Oil abundance, national oil companies and financial repression

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Abstract

This paper examines whether the ownership structure of oil companies in oil-rich countries affects the relationship between natural resource endowment and financial development. Specifically, it investigates if the banking sector tends to be more repressed in oil-abundant countries than in non-oil economies. Using the GMM dynamic panel system estimator on a large dataset covering 90 countries from 1973 to 2017, we find evidence that fiscal dependence on oil revenues, combined with national oil companies, encourages governments to implement financial repression measures that hinder the long-term development of the banking sector.

Keywords

Financial Repression, National Oil Companies, Credit. *JEL Codes: E43, E44, G20, O13*

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2 Introduction

A well-functioning banking system is vital for economic growth, serving as a conduit for credit intermediation and financial stability. It provides information on potential investments, enhances resource allocation, and promotes trading and risk management (Beck and Levine, 2005). However, many large oil producers struggle with less advanced financial systems, limiting their capacity to diversify economically and secure funds for investment. In these contexts, particularly where state-owned companies dominate the oil industry, governments often resort to financial repression intervening in financial markets to lower borrowing costs for quasi-fiscal activities [1] (Menaldo, 2015).

Financial repression involves direct government intervention in the financial sector to implicitly tax financial institutions. This intervention is not primarily motivated by the need to address credit market imperfections; rather, it arises from fiscal challenges. Governments implement strategies such as interest rate controls to finance their operations at lower costs. As a result, they depend on the implicit taxation of the financial sector due to difficulties in raising funds through more conventional means [2] (Montiel, 2011).

In this paper, we analyze whether countries with significant oil rents, national oil companies [3], and a fiscal dependence on oil revenue tend to use interest rate controls to reduce the financing costs for the non-financial public sector. Specifically, as oil rents become increasingly important for the sustainability of public finances in a given country, there are greater incentives to implement various measures that repress the financial system.

Luong and Weinthal (2010) state that mineral-rich countries often lack the institutional constraints necessary to prevent the ruling elite from relying on oil rents and engaging in excessive public spending. As a consequence, these countries struggle to establish strong fiscal regimes that support sound macroeconomic policies, which are crucial for coping with adverse oil price shocks. The authors argue that mineral-rich states are *cursed* by the public ownership models they adopt to manage their mineral wealth. Similarly, Brunnschweiler and Poelhekke (2021) find that domestic (public) ownership tends to result in lower levels of investment in exploration. Additionally, national oil companies typically operate in a protected domestic market, limiting their exposure to competition. Moreover, oil firms under public ownership often enjoy better access to international capital markets and, as a result, rely less on the financial services provided by domestic banking systems Wolf (2009).

Resource-rich countries, particularly those with high oil revenues, often exhibit low levels of financial system development. Mlachila and Ouedraogo (2020) identify several explanations for this phenomenon, commonly referred to as the *financial curse* [4]. One explanation is the concentrated structure of oil-rich economies, which exposes them to terms-of-trade shocks (Hausmann and Rigobon, 2003). In such

[1] Quasi-fiscal operations include activities undertaken by state-owned banks and enterprises, and sometimes by private sector companies at the direction of the government, where the prices charged are below the usual or market rates (IMF (2007)). Examples include subsidized bank loans provided by the central bank or other government-owned banks.

[2] Governments can intervene in the equilibrium of the financial system through various methods, including interest rate controls, direct credit allocation, high reserve requirements, state-owned banks, entry barriers for new domestic banks, capital account restrictions, prudential regulations, supervision of the banking sector, and unconventional monetary policies.

[3] In this document, the terms national oil companies, public ownership, and government ownership are used interchangeably to refer to entities and arrangements where the government has significant control over oil resources

[4] The lesser financial development exhibited by resource-abundant countries.

environments, banks tend to demand higher interest rates, making credit more expensive. Additionally, the Dutch disease effect shifts productive resources toward the nontradable sector, thereby lowering both productivity growth and credit availability (Benigno and Fornaro, 2013).

Another factor is the misuse of windfalls; when revenues are used primarily for consumption smoothing, this discourages the development of a robust financial system (Gylfason, 2006). Furthermore, inadequate institutions for contract enforcement make banks reluctant to lend. The effectiveness of enforcement and the reliability of the financial sector require credible institutions, which are often compromised by rent-seeking and corruption (Bhattacharyya and Hodler, 2014).

Evidence from oil-dependent countries supports the notion of low financial development. For instance, Berglof and Lehmann (2009) find that in Russia, bank lending plays a limited role in corporate investment. Similarly, Samargandi et al. (2014) develop a composite indicator of financial development for Saudi Arabia, demonstrating that its banking sector remains underdeveloped. Elhannani et al. (2016) show that while financial development has enhanced economic growth in Algeria, it has not mitigated the negative effects of oil rents. Gylfason and Zoega (2001), Nili and Rastad (2007), (Bhattacharyya and Hodler, 2014), Beck (2011), Kurronen (2015), Beck and Poelhekke (2023), and Mlachila and Ouedraogo (2020) provide empirical evidence that the banking sector tends to be smaller in resource-dependent economies. They cite several reasons for these findings as the high share of mineral exports in total exports reduces the level of bank credit to the private sector, and the impaired ability to enforce contracts in countries with low levels of democracy further exacerbates the issue. Additionally, they provide evidence that financial sector growth slows in resource-rich countries during commodity price shocks, attributed to repressed financial systems and weak governance structures.

The ownership structure of oil-extracting companies in petroleum-rich states such as Russia, Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan reveals significant insights into how oil wealth impacts state institutions Luong and Weinthal (2010). In these countries, when the government exerts a dominant role over the oil industry-often through state ownership or centralized control-there tends to be a weakening of state institutions. This centralization of oil wealth can hinder political and economic development, as it reduces the incentive for the government to diversify its economy or engage its citizens in governance. The flow of oil revenues directly into state coffers diminishes governmental accountability. Since these revenues come from external sources rather than domestic taxation, the state has less incentive to respond to the needs and demands of its citizens. This dynamic can lead to a lack of transparency, reduced civic engagement, and ultimately a governance structure that is less responsive to the populace Ahmadov (2013).

Brunnschweiler and Poelhekke (2021) examine the influence of oil company ownership from 1867 to 2008 and find a strong positive relationship between switching to Foreign (private) and Partnership (with over 50% domestic shares) ownership regimes and increased exploration and discoveries. In contrast, nationalization leads to a decline in these activities. Overall, their findings suggest that oil wealth weakens state institutions when the government has a dominant role in the industry, and domestic (public) ownership reduces investment in exploration, resulting in fewer discoveries. The negative impact of National Oil Companies (NOCs) on economic development and exploration activities can be attributed to insufficient public resources for these projects.

Nations with significant oil rents and state-owned oil companies may become overly reliant on these

resources. Consequently, when faced with lower international oil prices, these governments might resort to financing methods other than tax collection or debt issuance, such as financial repression. This research aims to explain the causes of the lower development of the financial sector in oil-rich countries and to investigate whether the ownership structure of resource companies affects the relationship between natural resource endowment and financial development. Specifically, the research questions are: Does the ownership structure of oil companies influence the relationship between natural resource endowment and financial development? If so, do countries with abundant oil resources and public ownership of national companies rely more on financial repression?

In exploing the scope of financial repression, Abiad et al. (2009) explains that state intervention in the financial sector was prominent in both developing and developed countries until the 1980s, with many banks owned or controlled by the government and interest rates regulated. Theoretical arguments for financial repression cite market failures and information frictions. Although many countries liberalized their financial sectors post-1980s, the 2008-09 global financial crisis reignited discussions on government regulation to prevent financial instability (Jafarov et al., 2019). Additionally, the Covid-19 pandemic resulted in the largest single-year surge in global debt since 1970 (Kose et al., 2022), prompting renewed debate on financial repression as a second-best solution to lower debt levels. By imposing interest rate ceilings, governments can reduce borrowing costs for the non-financial public sector. However, such measures weaken price signals in the credit market, distorting resource allocation for investment and hindering overall financial development.

In their assessment, Jafarov et al. (2019) evaluate government-mandated limits on interest rates, reflecting the resurgence of financial repression measures. They extended the database compiled by Abiad et al. (2009), which covers 90 jurisdictions from 1973 to 2005, and extended it until 2017. This extension is limited to the interest rate ceiling indicator due to data constraints. They evaluated the impact of interest rate controls on the per capita real GDP growth rate using panel data analysis, estimating that these controls could subtract between 0.4 and 0.7 percentage points from economic growth.

To answer our research questions, we utilize the database provided by Jafarov et al. (2019), which compiles information on the presence of interest rate controls across 90 countries from 1973 to 2017, highlighting the significance of administrative or legal controls on interest rates. To test the hypothesis, we employ the GMM dynamic panel system estimator, chosen for its suitability given the inertia of financial indicators, which tend to vary little between successive years (Mlachila and Ouedraogo, 2020). Additionally, the use of GMM is justified by the existence of unobservable country-specific characteristics, the presence of a lagged endogenous variable among the explanatory variables, and the fact that the total number of countries analyzed exceeds the number of years.

This document departs from previous literature by offering a different explanation for the lower financial development of oil-rich countries. It does so by endogenizing the decision to implement interest rate controls as a response to fiscal dependence on oil revenues, particularly when oil companies are state-owned. In environments with low institutional quality, this fiscal dependence exposes governments to adverse shocks in oil revenues. Consequently, these governments often resort to financial repression to cover their financing needs, which in turn slows down the development of the financial system.

Our working hypothesis posits that when a government's fiscal revenues are predominantly derived from oil rents, it may experience reduced public scrutiny over how these resources are utilized. This lack

of oversight arises as the government becomes less reliant on non-oil tax revenue, reducing the need for accountability to citizens. As a result, this can lead to a concentration of power in the executive branch, facilitating autocratic governance that can capture and distribute oil rents without significant checks and balances.

In this context, the complete control of exploration, production, and revenue distribution by National Oil Companies (NOCs) further exacerbates the issue. Findings indicate that the interplay of substantial oil revenues and the presence of NOCs can adversely impact the development of the financial system, potentially stifling financial innovation, limiting access to capital, and hindering overall economic diversification.

Our contribution is to provide an explanation specifically for the lower level of banking system development in oil-producing countries. This is linked to the public ownership of oil companies in an environment characterized by significant oil revenues and low institutional quality, leading to a significant dependency of public sector finances on oil revenues. In this context, domestic pressures to increase public spending and negative fluctuations in international oil prices create incentives for governments to seek revenue outside traditional tax channels to finance quasi-fiscal activities, with financial repression being one of the most commonly used tools. To our knowledge, no other research examines the credit deepening of countries with national oil companies and abundant oil resources through the lens of financial repression resulting from fiscal dependence on oil revenues

The document is organized as follows, section two explains the empirical strategy, including data, methodology, sample, and the definition we use of fiscal dependence. Section three discusses the model specification and results of the econometric model and in section four the concluding remarks.

3 Empirical Strategy

3.1 Data

This study seeks to determine whether abundant oil revenues and national companies managing their exploitation stimulate financial repression, thereby negatively affecting financial development.According to the International Monetary Fund (IMF) Sahay et al. (2015), financial development is defined as a combination of depth (size and liquidity of markets), access (the ability of individuals to access financial services), and efficiency (the ability of institutions to provide financial services at low cost and with sustainable revenues, along with the level of activity of capital markets).

This definition reflects the complexity of financial development, which involves various aspects of credit intermediation. While using a simple depth indicator, such as the ratio of credit to the private sector to GDP, is limited, it has the advantage of being readily available over the study period. Despite its shortcomings, our analysis will use this ratio as a proxy measure of financial development, with data sourced from the World Bank's World Development Indicators (WDI).

We utilize an unbalanced panel of 90 countries over the period from 1973 to 2017. We take advantage of the database provided by Jafarov et al. (2019), which compiles information on the presence of interest

rate controls (IRC) in lending and deposit markets. This qualitative index represents the significance of administrative or legal controls on interest rates, assuming four possible numerical values: zero (the strictest controls) to three (where banks are free to set their interest rates). IRC serves as the variable to account for financial repression. Interest rate controls impact the allocation of loanable funds; controls on lending rates hinder capital from being allocated to the most productive uses, while controls on deposit rates encourage savers to place their funds in informal financial systems or external assets. Generally, interest rate ceilings prevent a price-based allocation of funds (Montiel, 2011).

According to Jafarov et al. (2019), the global financial crisis of 2008-09 rekindled the debate on the role of government, prompting calls for increased regulation and supervision to strengthen the stability of the financial system. Conversely, the surge in government debt has revived discussions regarding the potential role of financial repression as a second-best solution to reduce debt burdens. Reinhart et al. (2011) suggest that the large public and private debts in advanced economies, combined with the perceived risks of currency misalignments and overvaluation in emerging markets facing capital inflows, have contributed to a resurgence of financial repression. This approach typically aims to provide cheap loans to companies and governments, reducing their repayment burdens by lowering returns to savers below the market rate.

To account for the relevance of the oil sector in each country, we use oil rents, defined as the value of crude oil production at world prices minus total production costs. This calculation involves estimating the price of oil barrels and subtracting average unit extraction costs. The resulting unit rents are then multiplied by the physical quantities extracted by each country to determine the rents for oil as a share of gross domestic product (GDP). In some countries, these earnings represent a significant portion of GDP, largely in the form of economic rents-revenues exceeding the cost of resource extraction.

Natural resources generate economic rents because they are not produced. When countries utilize these rents to support current consumption instead of investing in new capital to replace what is being depleted, they effectively borrow against their future.[5] This variable is expressed as a percentage of GDP and is sourced from the World Bank's World Development Indicators (WDI).

To establish the type of ownership of oil companies, we utilized the Natural Resource Governance Institute (NRGI) database. According to NRGI, National Oil Companies (NOCs) produce 55% of the world's oil and gas. They dominate the production landscape in some of the most oil-rich countries, including Saudi Arabia, Mexico, Venezuela, and Iran, and play a central role in the oil and gas sector. However, the NRGI dataset only covers the period from 2011 to 2017. Therefore, it was necessary to supplement this information with data from national sources to identify which countries have NOCs.[6]

As for control variables in the model, we include a variable to account for institutional strength, using the Polity index[7] as a proxy for institutional quality. According to the literature Bhattacharyya and Hodler (2014), higher institutional strength fosters better conditions for financial development, as a greater degree of democracy enhances transparency and government accountability, thereby reducing

[5] The World Bank, Metadata Glossary

[6] From 1973 to 2017, nine countries changed their ownership structures. Austria, Bulgaria, France, Hungary, Romania, Spain, and the United Kingdom transitioned to private ownership. Argentina, Bolivia, and Russia changed from public to private ownership and then back to public ownership.

[7] A measure of political regime characteristics categorizing autocracies (-10 to -6), anocracies (-5 to +5), and democracies (+6 to +10), taken from the Center for Systemic Peace

financial repression. To control for the level of economic activity, we incorporate gross capital formation and final consumption expenditure as percentages of GDP, allowing us to estimate the impact of demand for loanable resources. In the interest rate control model, we use the logarithm of the Consumer Price Index (CPI), positing that rising inflation incentivizes governments to limit nominal interest rates to avoid higher financing costs, reflecting the fiscal dominance of monetary policy. Many developing countries have faced double-digit inflation rates, leading monetary authorities to intervene in real interest rates through rate controls, which contributes to financial repression (Namazi and Salehi, 2010).[8]. Additionally, we include dummy variables for region and time trends.

As control variables, particularly for the interest rate controls model, we incorporate oil prices, which reflect a different dynamic than oil rents. According to Mansour and Nakhle (2016), the relationship between governments and companies varies with oil prices, which serve as a trigger for modifications in the upstream fiscal regime. High oil prices typically lead to increased taxes, contract renegotiations, tougher regulations, and, in extreme cases, expropriation and nationalization, as host governments seek a larger share of the perceived higher profitability of the industry. Reactions among oil-producing countries range from straightforward tax rate increases to the implementation of new taxes and enhanced shares for national oil companies, and even the expropriation of assets. The price level significantly influences the bargaining power of each party at the negotiating table; when oil prices are high, governments often hold the upper hand, while falling prices tend to favor companies. However, the response to declining prices is generally less visible and more erratic than that to rising prices (Mansour and Nakhle, 2016). The international oil prices are sourced from the Brent crude oil spot price series.

Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Credit as % of GDP (WDI)	3547	50.8304	42.4851	0.0595	233.211
Interest rate controls	3718	2.0126	1.2419	0	3
Oilrents as % of GDP (WDI)	3687	1.9891	4.7351	0	39.5580
National Oil Company (NGRI)	4050	0.3651	0.4183	0	1
Fiscal dependence index	2482	0.0059	0.0311	0	0.5000
log. CPI (WDI)	3631	3.1296	2.8123	-21.0658	13.7276
log. Oil price (BP)	4050	3.3556	0.7451	1.1909	4.7155
Polity (Center for Systemic Peace)	3757	3.6622	6.8228	-10	10
log. GDP-PC (WDI)	3739	13236.41	16821.71	164.3366	91565.73
log. consumption (WDI)	3606	78.6641	11.1091	11.6105	186.9121
log. FBK (WDI)	3665	23.9879	7.0957	-5.73974	89.3811

[8]Consumption, gross capital formation, and CPI are taken from the World Bank's WDI

3.2 Fiscal dependence on oil revenues and control variables

According to our hypothesis, governments in countries with high oil rents and national oil companies have direct access to these revenues, granting them greater discretion in utilizing these resources. This situation encourages the emergence of rentier states, characterized by weak tax systems that depend heavily on oil taxes and indirect or implicit taxes across various sectors of the economy (Luong and Weinthal, 2010), including financial repression.

Governments often suppress the financial system to fund their quasi-fiscal activities. Consequently, rentier states with weak fiscal structures arise, leading to persistent fiscal deficits that compel governments to implement interest rate controls and other measures of financial repression that, in the long run, tend to diminish the development of the financial system.

To test this working hypothesis, it is essential to estimate the dependence of total government revenues on oil taxes. However, to the best of our knowledge, there is no comprehensive dataset detailing the magnitude of oil taxes as a portion of total government revenues. Instead, we found only partial information from various sources, including the World Development Indicators (WDI), the OECD, and the National Oil Companies (NOC) database.

To measure fiscal dependence, we developed a summary measure that averages oil rents and NOC transfers to governments. Oil rents are sourced from the World Bank's WDI, while NOC transfers come from the Natural Resource Governance Institute (NRGI). Both sources have limitations, the WDI lacks information on government revenues for nearly 40% of the panel data, and the NOC transfer data only covers the period from 2011 to 2017.

The *fiscal dependence index* is a weighted index composed of normalized indices for two dimensions: the significance of oil revenues to government revenues and NOC transfers to the fiscal budget. To construct the index, we first normalize each country's distance relative to the maximum distance found in the database. Each component's magnitude is then converted to a scale between 0 and 1 using the following formula:

$$I(X_{i,t}) = \frac{X_{i,t} - m}{M - m} \tag{1}$$

where

$I(X_{i,t})$ = fiscal dependence index; $\forall i, t$
$M = \text{Max}(X_{i,t})$; $\forall i, t$
$m = \text{Min}(X_{i,t})$; $\forall i, t$
$X_{i,t}$ is the value for each country i in the year t

Finally, to construct the fiscal dependence index, we averaged the two components:

$$fdep = 0.5 * I(oil.rents/Gov.rev) + 0.5 * I(NOC.transfers/Gov.rev) \tag{2}$$

It should range from 0 (no fiscal dependence) to 1 (total dependence).

The fiscal dependence measure used in this study has limitations, particularly due to the lack of government revenue data from seven countries: Algeria, Ecuador, Hong Kong, Nigeria, Pakistan, Venezuela, and Vietnam. Notably, five of these countries have significant oil rents and national oil companies. While the absence of data from these countries may weaken the indicator, it remains sufficient to test the research hypothesis.

3.3 Methodology

This research aims to determine whether the combination of national oil companies and oil rents affects financial development. The study uses a large sample of 90 countries over a 45-year period. This analysis relies on financial indicators such as bank credit to the private sector and interest rate controls. Monetary and financial indicators exhibit inertia, meaning that variables in this sector tend to remain relatively unchanged over time. This inertia arises because central bank decisions depend on information about the state of the economy, along with delays in the transmission of monetary policy. From the perspective of financial institutions, factors such as asymmetric information, risk aversion, and the effects of banking regulations -particularly regarding solvency and provisioning- contribute to the persistence of financial indicators like bank lending.

To account for the inertia in interest rate controls and bank credit to the private sector, we employ dynamic panel data analysis. This approach allows us to capture the impact of lagged endogenous variables and the unobservable fixed effects of the countries in our sample. The dynamic model estimates the effects of interest rate control and bank credit based on their lagged values and a set of control variables.

$$y_{i,t} = \alpha y_{i,t-1} + \beta \chi_{i,t-1} + \eta_i + \epsilon_{i,t}; i = 1, .., N; t = 1, ...T \tag{3}$$

Where:

$y_{i,t}$: dependent variable (IRC or credit to the private sector).

$\chi_{i,t-1}$ a vector, containing both contemporaneous and lagged values of explanatory variables.

η_i: unobserved time-invariant heterogeneity.

$\epsilon_{i,t}$: is the idiosyncratic error component.

The endogeneity issues may surge from some of the following problems:

$E(\eta_i \mid \chi_i) \neq 0$ i.e. individual-specific effect is correlated with explanatory variables.

$E(\eta_i \mid y_{i,t-1}) \neq 0$ i.e. individual-specific effect is correlated with lagged dependent variable.

$E(\epsilon_{i,t} \mid \chi_i) \neq 0$ for t $\leq$ s; i.e. the covariate may exhibit a nonzero correlation with the contemporaneous or lagged idiosyncratic errors.

This empirical model may suffer from endogeneity due to the presence of a lagged dependent variable, unobservable variables, and reverse causality among the right-hand side variables. Additionally, inference

issues can arise when the number of periods is finite, leading to small sample bias in coefficient estimation. Hypothesis testing and least squares-based inference methods-specifically, fixed or random effects estimators-are biased and inconsistent (Bun et al., 2013). Consequently, it has become standard practice to use Instrumental Variables (IV) methods or the Generalized Method of Moments (GMM), both of which produce consistent parameter estimates for a finite number of periods and a large cross-sectional dimension. According to (Bond, 2002) and (Baltagi and Baltagi, 2008), the GMM method should be employed when the number of cross-sections (N, i.e., countries) is greater than the number of time series (T, i.e., years), specifically when ($N \geq T$), as is the case in this research. Furthermore,(Labra Lillo and Torrecillas, 2018) suggests that dynamic panel data methodology effectively addresses individual heterogeneity and facilitates the use of several instrumental variables to manage endogeneity.

Two main approaches have been developed to address endogeneity in models, using instrumental variables in levels and/or in differences. The first approach, known as *difference GMM* (Arellano and Bond (1991)), while the second, called *system GMM*, utilizes lags in both differences and levels as instrumental variables (Arellano and Bover, 1995). According to Bond (2002), the system estimator enhances the efficiency and consistency of estimation by reducing finite-sample bias. Within this class of methods, the System GMM estimator (Blundell and Bond, 1998) has been widely adopted. They articulated the necessary assumptions for this augmented estimator more precisely and tested it using Monte Carlo simulations (Roodman, 2009). The presence of country-specific effects and a lagged dependent variable among the explanatory variables leads us to employ the System GMM estimator, which is based on the dynamic panel data model.[9]

In selecting GMM estimators to address endogeneity issues arising from simultaneity bias and omitted variables, it is crucial to recognize the associated challenges in constructing the dynamic panel data model. A significant concern with System GMM is the potential for instrument proliferation. Using an excessive number of instruments may lead to overfitting, which can compromise the reliability of the estimates and increase the risk of bias. To mitigate over-identification, we restrict the instrument set and limit the dependent variable to one lag (Roodman (2009)). Following de Mendonça and Barcelos (2021), we ensure that the ratio between the number of instruments and the number of cross sections is less than one. To assess the validity of the instruments, we employ the Hansen test for over-identifying restrictions and autoregressive test to ensure the absence of second-order serial correlation in the first-differenced residuals, while also ensuring that the number of cross-sections exceeds the number of instruments.

For the empirical analysis, it is essential to test for the presence of panel unit roots. Given that our dataset spans a 45-year interval, it is important to consider the serial correlation patterns in the panel, which may include both short-memory and persistent components. These patterns can lead to inconsistencies in pooled estimators in dynamic heterogeneous panel models. The main advantage of using panel unit root tests is their significantly greater power compared to standard time-series unit root tests in finite samples (Taylor and Sarno, 1998).

Im, Pesaran, and Shin (1997) propose a testing procedure that utilizes a standardized t-bar test

[9]xtabond2 implements both estimators. As GMM estimators, the Arellano-Bond estimators have one- and two-step variants. Although asymptotically more efficient, the two-step estimates of the standard errors tend to be severely downward biased (Arellano and Bond (1991); (Blundell and Bond, 1998)). To compensate, xtabond2 includes a finite-sample correction to the two-step covariance matrix derived by Windmeijer (2000). This correction can make the two-step robust estimator more efficient than the one-step robust estimator, especially for system GMM (Roodman, 2009).

statistic based on the augmented Dickey-Fuller statistics averaged across groups Bornhorst and Baum (2007). [10] We employ IPS, incorporating a constant and a time trend in the specification due to the inertia of the time series. An important advantage of IPS is its applicability to unbalanced data panels, such as our dataset, which includes a moderate number of cross-sectional groups over a long time period. Additionally, it is particularly useful for our dynamic heterogeneous panel data as it allows for heterogeneity across countries, including individual-specific effects and unique patterns of residual serial correlations.

Subsequently, we conducted a marginal effect analysis to determine whether the ownership of oil companies negatively affects financial development, controlling for the fiscal dependence of government revenues on oil rents. The partial effect measures the impact on the conditional mean of the dependent variable resulting from a change in one of the regressors. In the linear regression model, the marginal effect equals the relevant slope coefficient Cameron (2005). Our interest lies in determining the marginal effect of a change in the ownership structure (a categorical variable) from 0 to 1 on the conditional mean of financial development, after controlling for the other variables in the model. With a dichotomous independent variable, the marginal effect is the difference in the adjusted predictions for the two groups, i.e., public versus private ownership of the oil companies. We applied average marginal effects using a corrected variance and covariance matrix. The mean of the partial effect of the ownership structure is given by:

$$\frac{\beta_k}{N} \sum_{i=1}^{N} = f(x_i \beta) \tag{4}$$

To complement the identification of the causality of the proposed institutional arrangement on financial development, we conduct a mediation analysis[11] It decomposes the total effect of treatment T on an outcome Y. Following Dippel et al. (2020), to identify what fraction of the total effect is explained by the indirect effect, we need to perform a mediation analysis that decomposes the total effect of T on Y into the mediated *indirect effect* of T on Y that operates through a mediator variable M, and the residual *direct effect* that does not operate through M. This implies that T causes Y both indirectly through M and directly.

The magnitude of the indirect effect indicates the extent of mediation through the relevant mediator variables. With complete mediation, the total effect of an independent variable on a dependent variable is transmitted entirely through one or more mediator variables. In this case, the independent variable has no direct effect on the dependent variable; rather, its entire effect is indirect. In contrast, with partial mediation, an independent variable has both direct and indirect effects on a dependent variable. The direct effect is not mediated, while the indirect effect is transmitted through one or more mediator variables Edwards and Lambert (2007).

This path analysis will support the findings obtained from the marginal effects and verify whether the interaction between fiscal dependence and domestic ownership of firms (treatment) exerts a direct

[10] The Im, Pesaran, and Shin test for unit roots, denoted as IPS, assumes individual unit root processes and has the null hypothesis that all panels contain unit roots.

[11] This refers to the transmission of the effect of an independent variable on a dependent variable through one or more other variables.

effect on financial development (outcome), as well as an indirect effect through interest rate controls. The magnitude of the indirect effect indicates the extent of mediation through the relevant mediator variables.

3.4 Sample

Jafarov et al. (2019) estimated the losses caused by interest rate controls (financial repression) on economic growth. For this purpose, they updated the database developed by Abiad et al. (2009), which included information on different dimensions of financial repression. We utilized this update to build our own database, which contains information on 90 countries on an annual basis, covering the period from 1973 to 2017.

In the database, there are 43 countries (48% of the sample) that are not oil producers, and most of them do not have proven oil reserves.[12] The remaining 47 countries in the database are oil producers. Within this group, three countries have maintained their main production in the hands of private companies[13], while the remaining 44 nations have national oil companies. Among these, there are 18 major producers whose oil rents equal or exceed 3% of GDP.

We hypothesize that countries with oil rents, public companies for the exploitation of hydrocarbons, and a weak tax system characterized by fiscal dependence on oil revenues negatively impact the development of their financial systems. For this reason, we focus on countries in the sample that have oil revenues and national oil companies. Since fiscal dependence is not a directly available variable, we approximate it using the fiscal dependence index.

3.5 Model specification

To assess the impact of the described institutional arrangement on financial development, we investigate whether this environment is associated with the implementation of interest rate controls. Specifically, we explore the interaction of these variables jointly: countries with oil rents, national oil companies, and fiscal dependence on oil revenues are more likely to implement interest rate controls, resulting in their banking systems granting lower credit compared to countries that lack these characteristics. According to Jafarov et al. (2019), financial repression reduces the return on savings, leading to financial disintermediation. By weakening price signals, it distorts the allocation of investment, thereby reducing the rate of return. A ceiling on loan interest rates benefits selected borrowers at the expense of depositors, who receive lower rates on their deposits. This constitutes a quasi-fiscal operation that effectively taxes depositors while subsidizing selected borrowers.

The empirical strategy consists of a first step involving the estimation of two dynamic panel data models, with one dependent variable representing interest rate controls and the other representing the change in credit to the private sector as a share of GDP. In both models, we use the interaction of oil company ownership, oil revenues, and fiscal dependence as the main independent variables in the regression, although the control variables differ between the two models. Both estimations aim to determine

[12] Of those non-oil countries with proven oil reserves, Italy is the country with the largest share, ranking 47th in the world, according to British Petroleum and the U.S. Energy Information Administration (EIA).

[13] Australia, Canada, and the USA

whether the specified conditions favor the imposition of interest rate controls by governments, thereby endogenizing the decision to implement financial repression measures. In the second model, we not only examine the effect of the interaction on the variation of credit to the private sector but also study the impact of interest rate controls on countries' financial development. Subsequently, we perform marginal effects analysis and mediation analysis to provide further evidence of the causal relationships.

To perform the dynamic panels, we first check the stationarity of the variables in the models. Credit to the private sector, which accounts for financial development, exhibits unit roots when the variable is taken in levels; however, in the first difference, we reject the null hypothesis of non-stationarity at the 1 percent level. Furthermore, we find that both the oil price level and the Consumer Price Index (CPI) are stationary. However, we were unable to apply the IPS test for the logarithm of gross capital formation, consumption expenditure, polity, oil rents, and IRC, as not all groups had sufficient observations.

Model for Interest rate controls

$$\begin{aligned} IRC_{i,t} = \alpha + \beta_1 IRC_{i,(t-1)} + \beta_2 NOC_{i,t} + \beta_3 oilrent_{i,t} + \beta_4 depf_{i,t} + \beta_5 (NOC_{i,t} \cdot depf_{i,t}) \\ + \beta_6 (NOC_{i,t} \cdot oilrent_{i,t}) + \beta_7 (depf_{i,t} \cdot oilrent_{i,t}) + \beta_8 (NOC_{i,t} \cdot depf_{i,t} \cdot oilrent_{i,t}) \\ + \beta_9 polity_{i,t} + \beta_{10} lnoprice_{i,t} + \beta_{11} X_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (5)$$

Where:

$IRC_{i,t}$: Interest rates controls
$NOC_{i,t}$: binary variable, 1 if is a public oil company, 0 otherwise
$depf_{i,t}$: index of fiscal dependence
$oilrent_{i,t}$: oil rents as % of GDP
$polity_{i,t}$: measured of Political Regime Characteristics
$lnoprice_t$: log. of oil prices
$X_{i,t}$: trend, region, difference logarithm of gross capital formation and final consumption expenditure as percentage of GDP, and the logarithm of CPI
$\varepsilon_{i,t}$: standard error term

This specification includes oil prices as an explanatory variable. Notably, this variable exhibits a low correlation with oil rents among major oil producers. In fact, the correlation coefficient between oil prices and oil rents as a percentage of GDP for oil-abundant countries is 0.176.

Higher oil prices encourage host governments to demand a greater share of the industry's increased profitability through taxes or contract renegotiations (Mansour and Nakhle, 2016). This increase in tax revenues reduces the need to raise indirect taxes on the financial system by using interest rate controls. Conversely, low oil prices decrease government oil revenues, leading to greater fiscal pressures that compel governments to implement financial repression measures.

Additionally, oil rents are a long-term characteristic that influences a country's productive structure and, consequently, the development of its financial system. In this context, oil prices act as a lever that triggers governments' short-term financial needs and drives the implementation of financial repression measures.

Model for private credit as percentage of GDP

In this context, the financial motivations of governments to implement financial repression by manipulating interest rates lead to financial underdevelopment. To test this hypothesis, we employ the following model:

$$\begin{aligned}\Delta Credit_{i,t} = \alpha + \beta_1 \Delta Credit_{i,(t-1)} + \beta_2 NOC_{it} + \beta_3 oilrent_{it} + \beta_4 depf_{it} + \beta_5 (NOC_{it} * depf_{it}) \\ + \beta_6 (NOC_{it} * oilrent_{it}) + \beta_7 (depf_{it} * oilrent_{it}) + \beta_8 (NOC_{it} * depf_{it} * oilrent_{it}) + \beta_9 IRC_{i,t} \\ + \beta_{10} \Delta lfbk_{i,t} + \beta_{11} d1974 + \beta_{12} X_{it} + \varepsilon_{it} \quad (6)\end{aligned}$$

Where:

$\Delta Credit_{i,t}$: domestic credit to private sector as % of GDP
$NOC_{i,t}$: binary variable, 1 if is a public oil company, 0 otherwise
$depf_{i,t}$: index of fiscal dependence
$oilrent_{i,t}$: oil rents as % of GDP
$IRC_{i,t}$: interest rate controls
$\Delta lnfbk_{i,t}$: difference logarithm of gross capital formation as % of GDP
$X_{c,t}$: instrumental variables: *trend, region, polity*
$\varepsilon_{i,t}$: standard error term

As a second step, we apply a test to assess the marginal effect of fiscal dependence on oil revenues regarding the control of interest rates and the deepening of credit relative to GDP in countries with national oil companies. As Cameron (2005) note, the marginal effect most often measures the impact on the conditional mean of y resulting from a change in one of the regressors, X_k. This marginal effect illustrates how the probability of implementing interest rate controls changes depending on whether the ownership structure is private or state-owned, while controlling for fiscal dependence on oil rents.

In the third step, we apply a mediational analysis. The basic mediational framework involves a three-variable system in which an initial independent variable influences a mediational variable, which, in turn, affects an outcome variable (Baron and Kenny, 1986). In our case, we test the proposed causal mechanism in which the interaction of government revenues, dependent on high oil revenues, and the presence of national oil companies hinders financial development through interest rate controls applied to the banking system. The mediational analysis aims to determine whether the relationship between the initial variable and the outcome is due, wholly or in part, to the mediator (Krull and MacKinnon, 2001). A variable is generally accepted to lie on the causal path if it is measured after the cause and before the effect and if its inclusion in the regression reduces the size of the presumed causal variable's coefficient Baron and Kenny (1986).

4 Results and Discussion

4.1 Model for Interest rate controls

Table 4 presents the estimation results for the dynamic panel analysis aimed at explaining interest rate controls. This analysis is based on the lagged dependent variable, the institutional arrangement of oil companies, and incorporates oil prices and the political environment as additional exogenous variables.

Table 3
IRC specifications

Interest rate control (IRC)	Model A	Model B	Model C	Model D	Model E	Model with interactions	
IRC lagged	0.938 (***)	0.191	0,189	0.164	0.313 (**)	0.251	(**)
	(0.016)	(0.119)	(0.116)	(0.131)	(0.127)	(0.124)	
NOC			0.261	0.459 (*)	0.933 (***)	0.752	(**)
			(0.195)	(0.234)	(0.315)	(0.315)	
oil rents				-0.065	-0.013	-0.300	
				(0.056)	(0.029)	(0.565)	
fiscal dependence					-2.643	92.584	
					(1.661)	(-141.92)	
NOC*oilrents						0.347	
						(0.680)	
NOC * fiscal dependence						-92.236	
						(-141.80)	
oil rents * fiscal dependence						15.014	
						(-29.241)	
NOC*oil rents *fiscal dependence						-16.286	
						(-29.541)	
(***) p<0.01, (**) p<0.05, (*) p<0.1							
GMM- Dynamic Panel Data. Two step-robust standard							
Hansen Prob > chi2	0.044	0.059	0,072	0,077	0,117	0,072	
AR(1) Pr > z	0,000	0.184	0.171	0.309	0.053	0,114	
AR(2) Pr > z	0.630	0.418	0.290	0.287	0.990	0,548	
Instruments	68	68	70	70	70	70	
Observations	3699	3626	3441	3427	2334	2334	
Countries	90	89	89	89	82	82	
No. of instruments/No. of cross sections	0,76	0,76	0,79	0,79	0,85	0,85	

Model A: lagged IRC. As control variables: fixed effects and time trend interacted with regions, consumption and FBK
Model B: lagged IRC, as exogenous variables: polity and log. of oil prices; keep control variables
Model C: previous set of exogenous variables and National Oil Company , keep control variables
Model D: previous set of exogenous variables and oil rents as exogenous variables, keep control variables
Model E: previous set of exogenous variables and fiscal dependence as exogenous variables, keep control variables

Statistical tests do not invalidate the econometric method, as the null hypotheses of the Hansen and AR(2) tests are not rejected. The significance of the coefficient associated with the lagged interest rate control (IRC) underscores the inertia present in these controls, thereby justifying the use of dynamic panel data.

To assess the influence of fiscal dependence on interest rate controls in countries characterized by oil revenues and public oil companies, this analysis considers both direct impacts and various interactions, which are evaluated through regression analysis. Consequently, to determine the overall effect, it is imperative to evaluate the marginal effect of fiscal dependence in relation to interest rate controls, taking into account whether the oil companies are privately or publicly owned. We specify distinct sets of effects to be estimated for countries with National Oil Companies and those without. The average marginal effect serves as an estimator of the average impact based on the ownership status of the oil company. Marginal effect tests are conducted using the observed values of oil

rents at their means.

Table 4
Model for Interest rate controls
Marginal effects

y: Interest rate controls			Obs.	2334
w.r.t. : fiscal dependence on oil revenue				
at mean oil rent				
over: NOC	dy/dx	z	Pr > z	Oil rent mean
Not-state owned	95.845	0.66	0.508	0.217
State-owned	-2.233	-2.22	0.026	2.029

The results indicate that countries with national oil companies tend to impose more controls on interest rates. When the IRC variable approaches zero, it reflects a situation where the tightest controls on rates are enforced. The estimated coefficient is negative and significant at the 5% level, suggesting that higher fiscal dependence correlates with the application of tighter interest rate controls.

Regarding the explanatory variables inthe dynamic panel data, both political factors and oil prices are found to be positive and significant. Thus, we interpret that more democratic countries tend to implement fewer interest rate controls, while higher oil prices increase government revenues and reduce the need to seek alternative funding sources.

4.2 Model for private credit as percentage of GDP

The dynamic panel analyzes the change in credit to the private sector as a percentage of GDP, based on the lagged dependent variable and the institutional arrangement of the oil companies. Independent variables include interest rate controls, the change in the logarithm of gross capital formation, and a dummy variable for the year 1974. In that year, international oil prices experienced an atypical increase (over 250% per year) due to the oil embargo imposed by Saudi Arabia, Iran, Iraq, the United Arab Emirates, Kuwait, and Qatar, which began at the end of 1973. The results are presented in Table 5.

Table 5
Change in credit as % of GDP specifications

Change in domestic credit (Ddcred)	Model A	Model B	Model C	Model D	Model E	Model with interactions
Change in cred. lagged	-0.351 (***)	0.446	0.699 (*)	0.782 (*)	0.740 (**)	0.775 (**)
	(0.065)	(0.365)	(0.384)	(0.413)	(0.323)	(0.330)
NOC			7.418 (**)	4.124	8.802 (**)	10.315 (*)
			(2.953)	(3,983)	(4.426)	(5.323)
oil rents				0.993	-0.202	7.986
				(0.879)	(0.469)	(9.358)
fiscal dependence					-32.558 (**)	-376.26
					(12.980)	(2671.71)
NOC*oilrents						-8.223
						(9.342)
NOC * fiscal dependence						340.808
						(2669.18)
oil rents * fiscal dependence						-463.45
						(415.72)
NOC*oil rents *fiscal dependence						463.25
						(416.39)
(***) p<0.01, (**) p<0.05, (*) p<0.1						
GMM- Dynamic Panel Data. Two step-robust standard						
Hansen Prob > chi2	0.266	0,01	0.528	0.436	0.328	0.321
AR(1) Pr > z	0.545	0.887	0.004	0.002	0.000	0.001
AR(2) Pr > z	0.001	0.419	0.743	0.543	0.404	0.382
Instruments	71	71	71	71	71	71
Observations	3420	3348	3348	3320	2289	2289
Countries	88	87	87	87	80	80
No. of instruments/No. of cross sections	0,81	0,82	0,82	0,82	0,89	0,89

Model A: uses lagged change in credit, as control variables: fixed effects and time trend interacted with regions and polity
Model B: uses lagged Ddcred. As exogenous variables: IRC, rate of growth of FBK and a dummy variable for the year 1974; keep control variables
Model C: previous set of exogenous variables and National Oil Company , keep control variables
Model D: previous set of exogenous variables and oil rents as exogenous variables, keep control variables
Model E: previous set of exogenous variables and fiscal dependence as exogenous variables, keep control variables

Statistical tests validate the econometric method, as the null hypotheses of the Hansen and AR(2) tests are not rejected. The significance of the coefficient associated with lagged credit emphasizes the inertia present in this financial indicator. Regarding the explanatory variables, fewer interest rate controls have a positive effect on credit deepening, while gross capital formation and the dummy variable are also positive and significant. Once again, it is essential to apply marginal effects tests to assess changes in credit depth concerning fiscal dependence by dividing the sample based on the ownership of oil companies.

Table 6
Model for private credit as percentage of GDP
Marginal effects

y: ΔCredit/GDP			Obs.	2289
w.r.t. : fiscal dependence on oil revenue				
at mean oil rent				
over: NOC	dy/dx	z	Pr > z	Oil rent mean
Not-state owned	-472.974	2696.03	0.861	0.209
State-owned	-35.849	14.814	0.016	2.059

Evidence from applying this test indicates that countries with fiscal dependence on oil revenues and national oil companies exhibit lower levels of financial development, as measured by credit deepening. The results of the marginal effects tests-both for the use of interest rate controls and for the growth of the credit share of GDP-show that fiscal dependence on oil revenues in countries with national oil companies is associated with a higher prevalence of interest rate regulations and lower credit growth.

4.3 Mediation analysis

The third stage of the empirical strategy involves applying mediation tests for panel data. The purpose of the mediation analysis is to estimate the portion of the effects of the interaction between the National Petroleum Company and fiscal dependence (independent variable) that are transmitted to credit deepening (dependent variable) through the application of interest rate controls (mediating variable). The portion of the impact of the independent variable that passes directly to credit deepening is referred to as the direct effect, while the portion of the interaction term that flows through interest rate controls is termed the indirect effect.

We apply the approach adapted from Krull and MacKinnon (2001), which involves three equations: 1) the dependent variable (DV) regressed on the independent variable (IV), 2) the mediator variable (MV) regressed on the IV, and 3) the DV regressed on both the MV and the IV.

A mediation analysis is conducted using a mixed-effects regression model to examine the relationship between the independent variable-the interaction between fiscal dependence and the National Oil Company- the mediator, IRC, and the dependent variable, the credit growth rate. The interaction term is not significant in Equation 1 ((c_{path})) but is a significant predictor of interest rate controls in Equation 2 ((a_{path})), indicating that as fiscal dependence increases, interest rate controls also increase. Additionally, the effect of the mediator IRC on credit growth is significant ((b_{path})). This supports the mediation hypothesis, suggesting that IRC plays a crucial role in the relationship between fiscal dependence and credit growth.

In summary, while fiscal dependence does not directly affect credit, it significantly influences interest rate controls, which in turn affects the growth rate. The mediation analysis indicates that IRC accounts for around 20% of the total effect of fiscal dependence on credit. The ratio of the indirect effect to the direct effect is approximately 0.25, suggesting that the indirect effect is about 25% of the direct effect.

Table 7
Mediation Analysis

Analysis Component	Coefficient	Standard Error	z-value	p-value	95% Confidence Interval
Equation 1 (c_path)					
Direct Effect of IV on Ddcred	8.24	5.99	1.38	0.169	[-3.50, 19.98]
Equation 2 (a_path)					
Effect of IV on IRC	1.67	0.81	2.06	0.040	[0.08, 3.27]
Equation 3 (b_path & c_prime)					
Effect of IRC on Ddcred	0.91	0.18	5.16	0.000	[0.57, 1.26]
Direct Effect (c_prime)	6.02	5.98	1.01	0.314	[-5.69, 17.73]
Summary of Effects					
Total Effect (c_path)	8.24				
Indirect Effect	1.53				
Proportion of Total Effect	20.24%				
Ratio of Indirect to Direct Effect	0.25				
Ratio of Total to Direct Effect	1.25				

5 Concluding remarks

In this paper, we hypothesize that oil-producing countries that manage their oil business through national companies may experience high fiscal dependence on these revenues, which encourages them to employ various mechanisms to finance public spending through specific measures of financial repression, such as interest rate controls. This proposed arrangement acts as an underlying mechanism that weakens credit expansion in the banking system because credit is not allocated efficiently, and depositors receive lower returns than they would in the absence of interest rate restrictions.

To study this hypothesis, we utilized the database on interest rate controls developed by Jafarov et al. (2019). By applying dynamic panel data analysis, along with marginal and mediation effects tests, we obtained empirical evidence that countries with national oil companies and governments dependent on oil revenues are more likely to implement interest rate controls. This, in turn, inhibits private credit growth and constrains the development of the financial system.

The results obtained provide an alternative explanation for the financial curse by endogenizing the application of financial repression within the institutional framework that characterizes countries with national oil companies and a high fiscal dependence on oil revenues. National oil companies are often viewed as sources of revenue for the state, which limits their ability to develop the investment plans necessary to maintain their competitiveness in the international oil market.

In this context, an important economic policy implication arises. By relying on revenues generated by oil companies, these countries have less incentive than their non-oil peers to develop a fiscal system based on direct, simple, transparent, and broad-based taxation. Additionally, overdependence on oil revenues makes it difficult for them to maintain fiscal discipline. This vulnerability to international oil price shocks compels them to repress their financial systems.

To address this issue, developing a tax system that is less dependent on oil revenues-such as by implementing sovereign wealth funds (macroeconomic stabilization funds) with clear rules for transferring revenues to the fund during periods of higher-than-budgeted revenues and mechanisms for withdrawals-could help stabilize the volume of revenues obtained by these countries. This approach would reduce the temptation for their administrations to interfere in the balance of the financial market, thereby stimulating long-term development.

Finally, it is important to note that a limitation of this research is the estimation of fiscal dependence. In the case of some countries with high oil revenues, it was not possible to obtain data on public revenues, which could impact the estimates made, although it is unlikely to change the overall conclusion.

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6 Appendix

Im, Pesaran and Shin (IPS) unit-root test

Variable	Statistic	p-value	N° of panels
Credit as % of GDP	-0.9189	1.0000	89
Δ Credit as % of GDP	-11.5847	0.0000	89
log. Oil price	-3.0671	0.0000	90
log. FBK	-2.3825	0.0000	89
log. Consumption	-2.1355	0.0000	89
Fisher unit-root test			
Oil rents as % of GDP			82
Inverse chi-squared	523.7715	0.0000	
Inverse normal	-13.7991	0.0000	
Inverse logit	-14.4403	0.0000	
Modified inv. chi-squared	18.3259	0.0000	

Model for Interest Rate Controls (IRC)

Interest rate control (IRC)	Model with interactions	
IRCL	0.251	(**)
	(0.124)	
NOC	0.752	(**)
	(0.315)	
oil rents	-0.300	
	(0.565)	
fiscal dependence	92.584	
	(-141.92)	
NOC*oilrents	0.347	
	(0.680)	
NOC * fiscal dependence	-92.236	
	(-141.80)	
oil rents * fiscal dependence	15.014	
	(-29.241)	
NOC*oil rents *fiscal dependence	-16.286	
	(-29.541)	

polity	0,070	(***)
	(0.018)	
lnoprice	0.481	(***)
	(0.111)	
Constant	-0.517	(*)
	(0.299)	

(***) p<0.01, (**) p<0.05, (*) p<0.1

GMM- Dynamic Panel Data. Two step-robust standard

Hansen	Prob > chi2	0,072
AR(1)	Pr > z	0,114
AR(2)	Pr > z	0,548
Instruments		70
Observations		2334
Countries		82
No. of instruments/No. of cross sections		0,85

Model for private credit as percentage of GDP

Change in domestic credit (Ddcred)	Model with interactions
Change in cred. lagged	0.775 (**)
	(0.330)
NOC	10.315 (*)
	(5.323)
oil rents	7.986
	(9.358)
fiscal dependence	-376.26
	(2671.71)
NOC*oilrents	-8.223
	(9.342)
NOC * fiscal dependence	340.808
	(2669.18)
oil rents * fiscal dependence	-463.45
	(415.72)
NOC*oil rents *fiscal depend	463.25
	(416.39)
IRC	7.895 (***)
	(1.693)
dlnfbk	81.005 (**)
	(32.339)
d1974	248.804 (***)
	(58.063)
Constant	-24.193 (***)
	(5.094)

(***) p<0.01, (**) p<0.05, (*) p<0.1

GMM- Dynamic Panel Data. Two step-robust standard

Hansen	Prob > chi2	0.321
AR(1)	Pr > z	0.001
AR(2)	Pr > z	0.382
Instruments		71
Observations		2289
Countries		80
No. of instruments/No. of cross sections		0,89