Government Domestic Debt, Private Sector Credit, and Crowding Out Effect in Oil-Dependent Countries

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Abstract

In oil-dependent countries, banks are more liquid, better capitalized, and more profitable. However, bank credit is relatively low as a percentage of GDP. The low level has been blamed, amongst other reasons, on governments' reliance on the banking sector to finance fiscal deficits. The effect of government borrowing operates directly (real crowding out), or indirectly through rising interest rates (financial crowding out). This study examines the crowding out effect of government domestic borrowing using a panel data model for 28 oil-dependent countries over the period 1990-2012. We estimate the model, using both fixed effects and generalised method of moments estimators, and find that a one percent increase in government borrowing from domestic banks significantly decreases the private sector credit by 0.22 percent and the lending rate by 3 basis points albeit insignificantly. This finding suggests that government domestic borrowing has resulted in the shrinking of private credit.

Keywords: banks, liquidity, oil-dependent, crowding out, credit

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1. Introduction

Banks intermediate funds from the surplus sector to the deficit sector of the economy. Banks are subject to certain regulations by the regulatory authorities, but they determine the rules in allocating funds, and thus play a significant role in determining the type of investment activities, the level of job creation and the distribution of income (Gross, 2001). The banking industry in oil-dependent countries has changed significantly buoyed by the natural resource sector, mergers and acquisitions, the advent of globalization, and the emergence of technological advances in information and communication technologies. The soundness and credibility of the banking systems has improved in recent years**.** However, banks in oil-rich countries[1] disburse less private credit than non-oil countries. For instance, bank private credit from 2000-2011 on average in Azerbaijan and Nigeria were 11% and 19% of total GDP, respectively (oil-rich countries); whereas bank private credit in Tunisia and Bangladesh were 55% and 33% of total GDP, respectively (non-oil countries)[2]. This is surprising given the massive amount of excess liquidity[3] in the banking sector of oil-rich countries. This reflects a weak level of financial intermediation.

The low level of bank credit to the private sector in oil-dependent countries has often been blamed, amongst other reasons, on governments increasing reliance on the banking sector to finance budget deficits. The effects of government borrowing can operate through different channels, however, many of the concerns have focused on the potential interest rate effect. Government borrowing can affect private investment by crowding out private sector credit directly (real crowding out), or indirectly through rising interest rates (financial crowding out), though the magnitude of these potential adverse consequences depends on the degree to which government borrowing raises interest rates and/or reduces private credit (Engen and Hubbard 2004). Nonetheless, the occurrence of one channel does not preclude the likelihood of the other.

The analysis on the effects of government borrowing on private investment has been ongoing for more than three decades, empirical consensus about the transmission mechanism and magnitude differ given economic structure and regulatory constraints. Does government borrowing from domestic banks qualitatively drive up interest rate, or quantitatively shrink

[1] A country is oil-rich if an average share of hydrocarbon in total fiscal revenue is at least 25 percent and/or an average share of hydrocarbon in total export proceeds is at least 25 percent.

[2] http://www.quandl.com/browse/worldbank/global-financial-development/bank-private-credit-to-gdp-all-countries.

[3] This is evident in the relatively small bank credit to the private sector as a per cent of total banking assets in many oil-rich economies.

private sector credit? Unfortunately, both economic theory and empirical analysis have proved inconclusive. Our study is a modest attempt to bridge some of gap in the literature in oil-dependent countries.

The paper is structured as follows. Section 2 reviews the literature on crowding out effect of government borrowing on interest rate and private credit. Section 3 describes our data and model specification. Section 4 presents and discusses the empirical results. Section 5 concludes the study.

2. Literature Review

The aggregate effect of government borrowing on interest rate is viewed from different perspectives (Bahmani-Oskooee, 1999). First, the *neo-classical theory* of interest rate argues that financing a budget deficit implies an increase in the supply of government bonds at a higher interest rates which discourages private investment and result in crowding-out. Second, the *Keynesian theory* asserts that expansionary fiscal policy will lead to little or no increase in the interest rate and instead an increase in output and income and hence a crowding-in rather than crowding-out (Aschauer, 1989). Third, *Ricardian Equivalence Theorem* proposed by Barro (1974) advocates neutrality such that increase in the deficit financed by fiscal spending will be matched with a future increase in taxes leaving interest rates and private investment unchanged. A similar view is found in *Capital Inflow Hypothesis* which is based on the idea that the demand for government debt is infinitely elastic (Dwyer, 1985). That is, an increase in the deficit will be financed partly or wholly not by domestic savings but an inflow of capital from abroad; if this hypothesis holds, interest rates will remain unchanged.

In principle, government borrowing affects private investment through lending rate, however in financially repressed[4] economies particularly in many developing countries, the equilibrium interest rate could be somewhat insensitive to market perceptions. Reinhart and Sbrancia (2011) argued that government debts could still have no effect on interest rates but have significant effect on private credit due to intervention by the government such as administrative controls imposed on interest rates, high legal reserve ratio, existence of direct intervention on credit allocation,

[4] Financial repressions are measures that governments employ to channel funds to themselves, which in a deregulated market would go elsewhere.

government ownership or control of financial institutions, barriers that limit other institutions seeking to enter the market, or by 'moral suasion'[5]

In terms of empirical evidence, a seminal study by Aisen and Hauner (2008) estimated the impact of budget deficit on interest rate with a generalised method of moments (GMM) over a panel dataset of 60 advanced and emerging economies. The authors concluded that there was a significant positive impact of budget deficits on interest rates, but the impact depends on the interaction term and was only significant when deficits were high, or interact with high domestic debt, when financial openness was low, or financial depth was low. However, despite the large attention given to developed economies, the economies with the highest interest rates and a history of fiscal mismanagement are in the developing countries. Mukhtar and Zakaria (2008) investigated the relationship between interest rates and government deficits in Pakistan, over the period 1960-2005 and found that government budget deficits did not exert significant influence on nominal or real interest rates. Pandit (2005) examined the relationship between long-term nominal interest rate and budget deficit variables in Nepal for the period 1975-2003 and found evidence that there exists positive but insignificant relationship between long-term nominal interest rate of government securities and budget deficit variables. Pandit concludes that both supply of and demand for long term government securities are not market based. Akinboade (2010) investigated the budget deficit–interest rate relationships in South Africa, using the Granger-causality methods. The author's results suggest that budget deficits have no effect on interest rates in South Africa. Chakraborty (2012) examined whether there is any evidence of financial crowding out in the recent years of financially deregulated interest rate regime in India. The author found no significant relationship between the two.

Credit markets rarely reach equilibrium through changes in interest rates alone (Temin and Voth, 2005). Thus, changes in quantity of credit will give a better insight of the effect of government borrowing. Temin and Voth (2005) argue that examinations of interest rates are fundamentally misguided, and that the 18th- and early 19th-century private loan market balanced through quantity rationing in England. The authors used a vector autoregressive (VAR) approach on lending volume at Hoare's Bank and concludes that there was substantial crowding out, that is, a 1% rise in government debt led to a 1% decline in private lending. Christensen (2005) regressed private sector lending on domestic debt in 27 sub-Sahara African countries over the period 1980–2000. The author's results showed significant support for the crowding-out hypothesis; on average across countries, an expansion in domestic debt of 1 percent relative to broad money causes the ratio of

[5] An unofficial technique of public and private discussions and arm-twisting, which may work by implicit threat

private sector lending to decline by 0.15 percent. Abdel-Kader (2006) conducted a survey of some state owned and private banks and 351 firms from various sectors in Egypt. The study investigated the extent of credit decline to the private sector in Egypt and whether it was due to supply factors (credit crunch), demand factors (credit slowdown), or other factors (e.g., crowding out). The study found that interest rates were no longer the decisive factor in lending decisions. A study by Emran and Farazi (2009) explored the crowding-out of private investment using panel data on 60 developing countries for 32 years. The estimates indicate that a $1.00 more of government borrowing reduces private credit by $1.40.

Our study differs from the existing empirical studies in three ways. Our study sample focuses on oil-dependent countries which are uniquely different from many other countries. Secondly, we explore both the interest rate and quantity channel effect of government domestic borrowing. Finally, we employ an estimation technique that utilizes cross-sectional time series data.

3. Data and Model Specification

This study estimates the link between government borrowing from domestic banks and changes in private sector credit and lending rate for a panel of 28 oil-dependent countries (see Appendix 2) The dataset encompasses 1990–2012 period and takes non-overlapping four-year averages[6]. The variables used in this study include factors which have empirically been found to be robust in explaining private credit development. Domestic lending rate, bank credit issued to the private sector, government domestic debt, per capita GDP, money supply, trade openness, institutional quality, inflation, and price of crude oil are obtained from the World Bank's World Development Indicator (WDI) database. Institutional quality is derived from the Heritage Foundation's Index of Economic Freedom database.

Our model is based on Emran and Farazi (2009) theoretical framework, equation (1) constitutes the baseline specification of the empirical dynamic panel data.

$$R_{it} = \rho R_{i,t-1} + x_{it}\beta + u_{i,t} \quad \textbf{(1)}$$

[6] To remedy missing data, mitigate high degree of persistence, smooth short-term fluctuations and to reduce the potential bias arising from having a large number of time observations in dynamic panel estimation. This is for dynamic panel GMM estimator only.

Where ρ is a scalar and x_{it} is the i^{th} observation on the *K* explanatory variables, it has unobservable country-specific, time-invariant effects, (v_i) and the residuals (ε_{it}), such that $u_{i,t}$ = $v_i + \varepsilon_{it}$.

More specifically, the estimated model is in the form:

$$R_{it} = \rho R_{i,t-1} + x_{it}\beta + v_i + \varepsilon_{it} \quad \textbf{(2)}$$

Where the residuals (ε_{it}) are white-noise such that the ε_{it} ~ IID (0, σ_{ε}^{2}), v_i ~ IID (, σ_{v}^{2}), and ρ is a scalar such that | ρ | < 1; *i* = 1, 2, 3,…..*N* is an index for individual sample of oil-dependent countries, where *N* = 28; *t* = 1, 2,3,….*T* is an index for time-variant periods, in this case, years, so that *T* = 6 for four-year average base estimation such as 1990-1993, 1994-1997, 1998-2001, 2002-2005, 2006-2009, 2010-2012 whilst *T* = 23 for the estimations involving the study period, 1990-2012. The country specific effect and the disturbance error are independent of each other. x_{it} as row vector of explanatory variables, excluding the lagged dependent variable, with the dimension of *K* = *n* x 1 with *n* equals the number of exogenous variables, but it is acknowledged that these variables may not be exogenous. ρ is an unknown parameter of the lagged endogenous variable, β is the unknown parameter vector of the *K* exogenous variables*; l* is the number of significant lags carried by the dependent variable to capture the entire history of the right-hand side variables (Green, 2003: 307); and v_i is country-specific fixed effects.

This model is also based on the assumptions that (i) the error term is orthogonal to the exogenous variables so that $E\ (x_{it}\ \ \varepsilon_{it}) = 0$; (ii) the independently and identically distributed error terms are uncorrelated with the lagged endogenous variable which implies that $E\ (R_{it-1}\ \ \varepsilon_{it}) = 0$; (iii) the exogenous variables might be correlated with the individual effect for which $E\ (x_{it}\ \ v_i) \neq 0$; and (iv) the past value is prone to affect the present, so there is a need to capture the dynamics effects of the dependent variable.

The dependent variables are bank credit and domestic lending rate. Bank credit issued to the private sector, is the credit provided by the banking system to the private sector as a percentage of GDP. This measure is better than other measures of financial development used in the literature because it is more directly linked to investment and growth (Calderón and Liu, 2003, p. 326; Fitzgerald, 2006).

Domestic lending rate measures bank lending rate that usually meets the short- and medium-term financing needs of the private sector. Given that most interest rates are highly correlated, the

(banks) lending rate is used as a proxy for the nominal interest rates (e.g. Bhalla, 1995; Deepak et al., 2002)

The independent variable of interest is: domestic debt, which measures the claims on the central government by the domestic deposit money banks and other financial institutions. The sign for this variable is expected to be negative because an increase in government borrowing could crowd out private credit as espoused (e.g. Christensen, 2005), and positive for lending rate because increase in government borrowing will potentially increase lending rate (e.g. Ford and Laxton 1995).

The set of control variables[7] embodied in $X_{i,t}$ are:
Per capita GDP, which is included as an indicator of growth. We control for per capita income growth as rapidly growing economies are likely to have greater demand for and supply of credit (e.g. Djankov et. al., 2007; Emran and Farazi, 2009).

We include money supply which measures the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government. We control for this variable because increase in money supply might lead to liquidity surges – thus to credit expansion

Trade openness index is calculated as the ratio of the country's total trade, the sum of exports plus imports, to the country's gross domestic product. We control for this variable since a relatively open economy could dampen the effect of government borrowing.

We include institutional quality because better institutions are associated with more transparency and accountability, less corruption, and better protection of property rights. As a proxy for the quality of institutions, we use the *Heritage Foundation's Index of Economic Freedom*. This index aggregates 10 components with equal weight namely, trade policy, fiscal burden, government intervention, monetary policy, capital flows and foreign investment, banking and finance, property rights, wages and prices, regulation, and black market. The index assigns a score (0-100) to each country's performance and higher scores correspond to higher levels of institutional quality. We control for this variable because better institutions is an important determinant of private credit (e.g. La Porta et. al., 1997).

[7] Per Capita GDP, Trade Openness, Money Supply, Private Credit, and Government Domestic Debt are measured in constant 2005 U.S. dollars.

To account for macroeconomic stability, we include inflation which is the growth rate of annual consumer price index (CPI). We control for this variable because high inflation distorts credit allocation process and deteriorates credit quality which undermine the supply of loanable funds (e.g. Baum et al. 2009).

We use Brent Crude to measure price of crude oil which is a major trading classification of sweet light crude oil that serves as a major benchmark price for purchases of oil worldwide.
Introducing the oil price index as an independent variable allows us to measure the impact that fluctuations in world oil price could have on the supply of loanable funds. We deflate this variable by CPI to obtain the real crude oil price. We control for this variable because an increase in the price of crude oil will result in a windfall and presumably increases bank credit. It could also dampen the effect of government borrowing on bank credit.

4. Econometric Results

4.1. Government borrowing and private credit

The basic model[8] specifying the private credit from the banking sector is expressed as follows:

$$C_{it} = \alpha_i + \beta_1 G_{i,t} + \beta_2 Y_{i,t} + \beta_3 F_{i,t} + \beta_4 I_{i,t} + \beta_5 O_{i,t} + \beta_6 Q_{i,t} + \beta_7 R_{i,t} + \varepsilon_{i,t} \quad \textbf{(3)}$$

Where *C* is the log of real private credit as a percentage of GDP, *G* is the log of real government borrowing as a percentage of GDP, *Y* is the log of real GDP per capita, *F* is the log of real level of financial debt, *Q* the institutional quality, *O* the real price of crude oil, *I* the inflation rate expressed as a percentage, *R* the lending rate expressed as a percentage, and $\varepsilon_{i,t}$ is the error term that includes all unobservable influences of private credit. The focus is on the parameter β_1; crowding out of private credit by government borrowing implies that $\beta_1 < 0$, while crowding in of private credit implies $\beta_1 > 0$

We present the fixed effect model results in Table 1. The regression results show that the effect of government borrowing on private credit is negative and statistically significant across all

[8] We deviated from the bank specific factors such as overhead cost, competition, interest spread etc. These explanatory variables were omitted as we improvise the specification according to the purpose of our study which is to assess the role of government borrowing from domestic banks on private credit to understand the transmission channel of the crowding out phenomenon.

specifications. In other words, when government borrows $1 from domestic banks, it crowds out private credit by $0.20. From all indications private credit to the private sector depends on government borrowing, money supply, and institutional quality. The fixed effect estimator mitigates the omitted variable problems by drawing fixed effects out of the error term. However, the estimates could be biased due to endogeneity arising from simultaneity as private and public credit are mostly determined by the highest achievable performance of the banks given regulatory constraints. However, we suspect reverse causality might be a trivial issue given the nature of oil-rich economies and their banking system (i.e. the close connection between governments and the banks), thus, it is likely that public credit will somewhat dictate the direction.

Table 1. Determinants of private credit, 1990-2012

	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit	Privatecredit
Domesticdebt	-0.372	-0.276	-0.275	-0.190	-0.190	-0.192	-0.204
	(10.83)**	(15.03)**	(14.95)**	(10.12)**	(10.12)**	(9.95)**	(9.36)**
Moneysupply		0.653	0.641	0.679	0.666	0.660	0.623
		(38.92)**	(32.37)**	(34.22)**	(27.96)**	(26.66)**	(22.42)**
Oilprice			0.172		0.153	0.147	0.096
			(1.18)		(1.02)	(0.93)	(0.45)
InstQ				3.729	3.649	4.374	4.350
				(4.10)**	(3.99)**	(4.23)**	(3.42)**
Inflation						0.024	-0.063
						(1.19)	(1.59)
GDPpercapita							0.472
							(4.52)**
Lendingrate							1.630
							(2.47)*
_cons	273.197	29.576	26.737	-190.973	-188.429	-224.958	-264.513
	(37.11)**	(4.01)**	(3.44)**	(3.79)**	(3.73)**	(3.97)**	(3.64)**
R2	0.17	0.77	0.77	0.79	0.79	0.79	0.80
N	620	620	619	452	452	429	363

The dependent variable is real private credit.
All variables are in log, except oil price, institutional quality, inflation and lending rate.
The model is estimated with fixed effect estimator with * and ** indicating significant at the 5 and 1 per cent level, respectively.
Source: Author's estimations

4.2. Government borrowing and lending interest rate

The basic model[9] specifying the lending rate to the private sector is expressed as follows:

$$R_{it} = \alpha_i + \beta_1 G_{i,t} + \beta_2 Y_{i,t} + \beta_3 F_{i,t} + \beta_4 I_{i,t} + \beta_5 O_{i,t} + \beta_6 Q_{i,t} + \beta_7 C_{i,t} + \varepsilon_{i,t} \quad \textbf{(4)}$$

[9] We have not drawn heavily on the determinants of interest rate model such as government consumption, private consumption, private savings, etc. These omitted variables are not required for our analysis as we improvise the specification according to our purpose which is to assess the role of government borrowing in the lending rate to understand the transmission channel of the crowding out effect

Where R is the lending rate in percentage, other variables is similar to equation (3)
The focus is on the parameter β_1; crowding out by government borrowing in relation to lending rate implies that $\beta_1 > 0$, while crowding in implies $\beta_1 < 0$

We used the fixed-effect panel regression on pooled data[10]. The estimated coefficients for equation (4) is presented in Table 2. The regression results show that the effect of government borrowing on lending interest rate is negative and statistically insignificant across all specifications. In other words, if government borrows 1% of total GDP, it decreases interest rate by 3 basis points. Domestic lending rate depends on money supply, oil price, and inflation. The fixed effect estimator improves the OLS model by mitigating the omitted variable problems; however, the estimates could be affected by endogeneity resulting from a loop of causality between the lending interest rate and government borrowing. Again, this could be inconsequential given the relatively tight grip of governments on domestic banks in the oil-rich economies.

Table 2. Determinants of lending interest rate, 1990-2012

	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate	Lendingrate
Domesticdebt	-0.020	-0.035	-0.040	-0.044	-0.045	-0.053	-0.031
	(0.75)	(1.31)	(1.57)	(1.32)	(1.40)	(3.05)**	(1.60)
Moneysupply		-0.086	0.029	-0.100	0.021	-0.010	-0.098
		(3.64)**	(1.02)	(3.00)**	(0.53)	(0.45)	(2.82)**
Oilprice			-0.160		-0.142	-0.098	-0.104
			(6.90)**		(4.99)**	(6.16)**	(6.54)**
InstQ				-0.555	-0.459	0.030	-0.033
				(3.37)**	(2.86)**	(0.31)	(0.34)
Inflation						0.051	0.051
						(30.44)**	(30.61)**
GDPcapita							0.123
							(1.43)
Bankcredit							0.123
							(2.84)**
_cons	17.804	21.237	23.421	52.489	48.360	18.753	21.669
	(31.05)**	(19.29)**	(21.24)**	(5.71)**	(5.40)**	(3.50)**	(3.98)**
R2	0.00	0.03	0.11	0.06	0.12	0.76	0.77
N	543	543	542	408	408	386	386

The dependent variable is nominal lending interest rate
All variables are in log, except oil price, institutional quality, inflation and lending rate.
The model is estimated with Fixed effect estimator with * and ** indicating significant at the 5 and 1 percent level, Respectively.
Source: Author's estimations

[10] The Hausman test rejects the hypothesis that the individual effects are uncorrelated with the other regressors for the baseline model at the 1-percent level. Thus we use the fixed effect model.

4.3. Government borrowing, private credit, and lending interest rate

Finally, we apply generalised method of moments (GMM) dynamic panel estimator[11] and utilize a model specification which has the following form:

$$R_{it} = \rho R_{i,t-1} + x_{it}\beta + u_{i,t} \quad \textbf{(5)}$$

In equation (5)[12], the lagged dependent variable is endogenous while other explanatory variables are treated as exogenous. Hence, we control for endogeniety of this variables in the lagged form as a repressor using internal instruments such as lagged levels and lagged differences. The government borrowing variable is constructed in such a way as to eliminate potential endogeniety and reverse causation and is thus treated in the syntax as an exogenous variable; it is not likely that current private credit or current lending rate may explain past government borrowing. Other explanatory variables are also controlled for and treated as exogenous using suitable internal instruments
We report the main econometric specification choices that we confronted and explain why the dynamic-GMM panel model is our preferred model over estimating static models (i.e. pooled OLS, fixed effects)

1). Static models omit dynamics which causes dynamic panel bias (Bond, 2002; Baum, 2006), and as a result do not allow us to study the dynamics of adjustment (Baltagi, 2008). Omitted dynamics imply that such models are misspecified because the entire history of the right hand side variables of equation (5) are not captured (Greene, 2008, p. 468)

2). There are 28 countries (N) analysed over a period of 23 years (T) and as a result there are more countries (N) than years (T). Many authors argue that the dynamic panel model is specially designed for a situation where 'T' is smaller than 'N' in order to control for dynamic panel bias (Bond, 2002; Roodman. 2006; Baltagi, 2008). For long panels (i.e. small N and large T), the fixed effect estimator may be a better choice because its bias decreases as more periods are added (Nickel, 1981). Based on these reasons and considering that our dataset is neither particular wide nor long, we present both the fixed effect and GMM estimation results.

3). The GMM estimator is best suited to handle biases induced by simultaneity, omitted variables, and unobserved country-specific effects and provides for potentially improved efficiency. For

[11] See Appendix 1 for more information on generalised method of moments (GMM) estimator
[12] Private credit and lending rate models, respectively

instance, the problem of potential endogeniety is easier to address in the dynamic panel estimates than in static models that do not use internally generating instruments. More so, in dynamic GMM estimation, all variables from the regression that are not correlated with the error term (lagged and differenced variables) can be potentially used as valid instruments.

Having identified the dynamic panel data model as the most appropriate econometric technique for our estimation, we have to decide which dynamic panel approach to use. Even though the GMM is the method of estimation of dynamic panel models that provides consistent estimates (Baum, 2006; Roodman, 2006), one has to decide whether to use "difference-GMM" (DGMM) or "system-GMM" (SGMM). We used SGMM over DGMM for the following reasons:

1). The SGMM estimate has an advantage over DGMM variables that are random walk or close to a random-walk (Bond, 2002; Roodman 2006). Since our model specification includes macroeconomic variables which are known in economics for the presence of random walk, the SGMM approach seems to be the more appropriate choice. Differencing the variables will remove any variable that is somewhat constant, such as lending rate.

2). The SGMM generally produces more efficient and precise estimates compared to DGMM by improving precision and reducing the finite sample bias (Baltagi, 2008). If one works with an unbalanced panel then it is better to avoid DGMM estimation which has a weakness of magnifying gaps (Roodman, 2006, p.19). Our panel is unbalanced. The estimate of DGMM specification does not provide better statistical diagnostics in comparison to SGMM. Hence, our preferred choice is SGMM.

Table 3. Base model- SGMM dynamic panel-two step robust estimate

	Private Credit		Lending Rate	
	D-GMM	SYS-GMM	D-GMM	SYS-GMM
Constant	-782*	-77.39	-8.65	86.69**
	(224)	(0.563)	(-1.99)	(0.016)
Private Credit L.1	0.261	0.725**		
	(0.110)	(0.018)		
Lending Rate L.1			0.895	0.521
			(1.704)	(0.252)
Domestic Debt	-0.191**	-0.221**	-0.051	-0.033
	(0.036)	(0.031)	(0.263)	(0.257)
Money Supply	0.534**	0.318**	-0.367	-0.125
	(0.047)	(0.032)	(-0.075)	(0.109)
Oil Price	0.674*	0.236**	-0.075	-0.038
	(0.081)	(0.085)	(0.062)	(0.064)
Inst. Quality	0.812	0.602**	-0.082	-0.148
	(3.821)	(0.042)	(0.111)	(0.155)
Inflation	-0.017	-0.023	0.049***	0.043***
	(0.094)	(0.538)	(0.001)	(0.682)
Lending Rate	-0.801	-0.695		
	(0.025)	(0.627)		
Private Credit			0.094	0.157
			(0.051)	(0.155)
GDP Per Capita	0.063	0.105	0.282	-0.009
	(0.170)	(0.062)	(0.115)	(0.913)
Countries	28	28	28	28
Observations	148	148	145	145
No. of instruments	18	26	16	24
Hansen J- test	0.847	0.866	0.506	0.661
Diff. in Hansen test	0.265	0.924	0.678	0.999
2nd Order Correlation	0.703	0.482	0.397	0.359

P-values in parenthesis.
***, **, * denote statistical significance at the 1%, 5% and 10% level, respectively.
Private credit, domestic debt, money supply and GDP per capita are in logs.
Source: Author's calculation.

The validity of the estimates in System-GMM depends on the statistical diagnostics. SGMM assumes that the disturbance terms are not autocorrelated, that is, the instruments in the model are exogenous, which is verified by testing for the presence of first, and more importantly, second-order autocorrelation in the error term. A small panel sample may produce "downward bias of the

estimated asymptotic standard errors" in the two-step procedure (Baltagi, 2008, p. 154); to circumvent this we used the Stata command "small" which produces a more accurate estimate by implementing the 'Windmeijer correction' (Windmeijer, 2005).

The results of relevant statistical tests and checks for SGMM are:
1) As documented by Arrelano and Bond (1991), the GMM estimator requires that there is first-order serial correlation AR (1) test but that there is no second-order serial correlation AR (2) test in the residuals. Since the null hypotheses imply that there is no first-order AR (1) test and second-order serial correlation AR(2) test, it means that one could reject the null hypothesis in the AR(1) test but not to reject it in the AR(2) test to get appropriate diagnostics. Our results satisfy this test specification, 0.48 and 0.359 for private credit and lending rate, respectively (see Table 3)

2) The Hansen J-statistic tests the null hypothesis that the model specification is correct and all over identifying restrictions are valid i.e. validity of instruments. The rejection of the null hypothesis means the estimates are questionable. Our Hansen test of over identifying restrictions does not reject the null at any standard level of significance ($p = 0.86$; $p = 0.66$ receptively). Hence, it is an indication that our model used valid instruments.

3) Roodman (2006) suggests checking for steady-state assumption which can be also used to investigate the validity of instruments. In other words, the estimated coefficient on the lagged dependent variable in the model should indicate convergence by having a value less than absolute unity, otherwise SGMM is invalid. The estimated coefficient of our lagged dependent variables are 0.72; and 0.52 respectably, which means the steady-state assumption holds.

4) Bond (2002) suggests additional checks on the validity of the estimates verifying if the estimated coefficient on the lagged dependent variable falls in between the values obtained from OLS and FE estimators. Our estimates satisfy this specification (i.e., the following values are obtained: for private credit: OLS=0.76 > GMM=0.72 > FE=0.51. For lending rate: OLS= 0.62> GMM = 0.52> FE= 0.49)

5) The Difference-in-Hansen test evaluates the validity of subsets of instruments. The null hypotheses of this test is that specified variables are proper instruments, i.e. that the set of examined instruments is exogenous. From Table 3, we do not have enough evidence to reject the null hypothesis of exogeneity of the GMM instruments.

6) Roodman (2007) suggests that one should report the number of instruments used in the dynamic panel, since they can generate potentially "weak" instruments that can cause biased estimates. First,

the number of instruments should not exceed the number of observations, which is the case here (26 instruments < 148 observations for interest rate model; and 24 instruments < 145 observations for private credit model). Furthermore, 'a tell-tale' sign is a perfect Hansen J-statistic with the p-value equal to 1.00. At the same time, the p-value should have a higher value than 0.25 (Roodman 2007, p. 10). The Hansen J-test reports a p-value of 0.86 and 0.66 respectively, which satisfies both rules. Finally, Roodman (2006; 2007) suggests reporting how one obtained the "optimal" number of instruments. In our case, the instruments came from the use of 3 lags for levels and 3 for difference. We estimated a number of regressions by increasing or decreasing the number of instruments, but other limits did not yield better diagnostics, indicating that this number of instruments is the most favourable.

Next, we move to economic interpretation of the results reported in Table 3. Our variable of interest (Domestic Debt) is statistically significant for private credit and statistically insignificant for the nominal lending rate. Hence, a one percentage increase in government borrowing from domestic banks decreases private credit by 0.22 percent and decreases lending rate by 3 basis points.

There is some crowding out effect on private credit by government borrowing but it is smaller than the 1.4 per cent recorded by Emran and Farazi (2009) in a panel of 60 developing countries. There are several reasons for this; one could be due to the banking structure of oil rich countries, banks in resource-based economies tend to display higher profitability and are more liquid and better capitalized (Beck, 2011). Therefore, if banks have excess liquidity, a higher lending to the government may not result in any significant reduction of credit to the private sector. Another reason could be that banks in oil-rich economies disburse a small amount of private credit to the private sector as a percentage of GDP, that is, the banks are already ineffective in channelling resources to the private sector, thus, increased government borrowing would have smaller effect on the already small bank credit. Despite the prevailing circumstances, our estimated coefficient for government borrowing on private credit is significantly negative in all specifications used.

On the issue of lending rate, government borrowing does not affect lending rate. A possibility– which is unlikely given that our sample countries are developing countries– could be that government borrowing did not result in higher interest rate due to the increasingly competitive nature of the domestic financial system and the integration among international financial markets. The second possibility why the equilibrium interest rate is somewhat insensitive could be that oil-rich economies are not liberalised, governments still have some dominance or control over domestic banks and financial institutions which generally occurs in developing countries since loans are not necessarily given according to the expected returns on the projects, but according to

other non-market based considerations. However, regardless of the specification used, our estimated coefficient for government borrowing on lending rate was insignificant.

5. Conclusion

Bank lending to the private sector is relatively low in most oil-dependent economies. Bank credit to the private sector significantly influences economic growth. This is because financial intermediaries mobilise savings, transforms maturities, exert corporate control, and channel funds to the most productive users. The possibility that government debt might crowd out bank credit to the private sector raises a concern regarding the impact of increased domestic debt on private investment along with economic growth. Oil-dependent countries disburse relatively less bank credit to the private sector even though their banks are more liquid. Is government borrowing a contributing factor and if so what is the channel. Our study shows that government domestic debt has a significant negative effect on private credit but it does not result in an increase in the interest rate charged by banks on loans to the private sector. Our results has several policy implications.

The effect of government domestic debt in oil-dependent countries is not “substantial”. This result should not be construed that government domestic debt does not matter. Substantial and persistent levels of government debt can put downward pressure on domestic loanable funds and thus hinder private investment. There are no significant changes in lending rate as a result of government domestic borrowing even though the quantity of private credit decreases. Governments in oil-dependent countries should not be overly concerned about whether domestic borrowing affects lending rate, but rather focus on its effects on the levels of financial intermediation

Low credit to the private sector reflects both demand and supply factors. Potential factors reducing credit demand could be dearth of profitable investment opportunities and the availability of alternative financing instruments such as the capital markets. Factors affecting loan supply include liquidity, increase in uncertainty, lack of competition in the banking sector, underdeveloped capital markets, lack of information about the quality of borrower, and imperfect legal environment. Low credit demand does not appear to be the reason for the present low levels of bank lending because alternative financing channels are not readily available. The low level of bank credit reflects mostly supply and institutional factors such as the lack of competition which allows banks to keep their credit levels low, and banks are vigilant in their lending behaviour.

Our results is important in understanding the mechanism through which government borrowing affects private investment. This is because private investment in oil-rich economies (and in any other economy) depends critically on the availability of sufficient amounts of private credit, hence, crowding out of private credit may have significant disadvantageous effects on private investment and consequently on economic growth.

This study has some limitations that may provide a basis for additional research. Some governments especially from the Middle East tend to borrow less from banks due to their historical huge foreign reserves. In this case, this may have diluted the coefficients estimates. Our research study shows that government borrowing from domestic banks did not significantly change the lending rate charged to the private sector, however, it did not empirically buttress the reasons for such interest rate insensitivity.

Notwithstanding the aforementioned limitations, our results are interesting: government domestic borrowing has resulted in the shrinking of private credit in oil-rich countries. This works through the credit channel and not through the interest rate channel.

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APPENDIX 1

The Fixed effects ("within") estimator:

$\ddot{y}_{it} = \ddot{x}_{it}\,\beta + \ddot{u}_{it}$, t = 1, 2….T: i = 1, 2…N (6)

The problem is estimating equation (6) with a fixed effect model will not account for dynamics. More so, it does not control for simultaneity whereby $\ddot{y}_{it}$ could be causing $\ddot{x}_{it}$ and vice versa. We apply Arellano and Bond (1991) to circumvent it.

$R_{it} = (\rho R_{i,t-1} - \rho R_{i,t-2}) + (\beta x_{i,t} - \beta x_{it-1}) + (u_{i,t} - u_{i,t-1})$

E ($\Delta u_{i,t}\, R_{i,t-r}$) = 0; E ($\Delta u_{i,t}\, x_{i,t-r}$) = 0; m

Where $r \geq 2$,….. and $t = 3$,……T

$R_{it} = (\rho R_{i,t-2}) + (\beta x_{i,t-2}) + (u_{i,t} - u_{i,t-1})$ (7)

Therefore the lagged values of endogenous variables dated $t - 2$ and earlier are valid instruments for the equation in first differences. However, there are possible problems with the use of the Difference GMM estimator. When the lagged values of the series are weakly correlated with first difference, it can yield parameter estimates that suffer from large finite sample bias because of weak instruments. More, when the individual series for the lagged dependent and independent variables are highly persistent, the problem is more severe because it will difference out the variables.

We use System GMM estimator to circumvent the problem of Difference GMM estimator

$R_{it} = (\rho R_{i,t-2}) + (\beta x_{it-2}) + (u_{i,t} - u_{i,t-1})$ (8)

$R_{it} = (\rho R_{i,t-1} - \rho R_{i,t-2}) + (\beta x_{it-1} - \beta x_{it-2}) + (u_{i,t})$ (9)

E ($\Delta u_{i,t}\, y_{i,t-r}$) = 0; E ($\Delta u_{i,t}\, x_{i,t-r}$) = 0;

Where r = 2,….. t – 1 and t = 3,….T

E ($u_{i,t}\, \Delta y_{i,t-r}$) = 0; E ($u_{i,t}\, \Delta x_{i,t-r}$) = 0;

Where r = 1,….. t – 1 and t = 3,….T

It uses the lagged levels of independent variables as instruments for the difference equation and the lagged differences of independent variables as instruments for the level equation. By allowing for more instruments the estimated coefficients of the Blundell and Bond (1998) are more efficient.

APPENDIX 2

Table 4. Summary of countries used in regression analysis.

Africa	Latin America	Middle East	Eastern Europe	Asia Pacific
Algeria	Bolivia	Saudi Arabia	Azerbaijan	Papua New Guinea
Angola	Mexico	Qatar	Kazakhstan	Indonesia
Equatorial Guinea	Ecuador	Syria		Malaysia
Gabon	Trinidad	Kuwait		Vietnam
Nigeria	Venezuela	Iran		
Cameroon		Yemen		
Chad		Bahrain		
Congo Rep		Oman		
Dem. Rep. Congo				