System estimator a la Blundell and Bond (1998), which uses additional moment conditions.

The estimation results are presented in Table 1. The first column shows the pooled regression results, the second one the fixed effects results, and the third column uses a GMM system to control for endogeneity and correct for the bias arising from including the lagged dependent variable in the fixed effect estimation. The GMM is the preferred specification and the pooled and fixed effects estimations are shown for comparison purposes. The following discussion of the results will focus on the GMM estimator.

- Fiscal balance, both in the short and long terms, emerges as the most influential macroeconomic fundamental on the current account balance in oil-exporting countries under all specifications.<sup>6</sup> The coefficient on the short-term fiscal balance is 0.51 under the GMM estimation, suggesting that a 1 percentage-point increase in the government budget balance (relative to trading partners) leads to an almost 0.5 percentage-point increase in the current account balance in percent of GDP. The coefficient of the long-term fiscal balance is higher, amounting to 0.86. These estimates are higher than those of Lee et al (2008).

- Oil balance comes out as another highly significant variable. The coefficient on the oil balance ranges from 0.13 to 0.35 under the different estimations. Although oil-exporting countries enjoy large oil surpluses, averaging around 23 percent of GDP for the sample countries, they spend significantly more on imports of goods and services, amounting to an average of 37 percent of GDP, leading to a less than one-to-one relationship between oil balances increases and current account surpluses. Under the GMM, oil balance coefficient of 0.35 means that an improvement in the oil balance by one percent would raise the medium-term current account balance by 0.35 percent of GDP.

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<sup>6</sup> In the specification, the long-term coefficient equals the short-term coefficient of the particular variable divided by 1 minus the coefficient of the lagged dependent variable.

**Table 1. Current Account Regressions**

|   | Pooled    | Fixed Effects | GMM       |
|---|-----------|---------------|-----------|
| Lagged dependent                            | 0.49***   | 0.4***        | 0.41***   |
| Oil balance                                 | 0.13***   | 0.23***       | 0.35**    |
| Fiscal balance                              | 0.36***   | 0.41***       | 0.51**    |
| Output growth                               | -0.04     | -0.11***      | -0.04     |
| Relative income                             | 0.01      | 0.08***       | -0.01     |
| Population Growth                           | 0.33*     | 0.24          | -0.55     |
| Age dependency                              | -0.04***  | -0.06         | -0.25**   |
| Initial NFA                                 | 0.01*     | 0.01***       | 0.02      |
| Oil Wealth                                  | -0.0002** | -0.001***     | -0.0005** |
| Degree of maturity in oil production        | 0.01      | 0.04          | -0.28**   |
| Constant                                    | -1.6***   | -5.5***       | 9.03**    |
| Fiscal balance (long term)1/                | 0.71***   | 0.68***       | 0.86***   |
| Adjusted R2                                 | 0.78      | 0.75          |           |
| Hansen test of overidentifying restrictions |           |               | 0.97      |
| Arellano-Bond test for AR(1)                |           |               | 0.01      |
| Arellano-Bond test for AR(2)                |           |               | 0.49      |
| Hansen test of exogeneity of instruments    |           |               | 1.0       |
| Number of countries                         | 28        | 28            | 28        |
| Observations                                | 582       | 582           | 582       |

Note: \*, \*\*, \*\*\*, indicates significance at the 10, 5, 1 percent level

1/ The long term coefficient equals the short-term coefficient (coefficient associated with the variable of interest) divided by 1 minus the coefficient associated with the lagged dependent variable.

- Stage of economic development does not significantly affect the current account balance for oil-exporting countries. Both relative income and economic growth came insignificant in the GMM specification. This is in contrast to the findings of Lee et al., (2008) and DeBelle and Faruqee (1996) for advanced and emerging economies.

- The demographic variable for age dependency ratio (the share of dependents to working age population) has significant negative effect on the current account among the sample countries. The coefficient, under GMM estimation, indicates that a country which has an increase of dependency ratio that is ten percentage-points above its trading partners will run a current account balance that is around 2½ percentage-point of GDP lower. Meanwhile, the other demographic variable, population growth, turned out to be insignificant.

- As discussed earlier, the sign of the NFA coefficient would be a priori ambiguous. Pooled and fixed effects estimations yield a positive significant coefficient, the GMM estimation which controls for endogeneity produces a positive but insignificant coefficient. The positive

influence of NFA on the current account is consistent with the findings in Lee et al., (2008), Lane and Milesi-Ferretti (2002), and Chinn and Prasad (2003).

- Oil wealth variable has significant negative impact on the medium-term current account balance under all estimation techniques. The long-run coefficient for oil wealth is  $-0.001$ , under the GMM, implying that, *everything else constant*, a country whose oil wealth is double the oil wealth of another country in terms of the share of their respective GDP would have a medium-term current account balance that is 0.2 percentage point lower.
- The degree of maturity in oil production has significant negative influence, under GMM, on the current account balance. The coefficient of  $-0.28$  suggests that, *everything else constant*, a country that has 10 years in oil production, following initially reaching the production level of 200 thousand barrels or more a day, will have on average a current account balance that is 2.8 percentage points of GDP lower.

#### IV. SENSITIVITY ANALYSIS

To assess the robustness of the above findings, I conducted an extensive sensitivity analysis. Reassuringly, however, this analysis revealed that the main results did not change with alternative specifications and variable definition. Table 2 presents the results of the robustness tests.

In the results shown in Table 1, economic growth was included in a linear form. I examined the results using economic growth in quadratic terms to account for any potential nonlinearities in the effect of the stage of development that may result from the need to first borrow and then repay capital. The economic growth variable remains insignificant. Column (1) in Table 2 reports the results. While the fiscal balance, the oil balance, oil wealth, and the degree of maturity in oil production continue to be significant and have similar magnitudes compared with the main specification, age dependency becomes insignificant and the initial NFA becomes significant.

Furthermore, estimations were conducted with the oil price instead of the oil balance. Estimates (2) in Table 2 reveal that the oil price has a significant positive influence on the current account position. The fiscal balance remains significant but has a relatively larger coefficient compared to the GMM specification in Table 1 (0.69 compared to 0.51). Oil wealth comes out significant but the degree of maturity in oil production does not.

**Table 2. Robustness of Current Account Regressions Using GMM**

|   | (1)      | (2)        | (3)       |
|---|----------|------------|-----------|
| Lagged dependent                            | 0.42***  | -0.13      | 0.23*     |
| Oil balance                                 | 0.27**   |            | 0.24*     |
| Oil Price                                   |          | 7.41***    |           |
| Fiscal balance                              | 0.59**   | 0.69***    | 0.59***   |
| Output growth 1/                            | 0.01     | 0.16       | -0.41     |
| Relative income                             | 0.06     | -0.03      | -0.09     |
| Population Growth                           | -0.62    | 3.06*      | 1.45      |
| Age dependency                              | -0.14    | -0.13      | -0.31     |
| Initial NFA                                 | 0.03*    | -0.001     | -0.01     |
| Oil Wealth                                  | -0.0004* | -0.0005*** | -0.0003** |
| Degree of maturity in oil production        | -0.17*   | 0.06       | -0.08     |
| Constant                                    | 5.83     | -27.82***  | 5.46      |
| Fiscal balance (long term)3/                | 1.0**    | 0.61***    | 0.77***   |
| Adjusted R2                                 |          |            |           |
| Hansen test of overidentifying restrictions | 0.95     | 1.0        | 1.00      |
| Arellano-Bond test for AR(1)                | 0.01     | 0.07       | 0.08      |
| Arellano-Bond test for AR(2)                | 0.98     | 0.78       | 0.57      |
| Hansen test of exogeneity of instruments    | 1.0      | 1.0        | 0.98      |
| Number of countries                         | 28       | 28         | 28        |
| Observations                                | 582      | 582        | 582       |

Note: \*, \*\*, \*\*\*, indicates significance at the 10, 5, 1 percent level

1/ Economic growth enters in quadratic form in specification (1).

2/ Oil reserves is valued using the oil price trend based on the Hodrick\_Prescott Filter under specification (3).

3/ The long term coefficient equals the short-term coefficient (coefficient associated with the variable of interest) divided by 1 minus the coefficient associated with the lagged dependent variable.

Given the importance of the oil wealth variable, different price assumptions were examined. In the main specification, oil reserves were valued at the corresponding year's price, which may entail an implicit assumption of a permanent price shock. An alternative valuation assumption was used to examine the robustness of the significance of the oil wealth variable. Using the oil price trend based on the Hodrick-Prescott Filter to value oil reserves (specification (3) in Table 2), the results of the GMM specification in Table 1 continue to hold except for age dependency and degree of maturity in oil production which now become insignificant.

In summary, the results of the main specification remained robust to the sensitivity analysis. The fiscal balance, the oil balance (alternatively oil price), and oil wealth continue to be significant across all specifications, while the degree of maturity in oil production gives mixed results.

## V. CONCLUSION

The paper examines the main underlying determinants of the medium-term current account balance for oil-exporting countries using dynamic panel estimation techniques. Previous studies included a very limited number of oil-producing countries in their samples, raising concerns about the applicability of the estimated coefficients for oil countries. Furthermore, current approaches fail to capture the oil in the ground wealth for oil countries and the degree of maturity in oil production. This paper explores the underlying determinants of the current account for a large sample of oil-exporting countries, and extends the specifications commonly used in the literature to include an oil wealth variable as well as a proxy for the degree of maturity in oil production. The paper therefore contributes to the existing literature both in terms of the sample studied as well as the variables considered.

The results reveal that the factors that matter in determining the equilibrium current account in case of oil-exporting economies are the fiscal balance, the oil balance, oil wealth, age dependency, and the degree of maturity in oil production. More importantly, the paper helps to identify the oil-exporting economies' specific characteristics that significantly affect the equilibrium current account balance such as the underground oil wealth and the degree of maturity in oil production. Results demonstrate that the fiscal balance and the oil balance variables are highly significant across all estimation methods and specifications. The size of the fiscal balance coefficient, however, is considerably higher than the estimates found in Lee et al., (2008) for advanced and emerging economies. Oil wealth is found to have a significant negative influence on the current account balance across all specifications. Thus, countries with higher oil wealth are more likely to run lower current account surpluses. The variables for age dependency and the degree of maturity of oil production are significant in the main specification but are not robust across alternative specifications.

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