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# Curse or blessing: how do oil price fluctuations influence financial development in low- and middle-income net oil-exporting countries?

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## Abstract

Why do oil-exporting developing countries tend to have weak levels of financial development? This study examines the role of oil price fluctuations in answering this question by focusing on the case of low- and middle-income net oil-exporting countries. Covering the period from 1987 to 2015, the empirical analysis is based on a large sample of 657 country-year observations. The long-run effect is captured using the System Generalized Method of Moments (GMM) estimator applied to a dynamic panel data model to deal with dynamic endogeneity bias, after controlling for several determinants of financial development. The results reveal that low- and middle-income net oil-exporting countries do not benefit from the increase in the world oil price to develop their financial system. Even worse, the rise in oil price jeopardizes the financial development of these countries. These counterintuitive and intriguing findings can be explained by the resource curse in financial development. They prove to be robust to the use of alternative test variables and alternative econometric methodologies.

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# 1. Introduction

A large literature recognizes the development of the financial sector as a critical factor in inclusive economic development (e.g., Levine, 2005; Beck, 2009). Demirgüç-Kunt (2012) shows that countries with better developed financial systems grow faster and it is the deepest income quintile that benefits most from this increase. On the other hand, countries with less developed financial systems are experiencing a more rapid reduction in income and an increase in poverty. Rajan and Zingales (1998) and Beck et al. (2005) show that the development of the financial sector helps small businesses to overcome the constraints of financing. Also, Beck et al. (2000) show that the positive effect of the growth of financial markets allows better profitability of economic growth. Assuming that the financing-growth relationship is consistent across countries, previous literature (e.g., Baltagi et al., 2009; Ahmed, 2016; Trabelsi and Cherif, 2017; Nakhli et al., 2020; Gaies and Nabi, 2021) focuses on large cross-country samples examining three main determinants of financial development, namely economic openness, institutional quality, and income level. Other studies (e.g., Rioja and Valev, 2004a, b) argue that financial development is dictated by differences in economic growth depending on the extent to which an economy depends on exports of natural resources or its wealth of natural resources. On closer examination, it appears that this literature has focused specifically on the link between GDP and finance by considering the role of natural resources as a moderating factor. One of its main results suggests that resource-rich countries are generally characterized by low financial development, even when they experience high income levels. Given its counterintuitive nature – since resource-rich countries generate considerable liquidity from natural resource exports – this result is examined by a more recent literature (e.g., Beck, 2011; Yuxiang and Chen, 2011; Bhattacharrya and Hodler, 2014) that suggests that a financial development curse exists in resource-abundant economies. The "usual suspects" identified to explain the "curse" are poor government policies, insufficient human capital development, inadequate management of financial resources, improper use of natural resource windfalls, and rent-seeking behavior. The endogenous nature of these factors leads to believe that each resource-abundant economy is the master of its own fate in terms of tackling the financial developing curse, thereby obscuring the role of exogenous factors, namely movements in world commodity prices. To address this concern, Mlachila and Ouedraogo (2020) investigate the infamous financial development curse in relation to commodity price fluctuations by analyzing 68 commodity-rich developing countries between 1980 and 2014, using the GMM estimator. The authors find that commodity price fluctuations have a negative impact on financial development, adding a potential exogenous cause of the financial development curse. They show that if commodity prices rise, the economy becomes more vulnerable due to macroeconomic instability, which reduces growth and hinders financial system development. As Mlachila and Ouedraogo (2020) note, their study is the first to explicitly investigate the exogenous determinants of the financial development curse in resource-abundant economies by considering commodity price fluctuations.

To go one step further, in this study we focus on oil price fluctuations and consider a more homogenous sample of low- and middle-income net oil-exporting countries. Indeed, Mlachila and Ouedraogo (2020) include high-income countries and group in their sample producers and exporters of different types of commodities, which may obscure some heterogeneities across countries. For instance, it is well known that the trend of financial development – like that of economic development – can be dissimilar between developed and developing countries (Demirgüç-Kunt, 2012). In addition, the financial development curse may depend on the type of commodity in which the economy is specialized and whether the country is net exporter or only a producer of commodities. We also argue that focusing on oil prices provides a more specific explanation for the financial development curse in resource-abundant economies, given the potential heterogeneity in price movements between fuel and non-fuel commodities.

Furthermore, we complement studies that explain the financial development curse in resource-abundant economies through endogenous factors (e.g., Beck, 2011; Yuxiang and Chen, 2011; Bhattacharrya and Hodler, 2014), particularly resource rent management, as we use oil price fluctuations to examine an exogenous determinant of the financial development curse. We also complement the recent literature on the effect of oil price fluctuations on financial instability that shows a correlation between these fluctuations and financial crises in resource-rich economies (Kinda et al., 2018 and Gaies et al., 2020). Indeed, the financial development–oil price nexus can be a channel explaining this correlation. Our study also makes a methodological contribution because, as Mlachila and Ouedraogo (2020) note, the existing literature on the financial development curse has employed static estimators, including fixed and random effects models, to study the macro-financial effects of natural resources and rents (e.g., Beck, 2011; Bhattacharrya and Hodler, 2014). However, these econometric methods are not able to deal with the endogeneity bias that could emerge from the bi-directional relationship between the financial system and the resource rents. We therefore use the dynamic panel GMM estimator to address these concerns following Mlachila and Ouedraogo (2020). Then, we strengthen the robustness of our estimates by using alternative econometric methods, including the dynamic feasible generalized least squares (FGLS) estimator and alternative test variables. Finally, this study could provide valuable lessons for policymakers by helping them better regulate the relationship between the energy sector and the financial sector. This is useful for low- and middle-income net oil-exporting countries seeking practical strategies to avoid or mitigate the resource curse and move toward sustainable economic growth with more diversified economic activities.

The remainder of this paper is organized as follows. Section 2 describes the data and variables used in the subsequent analyses. Section 3 outlines the empirical approach. Section 4 presents the results. Section 5 discusses the findings and concludes.

# 2. Data and variables

This section describes our data sources and the construction of the variables used in the empirical analysis.

## 2.1. Data sources

To examine the relation between oil price fluctuations and financial development, we merge five databases: i) the U.S. Energy Information Administration (EIA), ii) the Plains All American Pipeline (PAA) databases, which both provide oil price fluctuation data; iii) the World Bank database, which provides world development indicators; iv) the KOF database, which provides trade and financial openness data; and v) the Financial Structure Database (FSD), which provides financial development indicators. Our sample includes developing countries that are classified by the World Bank as low- and middle-income countries.[1] Based on this list, we select the net oil-exporting countries, according to the CIA World Factbook list, and then discard the upper-middle- and high-income countries, such as Kuwait, Saudi Arabia, and the United Arab Emirates. Compared to other developing economies, these countries have a higher level of financial, institutional, and economic development. The choice of our sample is also justified by the fact that the academic literature on energy and finance often deals with the largest oil-exporting developing countries that have upper-middle and high income, rather than low- and middle-income net oil-exporting developing countries. Our final sample contains 657 country-year observations over the 1987-2015 period.

[1] The list of countries is presented in Appendix A.

## 2.2. Variables

*Financial development*

Following prior literature, we use the domestic credit to the private sector, denoted *DCPS*, as an indicator of financial development in low- and middle-income countries (Baltagi at al., 2009; Ahmed, 2016; Trabelsi and Cherif, 2017; Nakhli et al., 2020; Gaies and Nabi, 2021). *DCPS* is computed as the total claim by financial institutions on the domestic private sector, scaled by GDP. Lower *DCPS* values denote a lower degree of financial development. As noted by Rioja and Valev (2014), the domestic credit to private sector (% of GDP) is considered as an accurate indicator of the financial deepening that characterizes low- and middle-income economies, since the financial sphere of these countries relies to a large extent on banking intermediation rather than on capital markets as in developed and emerging countries. For this reason, previous studies that have examined the link between oil price and stock markets in developing countries might not capture the main financial effects of oil price fluctuations. Hence, our investigation addresses this shortcoming.

*Oil price fluctuations*

Our analysis employs the variation of three alternative indicators of oil price fluctuations, namely the West Texas Intermediate Spot Price FOB, ($Real\_oil\_price\_fluctuations_{WTI}$), the Europe Brent Spot Price FOB ($Real\_oil\_price\_fluctuations_{Brent}$), and the Illinois Spot Price FOB ($Real\_oil\_price\_fluctuations_{Illinois}$). All these variables are adjusted for seasonality (log-difference).

*Control variables*

To single out the incremental explanatory power of oil price fluctuations on financial development, we include a set of control variables deemed to explain the degree of financial development (Baltagi at al., 2009; Ahmed, 2016; Trabelsi and Cherif, 2017; Nakhli et al., 2020; Gaies and Nabi, 2021). These variables include the one-year-lagged values of economic development, trade openness, financial openness, and financial development, as described in Table 1 below.

**Table 1.** Control variables

| Variable | Definition | Expected sign | Source |
|---|---|---|---|
| *Financial development$_{t-1}$* | Domestic credit to private sector (% of GDP) one-year lagged. | + | Financial Structure Database. |
| *Economic development$_{t-1}$* | Real gross domestic product divided by midyear population one-year lagged. | + | World Development Indicators. |
| *Trade openness$_{t-1}$* | De facto KOF trade globalization Index one-year lagged. | + | KOF Globalization Index. |
| *Financial openness$_{t-1}$* | De facto KOF financial globalization Index one-year lagged. | +/- | KOF Globalization Index. |

Moreover, to go further than previous research which investigated the impact of oil price on long-run financial variables based on time series data, our study has been conducted using panel data because of some major advantages highlighted by several econometric works, such as Hsiao (2007). According to the author, the use of panel data is beneficial for the econometric processing through comprehensive modeling of the economic reality, because unlike time series and cross-section data, it considers the individual dimension of information, in addition to the time dimension. Furthermore, when using panel data, the estimates benefit from a higher degree of freedom, their predictive power increases, and the risk of the omitted variables bias and that of non-stationarity is reduced.

In addition, in order to reflect the long-run impact of oil price fluctuations on financial development in low- and middle-income countries, our study covers the period 1987-2015 (annual data), knowing that much of the previous work on finance and oil linkages focused on the short- and medium-term using daily and monthly data.

# 3. Methodology

Our econometric model is based on Baltagi et al. (2009), Ahmed (2016), and Trabelsi and Cherif (2017). With reference to these empirical studies on the determinants of financial development, it has become common practice to examine the impact of trade and financial openness on financial development using the following dynamic modeling:

$$\Delta Y_{it} = (\pi - 1)\, Y_{it-1} + \beta' X_{it-1} + \alpha O_{it} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

where, $\gamma = (\pi - 1)$ and $\Delta Y_{it} = Y_{it} - Y_{it-1}$

Equation (1) is equivalent to:

$$Y_{it} - Y_{it-1} = \pi Y_{it-1} - Y_{it-1} + \beta' X_{it-1} + \alpha O_{it} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (2)$$

Hence,

$$Y_{it} = \pi Y_{it-1} + \beta' X_{it-1} + \alpha O_{it} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (3)$$

where, $Y_{it}$ represents the financial development variable explained by its one-year lagged value, namely $Y_{it-1}$. $X_{it}$ is a set of control variables, including the one year-lagged values of economic development, trade openness, and financial openness, as well as a constant. To examine the relationship between financial development and oil price fluctuations, and to go one step further than the financial development studies cited above, which did not examine the relationship between finance and oil prices, we augment the standard dynamic modeling of financial development with a set of oil price fluctuation variables $O_{it}$. $\pi$ is the coefficient reflecting the potential existence of conditional convergence in terms of financial development among countries, and $\beta'$ is the matrix of the coefficients of the remaining explanatory variables. $\mu_i$ is the country-specific effect; $\lambda_t$ is the time-specific effect; $\varepsilon_{it}$ is the error term. The indicators $i$ and $t$ represent the countries ($i$ = 1, 2… N) and the periods ($t$ = 1, 2… T) respectively.
Standard estimators based on the ordinary least squares method (OLS) could be inconsistent in estimating Equation (3) due to the potential endogeneity bias caused by i) the unobserved heterogeneity correlation problem and ii) dynamic endogeneity, which results in incorrect estimations and predictions leading thereby to misleading interpretations (Hamilton and Nickerson, 2003; Greene, 2011; Wooldridge, 2010). The problem of unobserved heterogeneity correlation arises when the country-specific effect, which indicates the time-invariant characteristics of each country, such as the geographic area, is correlated with one or more explanatory variables. The problem of dynamic endogeneity occurs when one or more explanatory variables are correlated with the error term, leading to biased estimates because of the risk of serial correlation.
To mitigate the concerns and to obtain consistent estimations, we start by defining the first differenced form of Equation (3) as follows:

$$\Delta Y_{it} = \pi \Delta Y_{it-1} + \beta' \Delta X_{it-1} + \alpha\, \Delta O_{it} + \Delta\lambda_t + \Delta\varepsilon_{it} \qquad (4)$$

Equation (4) is equivalent to:

$$Y_{it} - Y_{it-1} = \pi\, (Y_{it-1} - Y_{it-2}) + \beta'(X_{it-1} - X_{it-2}) + \alpha\, (O_{it} - O_{it-1}) + (\lambda_t - \lambda_{t-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \qquad (5)$$

Hence, the country-specific effect ($\mu_i$) is controlled: $\Delta\, \mu'_i = 0$ (6)

We then estimate Equation (4) using the Generalized Method of Moments (GMM) developed by Arellano and Bond (1991). The estimator resulting from this step is called Difference GMM estimator (DGMM), knowing that we use the lagged values of the explanatory variables as instruments for their contemporary values written in the first difference. In theory, the first differenced form and the "internal" instruments indicated above allow us to address the unobserved heterogeneity correlation problem and the dynamic endogeneity problem. Yet, according to Arellano and Bover (1995) and Blundell and Bond (1998), the main weakness of DGMM lies in the fact that the explanatory variables lagged in level could be weak instruments for their values expressed in the first difference, especially if the number of countries is greater than the number of years (N> T), which is the case for our sample. In addition to that, the first differenced form reduces the number of observations and, thus, decreases efficiency because it lowers the degree of freedom and the representativeness of the sample.

To address these shortcomings, we use a more advanced version of the DGMM estimator developed by Blundell and Bond (1998), namely the System Generalized Method of Moments (SGMM). In doing so, we combine the two types of "internal" instruments, differenced, and in level. Consequently, the explanatory variables in difference are instrumented by their lagged values in level. Simultaneously, the explanatory variables in level are instrumented by their lagged differenced values, as expressed in the following:

$$\begin{cases} Y_{it} = \pi Y_{it-1} + \beta' X_{it-1} + \alpha O_{it} + \mu_i + \lambda_t + \varepsilon_{it} \\ \Delta Y_{it} = \pi \Delta Y_{it-1} + \beta' \Delta X_{it-1} + \alpha\, \Delta O_{it} + \Delta\lambda_t + \Delta\varepsilon_{it} \end{cases} \quad (7)$$

According to Blundell and Bond (1998), there are two conditions that should be verified. First, the instruments should be weakly correlated with the error term and their number should be slightly higher than the number of instrumented variables. Second, there should be no second-order serial correlation with the error term. As recommended by Roodman (2009a; 2009b), we perform the Hansen test and the Arellano and Bond test (AR (2)) to verify these conditions. Also, according to this author, we refer to the corrections proposed by Newey and Windmeijer (2009) to optimize the number of instruments, and we adjust the error term by utilizing White's (1980) method to correct for heteroscedasticity bias.

Finally, besides the SGMM estimations, we estimate Equation (3) with the Fixed-effects estimator with a robust correction to understand the explanatory power of our modeling by the magnitude of the coefficient of determination (R-squared). As previously mentioned, this estimator does not serve as a basis for interpreting the coefficients (α, π and β') of the explanatory variables, due to the potential endogeneity bias.

# 4. Results

Table 2 presents the baseline estimations of Equation 3 described above.[2] Three main results are worth noting. First, the dynamic specification illustrated by Equation 3 has good explanatory power and is therefore able to capture the representative determinants of the financial development phenomenon in our sample. This conclusion is based on the R-squared values greater than 70%, which are shown in columns 1-3 of Table 2. In addition, the magnitude of the Fisher-statistic proves the overall significance of the specification at the 1% level. Also, the Hansen test confirms the validity of the instruments used because its P-values are greater than 10% in all SGMM regressions (see, columns 4, 5 and 6 of Table 2). Referring to the P-values of the Arellano and Bond test (AR2) that are greater than the 10% level in all SGMM regressions (see, columns 4, 5 and 6 of Table 2), it seems clear that there is no serial correlation between the error term in second-order. In sum, those tests show the consistency of the SGMM

[2] Variable summary statistics are portrayed in Appendix B.

estimations.
Second, a look at Table 2 reveals that our control variables' coefficients are in line with those reported in previous studies on the determinants of financial development (e.g., Baltagi et al., 2009; Ahmed, 2016; Trabelsi and Cherif, 2017), but focusing on spatio-temporal frameworks different from ours. Indeed, the positivity, significance, and magnitude of the coefficients of the one-year lagged variable "economic development" leads us to assume that the level of economic development is a key determinant of the degree of financial development. The positive and significant coefficients of the one-year lagged financial development variable indicates the existence of conditional convergence in terms of financial development among countries because their values are less than 1 in all regressions. Also, the one-year lagged trade openness variable is characterized by significant and positive coefficients, which reflects the importance of external trade in promoting the domestic financial system of low- and middle-income net oil-exporting developing countries. Conversely, it seems that financial openness does not explain the financial development in these countries. This conclusion is deduced from the insignificance of the coefficients of the one-year lagged financial openness variable. This can be explained by the fact that the effects of financial openness in developing countries are ambiguous because they depend on the nature of openness. Indeed, according to Gaies et al. (2019), when investment-globalization (based on foreign direct investment) develops the domestic financial system, indebtedness-globalization (based on external debts) increases its instability.
Third, the coefficients of our three indicators of real oil price fluctuations, namely "*Real oil price fluctuations$_{Brent}$*", "*Real oil price fluctuations$_{WTI}$*" and "*Real oil price fluctuations$_{Illinois}$*" are negative and statistically significant at least at the 5% level in all SGMM regressions, as shown in Table 1. This indicates a negative and significant impact of the rise in world oil prices on the financial development of low- and middle-income net oil-exporting economies. In other words, it appears that this negative and persistent financial contagion through oil price fluctuations produces a harmful long-run effect on the domestic financial sphere of these economies.
To further square our findings, we have subjected our basic results to two robustness checks. First, we include the two variables *Nominal oil price fluctuations$_{WTI}$*, representing the variation of the West Texas Intermediate Spot Price FOB (Dollars per Barrel), and *Nominal oil price fluctuations$_{Brent}$*, that is the variation of the Brent Spot Price FOB (Dollars per Barrel). Neither of them is adjusted for inflation but they are adjusted for seasonality (log-difference). As previously, these alternative measures originate from the EIA database on oil prices and correspond to yearly data. The same applies for our third alternative variable of nominal oil price fluctuations, namely *Nominal oil price fluctuations$_{Illinois}$*, which indicates the variation of the Illinois Spot Price FOB (Dollars per Barrel), and which is not adjusted for inflation but adjusted for seasonality (log-difference). It is extracted from the Plains All American Pipeline (PAA) annual oil price database. Our main findings are consolidated by the negative and significant coefficients of those alternative variables and the stability of the magnitudes, significances, and sings of the coefficients of the control variables, according to the outputs of Table 3 illustrated below.

**Table 2.** Financial development and real oil price fluctuations – baseline estimations

| Estimator | Fixed effects (1) | Fixed effects (2) | Fixed effects (3) | SGMM (4) | SGMM (5) | SGMM (6) |
|---|---|---|---|---|---|---|
| *Financial development$_{t-1}$* | 0.770*** | 0.770*** | 0.771*** | 0.813*** | 0.769*** | 0.807*** |
| | (0.047) | (0.047) | (0.046) | (0.119) | (0.124) | (0.119) |
| *Economic development$_{t-1}$* | 0.482*** | 0.490*** | 0.481*** | 0.435** | 0.529*** | 0.445** |
| | (0.113) | (0.114) | (0.113) | (0.188) | (0.192) | (0.189) |
| *Trade openness$_{t-1}$* | 0.002 | 0.002 | 0.002 | 0.010* | 0.009 | 0.010* |
| | (0.001) | (0.001) | (0.001) | (0.005) | (0.006) | (0.005) |
| *Financial openness$_{t-1}$* | -0.001 | -0.001 | -0.001 | -0.002 | -0.003 | -0.002 |
| | (0.001) | (0.001) | (0.001) | (0.004) | (0.004) | (0.004) |
| *Real oil price fluctuations$_{Brent}$* | -0.110*** | | | -0.098** | | |
| | (0.038) | | | (0.043) | | |
| *Real oil price fluctuations$_{WTI}$* | | -0.109*** | | | -0.097** | |
| | | (0.036) | | | (0.040) | |
| *Real oil price fluctuations$_{Illinois}$* | | | -0.098*** | | | -0.087** |
| | | | (0.034) | | | (0.037) |
| Constant | -2.973*** | -3.028*** | -2.969*** | -3.037*** | -3.589*** | -3.094*** |
| | (0.720) | (0.725) | (0.720) | (0.989) | (1.006) | (0.991) |
| Observations | 657 | 657 | 657 | 657 | 657 | 657 |
| R-squared | 0.796 | 0.796 | 0.796 | | | |
| Fisher-statistic | 283 | 281.7 | 282.9 | | | |
| AR2 P-value | | | | 0.738 | 0.739 | 0.739 |
| Hansen P-value | | | | 0.758 | 0.756 | 0.751 |

Note: Estimations are run by the Fixed-effects estimator with robust correction and System GMM (Windmeijer, 2009) with a small sample and robust correction. Standard errors are reported between parentheses. ***, ** and * indicate statistical significance at 1%, 5% and at 10%, respectively.

**Table 3.** Financial development and nominal oil price fluctuations – robustness test

| Estimator | Fixed effects (1) | Fixed effects (2) | Fixed effects (3) | SGMM (4) | SGMM (5) | SGMM (6) |
|---|---|---|---|---|---|---|
| *Financial development$_{t-1}$* | 0.771*** | 0.771*** | 0.771*** | 0.809*** | 0.814*** | 0.803*** |
| | (0.047) | (0.047) | (0.046) | (0.120) | (0.146) | (0.120) |
| *Economic development$_{t-1}$* | 0.480*** | 0.487*** | 0.479*** | 0.440** | 0.512** | 0.449** |
| | (0.113) | (0.114) | (0.113) | (0.188) | (0.227) | (0.189) |
| *Trade openness$_{t-1}$* | 0.002 | 0.002 | 0.002 | 0.010* | 0.012* | 0.010* |
| | (0.001) | (0.001) | (0.001) | (0.005) | (0.007) | (0.005) |
| *Financial openness$_{t-1}$* | -0.001 | -0.001 | -0.001 | -0.003 | -0.004 | -0.002 |
| | (0.001) | (0.001) | (0.001) | (0.004) | (0.005) | (0.004) |
| *Nominal oil price fluctuations$_{Brent}$* | -0.104*** | | | -0.095** | | |
| | (0.038) | | | (0.041) | | |
| *Nominal oil price fluctuations$_{WTI}$* | | -0.103*** | | | -0.087** | |
| | | (0.035) | | | (0.042) | |
| *Nominal oil price fluctuations$_{Illinois}$* | | | -0.093*** | | | -0.084** |
| | | | (0.033) | | | (0.036) |
| Constant | -2.950*** | -3.003*** | -2.948*** | -3.055*** | -3.624*** | -3.107*** |
| | (0.719) | (0.724) | (0.720) | (0.996) | (1.149) | (0.997) |
| Observations | 657 | 657 | 657 | 657 | 657 | 657 |
| R-squared | 0.796 | 0.796 | 0.796 | | | |
| Fisher-statistic | 281.4 | 280.1 | 281.4 | | | |
| AR2 P-value | | | | 0.738 | 0.738 | 0.739 |
| Hansen P-value | | | | 0.756 | 0.335 | 0.749 |

Note: Estimations are run by the Fixed-effects estimator with robust correction and System GMM (Windmeijer, 2009) with a small sample and robust correction. Standard errors are reported between parentheses. ***, ** and * indicate statistical significance at 1%, 5% and at 10%, respectively.

Second, we re-estimate Equation 3 using the dynamic feasible generalized least squares (FGLS) estimator which yields robust results consistent with those of the SGMM estimator, according to Phillips (2010). Yet, it is worth noting that the SGMM estimator is still the best recommended for dynamic panel models. This test is reported in Table 4 below and consolidates our conclusions drawn from the empirical findings of Table 2. Indeed, Table 4 confirms that oil price fluctuations have negative and significant effects on the financial development of low-and middle-income net oil- exporting developing countries. The coefficients of the control variables maintain the same signs showing a positive and significant effect of economic development and trade openness on financial development while the impact of financial openness is not significant. The magnitudes of the Wald X2-statistic indicate the overall significance of the specification at the 1% level. In summary, the results presented in Table 4 are similar to those in Tables 2 and 3 which demonstrates their robustness.

**Table 4.** Financial development and oil price fluctuations – robustness test using the Dynamic FGLS estimator

| Estimator | Dynamic FGLS (1) | Dynamic FGLS (2) | Dynamic FGLS (3) | Dynamic FGLS (4) | Dynamic FGLS (5) | Dynamic FGLS (6) |
|---|---|---|---|---|---|---|
| *Financial development$_{t-1}$* | 0.880*** | 0.881*** | 0.881*** | 0.880*** | 0.881*** | 0.881*** |
| | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) | (0.016) |
| *Economic development$_{t-1}$* | 0.053*** | 0.053*** | 0.052*** | 0.052*** | 0.053*** | 0.052*** |
| | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) | (0.020) |
| *Trade openness$_{t-1}$* | 0.002** | 0.002** | 0.002** | 0.002** | 0.002** | 0.002** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| *Financial openness$_{t-1}$* | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 | -0.001 |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| *Real oil price fluctuations$_{Brent}$* | -0.103*** | | | | | |
| | (0.039) | | | | | |
| *Real oil price fluctuations$_{WTI}$* | | -0.093** | | | | |
| | | (0.037) | | | | |
| *Real oil price fluctuations$_{Illinois}$* | | | -0.092*** | | | |
| | | | (0.034) | | | |
| *Nominal oil price fluctuations$_{Brent}$* | | | | -0.100*** | | |
| | | | | (0.038) | | |
| *Nominal oil price fluctuations$_{WTI}$* | | | | | -0.091** | |
| | | | | | (0.036) | |
| *Nominal oil price fluctuations$_{Illinois}$* | | | | | | -0.090*** |
| | | | | | | (0.034) |
| Constant | -0.067 | -0.070 | -0.066 | -0.062 | -0.067 | -0.063 |
| | (0.144) | (0.143) | (0.143) | (0.143) | (0.143) | (0.143) |
| Observations | 657 | 657 | 657 | 657 | 657 | 657 |
| Wald X2-statistic | 3452 | 3458 | 3458 | 3459 | 3463 | 3466 |

Note: Estimations are run by the Dynamic Feasible Generalized Least Squares (Dynamic FGLS). Standard errors are reported between parentheses. ***, ** and * indicate statistical significance at 1%, 5% and at 10%, respectively.

# 5. Discussion and conclusion

This study examines the role of oil price fluctuations on long-term financial development in a sample of low- and middle-income net oil-exporting developing countries over the 1987-2015 period. Using the Generalized Method of Moments applied to a dynamic panel data model, our results suggest that the increase in the world oil price has a negative impact on the degree of financial development in our sample countries. In other words, there is a negative and persistent financial contagion from oil price fluctuations that has a negative long-term effect on the domestic financial sphere of these economies. These results are explained by the financial development curse. In this sense, Van Der Ploeg (2011) argues that the increase in resource prices may dampen economic development. This effect works through the exchange rate mechanism. More specifically, an increase in commodity exports may exert an upward pressure on real exchange rates, which is likely to undermine the competitiveness of non-resource sectors, including the financial sector. This is also demonstrated by Mlachila and Ouedraogo (2020) who add that macroeconomic instability in general leads to this negative effect on financial development, which is in line with other studies (e.g., Baltagi et al.,2009; Ahmed, 2016; Trabelsi and Cherif, 2017; Nakhli et al., 2020) that also point to the negative impact on income, reducing domestic credit and savings. On the other hand, a positive oil price shock can harm the financial system through financial fragility and banking crises, as found by Kinda et al. (2018). The authors stress that commodity price shocks contribute considerably to the fragilization of the financial sector and could even lead to financial crises. This relationship is explained by the fact that commodity price shocks increase unsolvable credits and reduce financial returns. This impact is transmitted through the channel of reduced GDP growth, tax payments and savings, as well as an increase in public deficits, external debt, and unemployment rates. Another explanation for the negative impact of the rise in oil prices could be drawn from Hattendorf (2014), who shows that resource-abundant countries are more susceptible to terms-of-trade shocks, leading to higher interest rates used by banks as a risk premium, and an overall decline in credit and investment.

Based on the discussed primary results, valuable policy insights can be drawn from this study for low- and middle-income net oil-exporting countries. These economies do not appear to be benefiting from an increase in the world oil price to develop their financial sectors, despite the substantial amounts of cash they generate from oil export revenues. Indeed, it is well known that the economic efficiency of the use of natural resource abundance is closely related to how windfalls are allocated across financial and real activities. For instance, if windfalls are used to smooth consumption, especially in times of recession/depression, they can undermine and replace the role of the financial sector in supporting real activities. In addition, windfalls can fund investment in activities linked to natural resources at the expense of investment in the financial system, thereby diminishing financial development (Beck, 2011). Also, an increase in oil rents that can follow the rise in oil prices is likely to reduce productivity growth that is a consequence of more easily accessible foreign capital (Mlachila and Ouedraogo, 2020). The influx of capital leads to an overconsumption of domestic goods and services. This implies an inefficient allocation of resources from the tradable sector (more productive) to the non-tradable sector (less productive). Then, the decrease in productivity leads to a lower level of financial resources, which limits the capacity of the financial system to generate funds, especially for private investment. Such perverse mechanisms should be avoided by low- and middle-income net oil-exporting countries by developing sound governance, supervision and monitoring of the accumulation, absorption and allocation of the oil rents, especially after an increase in the world oil price. The role of the financial regulatory authorities is crucial in avoiding anti-competitive regulations that privilege banking oil-rent monopolies and thus favor non-optimal credit management. These authorities can incite financial institutions to prevent oil price shocks by setting up a number of specific countercyclical funds to be used in the event of adverse movements affecting their balance sheets. In this vein, Stiglitz and Weiss (1981), for instance, argue that in times of rising commodity prices and thus uncertainty, a credit crunch can occur due to the problem of adverse selection and a lack of information and banking monitoring. This is likely to be the case in countries characterized by weak institutions. Furthermore, sound tax policies could reduce the negative effects of oil price fluctuations. Such policies could include a special sovereign wealth fund. More generally, good governance, democracy, and institutional quality can contribute to mitigating the negative effect of oil price fluctuations through better allocation of windfalls and better law enforcement with respect to financial services.

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**Appendix A. Sample countries**

| |
|---|
| Albania, Algeria, Angola, Argentina, Belize, Bolivia, Brazil, Cameroon, Chad, Colombia, Congo. Dem. Rep. of, Congo. Republic of, Ecuador, Egypt, Gabon, Georgia, Guatemala, Iran. Islamic Republic of, Iraq, Kazakhstan, Kenya, Libya, Malaysia, Mauritania, Mexico, Mongolia, Nigeria, Papua New Guinea, Sudan, Suriname, Syrian Arab Republic, Tunisia, Turkmenistan, Venezuela. Rep. Bol. and Vietnam. |

**Appendix B. Summary Statistics**

| Variable | Observations | Mean | Standard Deviation | Min | Max |
|---|---|---|---|---|---|
| Financial development$_t$ | 698 | 2.83 | 0.99 | -1.56 | 5.04 |
| Financial development$_{t-1}$ | 671 | 2.81 | 1.00 | -1.56 | 5.04 |
| Economic development$_{t-1}$ | 822 | 7.44 | 0.88 | 5.31 | 9.16 |
| Trade openness$_{t-1}$ | 828 | 46.40 | 21.41 | 7.63 | 90.64 |
| Financial openness$_{t-1}$ | 828 | 49.69 | 16.65 | 5.66 | 85.86 |
| Real oil price fluctuations$_{Brent}$ | 840 | 0.04 | 0.22 | -0.47 | 0.42 |
| Real oil price fluctuations$_{WTI}$ | 840 | 0.05 | 0.24 | -0.45 | 0.44 |
| Real oil price fluctuations$_{Brent}$ | 840 | 0.07 | 0.22 | -0.48 | 0.45 |
| Nominal oil price fluctuations$_{WTI}$ | 840 | 0.07 | 0.24 | -0.45 | 0.47 |
| Real oil price fluctuations$_{Illinois}$ | 840 | 0.04 | 0.24 | -0.53 | 0.47 |
| Nominal oil price fluctuations$_{Illinois}$ | 840 | 0.07 | 0.25 | -0.54 | 0.50 |