

**Banking Sector Depth and Economic Growth Nexus:  
A Comparative Study between the Natural Resource-based  
and the Rest of the World's Economies**

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**Abstract**

This paper investigates the relationship between banking sector depth and long-term economic growth in the natural resource based economies *vis-à-vis* economies that are not dependent on natural resources. For the empirical investigation, a Generalised Method of Moments (GMM) estimator for dynamic panel-data models is adopted for 194 countries spanning the period 1964 to 2013. By using different measures of banking sector depth and economic growth, the investigation yields three key findings. First, the banking-growth relationship is non-linear and positive within certain levels of banking sector depth in both country groups. Second, the time lag between the change in the level of banking sector depth and the effect on economic growth is shorter in the natural resource-based countries than in the other countries. Finally, the total effect of banking sector deepening on long-term economic growth is weaker in economies with abundant natural resources than in the rest of the world.

Key Words: Economic growth, Financial sector depth, Natural recourse-based economies

JEL Classification codes: G2; O16

## 1. Introduction

The severity of the Global Financial Crisis (GFC) in 2008/09 has revamped the interest of many scholars to revisit the relationship between financial development and economic growth. Prior to the crisis, evidence provided support to the notion that the development of the financial sector stimulates long-term economic growth. Recent research, however, suggests that the relationship between banking sector depth and long-term economic growth is somewhat more complicated especially when non-linearity is considered (Arcand et al., 2012; Grochowska et al., 2014). In exploring the impact of the financial sector on economic growth Aghion and Howitt, (2009), sustain that ‘frictions’ should be taken into account should a clear and deeper understanding of the mechanisms in operation are to be understood.

Despite the renewed interest in this area, research that assesses the finance-growth nexus in the context of natural resource-based countries (NRBCs) is limited (Barajas et al., 2013; Beck, 2011). Research that considers the relationship between banking sector depth and economic growth in the NRBC as a group overlooks the effect of a change in the banking sector development on long-term economic growth. Measuring such an effect is particularly relevant to governments considering the potential economic benefits of adopting policies that encourage the development of the banking sectors.

Accordingly, this paper intends to investigate the extent to which the banking sector depth is linked to long-term economic growth in the NRBC countries *vis-à-vis* rest of the world economics that are not dependent on natural resources. In this investigation, three relationship dimensions are considered. The first is the type of relationship, the second is the time lag between the change in the banking sector depth and its effect of economic growth, while the third is the relationship magnitude. For the empirical investigation, a Generalised Method of Moments (GMM) estimator for dynamic panel-data models is adopted for 194 countries spanning the period 1964 to 2013.

The research contributes to the development of the finance-growth nexus literature as well as to policy making in the NRBC economies. It is the first comparative study in the context of NRBC economies that investigates in depth the relationship between banking sector development and long-term economic growth using a GMM methodological framework. Assessing the type and scale of the relationship between the banking sector depth and long-term economic growth enables policymakers to evaluate the relevance of the banking sector for their economies.

The rest of the paper is organized as follows. Section 2 provides a brief review of the finance-growth nexus literature, whilst section 3 touches on the data and variables utilised in the empirical analysis. Section 4 elaborates on the methodological framework whilst section 5 discusses the results. Finally, section 6 provides some concluding remarks.

## 2. Literature Review

Undoubtedly, the intermediating role of the financial sector is so inextricably linked to the functioning of economies that any attempt to investigate this underlying relationship merits consideration (Cetorelli, 2009; Ang, 2008). The current finance-growth nexus debate encountered in the extant academic literature purports to theoretically as well as empirically shed additional light on the causal dimension of the performance of the financial sector and economic growth (Aghion and Howitt, 2009).

On the theoretical front, Bagehot (1873) and Schumpeter (1911) were *inter alia* two of the most important academics that looked into the implications of the relationship between finance and growth. More specifically, Bagehot (1873) whilst stressed the crucial role that the banking system assumes in conditioning economic growth he also delineated the conditions under which banks potentially could promote innovation and growth through funding productive investments. In the same spirit, Schumpeter (1911) sustained that financial services play an instrumental role in driving economic growth.

In the years that followed, Robinson (1952) in attempt to shed some light in the causal dimension argued that financial development follows growth thus, suggesting that ‘where enterprise leads, finance follows’. According to Alexiou et al. (2016, 3) “although growth may be constrained by credit creation in less developed financial systems, in more sophisticated systems finance is viewed as an endogenous response to demand requirements”. In a more sophisticated manner, Patrick (1966) describes the finance-growth interaction as a relationship where both the supply-leading and the demand-following set of hypotheses can be applied in a sequential manner. More specifically, at the early stages of economic development, finance spurs economic growth through innovative investments (Rajan and Zingales, 2003). As the economy grows stronger and stronger the direction of causality weakens or even reverses in so far as “the supply-leading impetus gradually becomes less important, and the demand-following financial response becomes dominant” (Patrick, 1966, 177).

Proponents of the supply-leading hypothesis contend that developed financial sectors stimulate economic growth by overcoming market frictions. Levine (2005) summarises this role in the following five points: (i) producing information *ex ante* on potential investments and allocating capital, (ii) monitoring investments and enhancing corporate governance of the borrowing firms, (iii) facilitating the trading, diversification and risk management, (iv) mobilising and pooling savings, and (v) facilitating the exchange of goods and services.

Over the years, different methodological frameworks have been employed to study the relationship between financial development and long-term economic growth. The use of panel data analysis is *inter alia* a novel empirical framework in this area which effectively overcomes constraints associated with existing cross-country studies. Levine et al. (2000) and Beck et al. (2000) are the first to utilise panel data analysis along with more advanced econometrics

approaches such as IVs and the GMM estimator. The two papers use the same data set and apply the same methodology to examine different areas in the financial development and economic growth arena.

Levine et al. (2000) contend that the exogenous component of financial intermediary development promotes economic growth. Their paper uses the average data for 74 countries for the period from 1960 to 1995. The data are averaged over 5 year intervals to capture the long-term relationship. The GMM dynamic panel data models' results indicate a strong positive relationship between the exogenous component of financial intermediary development and the long-run economic growth. Beck et al. (2000) argue that the development of a financial intermediary influences the sources of economic growth, including the total factor productivity growth, physical capital accumulation and private savings rates as well as economic growth. Their paper shows that financial intermediary development has a considerable impact on productivity growth.

An additional paper that employs the GMM estimator for the dynamic panel data models is that of Barajas et al. (2013). Their paper assesses whether the economic growth benefits from the financial sector development that differs across regions, income levels, and the type of economy. The authors find that the effect of banking sector depth on economic growth in the Middle East and North Africa (MENA), Latin America and the Caribbean are lower in comparison with other regions. In considering the different economy types, Barajas et al. (2013) show that oil exporting countries benefit less from banking sector deepening and the benefits fall constantly with the degree of oil dependency.

In addition, Arcand et al. (2012) in an attempt to provide more efficient estimates uses a mixture of various methodologies. More specifically, by building on Beck and Levine's (2004) model they incorporating the level of credit to the private sector and a quadratic term in this variable in an attempt to investigate the presence of a non-monotonic relationship between credit to the private sector and economic growth. In the panel studies, the authors use the system GMM estimator. Arcand et al. (2012) also investigate the relationship at the industry-level by exploiting the model developed by Rajan and Zingales (1998). Their paper finds a strong positive relationship between financial depth and GDP growth in economies with small and intermediate financial sectors. The relationship, however, turns negative after the level of credit to the private sector relative to the GDP reaches a particular threshold (estimated to be around 80% to 100% of GDP).

Other more recent papers in the literature confirm the non-monotonic relationship between banking sector depth and long-term economic growth globally (Beck, et al. 2014; Breitenlechner, et al., 2015; Cecchetti and Kharroubi, 2012; Ductor and Grechyna, 2015; Gründler and Weitzel, 2013; Law and Singh, 2014), in the Organisation for Economic Co-operation and Development (OECD), European Union (EU), and/or Group of Twenty (G20)

countries (Cournède and Denk, 2015; Prochniak and Wasiak, 2016), in the middle-income countries (Samargandi, et al., 2015), and in East Asia and Latin America (Aizenman, et al., 2015).

In relation to the level at which banking-growth relationship turns from positive to negative, scholars estimate panel data models using OLS, pooled instrumental variable (IV) and GMM show that the turning point range is between 80% to 100% private credit to GDP (Breitenlechner et al., 2015; Cecchetti and Kharroubi, 2012; Cournède and Denk, 2015). Some researchers explain that the change in the nature of the relationship is due to the misallocation of resources (Ductor and Grechyna, 2015) or “financial Dutch disease”, where the boom in the financial services divert long-term funding away from manufacturing and other sectors that rely on stable external finance (Aizenman et al., 2015). It is argued that “policies aimed at limiting excessive leverage and risk-taking as well as requiring banks to refocus their business models towards the provision of credit could ensure that financial deepening has positive growth effects even in mature financial systems” (Beck et al., 2014, 384).

In the following sections, we make a contribution to this debate by exploring the nexus for a group of 194 countries, most of which have been affected significantly in recent years.

### **3. Data and Variables**

#### *Dependent variables*

Overall, the data utilized in this study are taken as five-year averages for 194 countries over the period from 1961 to 2013. We use four different proxies of economic growth in an attempt to explore all potential channels through which economic growth is effectively modelled (see table A3 in Appendix A for definition of variables.) The first is real GDP per capita growth. The variable is the most extensively used in the finance-growth nexus literature as a measure of economic growth. The source of the real GDP per capita growth as well as the other dependent variables discussed below is sourced from the World Development Indicators database of the World Bank. The second dependent variable is the real GNI per capita. The aim of selecting the real GNI per capita growth is to utilise a different indicator of economic growth. The indicator can provide insights into the finance-growth relationship in countries where the real GNI per capita is the main reported measure of economic growth. Out of all the key research papers discussed in the literature review section, only Goldsmith (1969) employs GNI per capita when investigating the relationship. The other two proxies of economic growth are the gross capital formation to GDP and the private sector gross capital formation to GDP ratios (hereafter referred to as the investment to GDP and the private investment to GDP ratios respectively). The two indicators are selected as they represent sources of economic growth. In passing, it should be mentioned that King and Levine (1993), Ndikumana (2005), and Xu (2000) are amongst some researchers who use one or both indicators.

### *Independent variables*

As independent variables we consider a number of variables as measures of the banking sector depth. The first is the credit to private sector to GDP ratio, which is by far the most widely used in the literature as a measure of financial development in general, and banking sector depth in particular. The significance of the indicator in the finance-growth nexus literature reflects its focus on the credit facilities extended by financial intermediaries to the private sector. Other proxies of the banking sector depth are the bank assets to GDP and the bank liabilities to GDP ratios. Those are broader measures of banking sector depth than the credit to private sector to GDP ratio, since the lending to the public sector is included. In this research, the Passport database of the Euromonitor International provides the bank assets to GDP and bank liabilities to GDP ratios data for 170 countries for the period from 1977 to 2013. The last two indicators of banking sector depth are the money and quasi money (M2) to GDP and the liquid liabilities to GDP ratios (hereafter the indicators are referred to as the money supply to GDP and the broad money supply to GDP ratios accordingly). The broad money supply to GDP ratio is considered to be a traditional measure and is employed by many papers in the finance-growth nexus research area due to its broader scope which captures the size of the financial system (Beck *et al.*, 2000; King and Levine, 1993).

### *Controlling variables*

The controlling variables incorporated in this study purport to account for differences in the long-term economic growth rates associated with the initial level of the economic growth measure, the rate of inflation, government consumption, levels of education, trade openness, and foreign investment. The controlling variables included are the most common ones used in the finance-growth nexus literature (See, for example, Arcand *et al.*, 2012; Barajas *et al.*, 2013). The source of all conditioning variables is the World Development Indicators database.

## **4. Hypotheses and Methodological Framework**

### *Statement of hypotheses*

In this study we explore the extent to which banking sector depth is associated with the long-term economic growth in the NRBC *vis-à-vis* the rest of the world that are not dependent on natural resources. In answering this research question, a system GMM estimator for dynamic panel data models is adopted.

To assess the extent to which banking sector depth is linked to economic growth, the paper considers three relationships. The first one is the nature of the relationship, the second is the

time lag between the cause and effect, and the third is the magnitude of the relationship. Accordingly, there are three research hypotheses:

H1. *The deepening of the banking sector has a positive effect on long-term economic growth in the NRBC group and the other countries group,*

H2. *The time lag between the deepening of the banking sector and its effect on long-term economic growth in the NRBC and the other countries group is equal, and*

H3. *The total effect of banking sector deepening on long-term economic growth in the NRBC group is smaller than that for the other countries group.*

#### *Specification of the econometric model*

The estimated models in this research follow two general regression equations. The first is given by:

$$y_{i,t} = \alpha_t + \beta y_{i,t-1} + \gamma_j x_{i,t-j} + \delta_j z_{i,t-1} + \zeta_j w_{i,t} + v_{it} \quad (1)$$

where the economic growth measures ( $y_{i,t}$ ) are regressed on a constant ( $\alpha_t$ ), its own first time lag ( $y_{i,t-1}$ ), current and time lagged measures of banking sector depth ( $x_{i,t-j}$ ), lagged values of a controlling variables set ( $z_{i,t-1}$ ), and time dummy variables ( $w_{i,t}$ ). The regression equation is designed to assess the effect of changes in the current and lagged values of the banking sector measure on economic growth while controlling for differences among countries and variation over time.

There are two sets of controlling variables. The first is the simple conditioning set, which includes the initial value of real GDP per capita (or real GNP per capita in models where the dependent variable is real GNP per capita) and education. This is while the second is the full conditioning set which consists of the variables in the simple conditioning set plus measures of inflation, government spending, trade openness, and foreign investment. The time lags of the controlling variables are used instead of the current variables to avoid any endogeneity problems.

The second regression equation employed here is as follows:

$$y_{i,t} = \alpha_t + \beta y_{i,t-1} + \gamma_j x_{i,t-j} + \eta_j x_{i,t-j}^2 + \delta_j z_{i,t-1} + \zeta_j w_{i,t} + v_{it} \quad (2)$$

Regression equation (2) includes all the variables in regression equation (1) along with the squared values of the current and time lagged banking sector depth measures ( $x_{i,t-j}^2$ ) to allow for non-linear relationships. Equation (2) is in line with the recent findings by Arcand *et al.* (2012) which suggests that the relationship between financial development and economic growth is non-monotonic.

The paper estimates regression equations (1) and (2) using the system GMM estimator for dynamic panel data models for the NRBC and the other countries groups. It should be stressed that all the models are estimated using the “xtabond2” command developed by David Roodman in Stata version 13.1 (StataCorp, 2013). The total number of countries included in the models is 194 after excluding those with banking sectors’ depth ratios to GDP of 1.50 or more. The excluded countries are from both country groups and consist of economies with overdeveloped financial sectors and/or are considered offshore banking centres.<sup>1</sup> The research discounts such countries to ensure that their exceptionally high levels of financial development do not dilute the results. For each country group, the models are estimated using the various combinations of banking sector depth and economic growth measures as well as the different sets of control variables. Accordingly, for each regression equation, 120 general models are estimated.

A general to specific approach is adhered to in order to eliminate statistically invalid models and arrive at the appropriate combination of explanatory variables’ time lags (Campos *et al.*, 2005). Note that, in the general models, the current and first three time lags of the banking measures are included. The controlling and time dummy variables are kept intact throughout the general to specific elimination process regardless of their statistical significance to ensure that all the models are controlled for differences among countries and variation over time. Finally, the model with one or more banking sector independent variables that are significant at the 10% level minimum are preferred which are then tested for second-order serial correlation and joint validity of the instruments. The second-order serial correlation is a test of the validity of the lags included in the model. This is while the Hansen over-identification test is employed to establish the joint validity of the instruments in the GMM models (Roodman, 2009a). The models that satisfy both tests are finally selected.

#### *Research reliability and validity*

The research process implemented in this paper, including the application of the general to specific approach and the different statistical tests employed, is intended to ensure the objectivity and replicability of the research. Conducting this research without a clear procedure

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<sup>1</sup> The countries excluded from the other countries group are the Bahamas, Cyprus, Denmark, Hong Kong, Iceland, Ireland, Japan, Luxembourg, Macoa, Malta, Mauritius, Netherlands, Panama, Portugal, Spain, Switzerland, United Kingdom, Vanuatu, and Zimbabwe. From the NRBC group, only the Syrian Arab Republic is excluded.



in terms of selecting the statistically valid models could impair the objectivity of this research as the researcher would select the models based on a subjective assessment of the various statistical tests.

The models estimated here use a number of specifications that assert the research rigour and provide confidence in their results. First, in all estimated models, the independent and control variables are treated as endogenous variables and only the time dummy variables are treated as strictly exogenous. Under the former, the lagged differences of the endogenous variable are valid instruments as they should not be correlated with contemporary and past errors. This is where under the strictly exogenous assumption, the contemporaneous and past differences can be employed as instruments (Roodman, 2009a).

Another consideration that is taken into account when specifying the models is the number of instruments used. Roodman states that a “large instrument collection overfits endogenous variables even as it weakens the Hansen test of instruments’ joint validity” (2009b, 1). The estimated models deal with this issue in two ways. The first is to limit the number of instruments employed to the number of countries in the panel. This is considered the “minimally arbitrary rule of thumb” (Roodman, 2006, 13). Secondly, the instruments are “collapsed” by combining instruments through addition into smaller sets (see Roodman, 2009b). Further, the models adopt the two-step estimation with the corrected errors pioneered by Windmeijer (2005). The two-step standard errors with Windmeijer correction are quite accurate, according to Roodman, and their “estimation with corrected errors seems modestly superior to the cluster-robust one-step estimation” (2009a, 97). Note that the corrected errors are robust to heteroskedasticity and arbitrary patterns of autocorrelation within individuals. Another correction that is applied to the NRBC group models is the small-sample corrections to the covariance matrix estimate. The models, accordingly, are tested using the  $t$ -test instead of the  $z$ -test statistics for the coefficients and the  $F$ -test in place of the Wald  $\chi^2$  test for the overall fit.

## 5. Discussion and Results

This study has identified 61 statistically significant models (details of the selected models are provided in Tables B1 to B15 in the Appendix B). In summarizing the findings in all estimated models, this section purports to closely scrutinize the yielding evidence for each country group and compare them along three dimensional relationships i.e. the type of the relationship between each banking sector depth measure and the economic growth indicator, the time lags between alternative banking sector depth measures and the effect on the economic growth as well as the magnitude of the finance-growth relationship.

### *Types of Relationships*

Table 1, reports the results on the type of the relationships, i.e. positive or negative, between the banking sector depth and the variables used as proxies for economic growth. More specifically, the findings suggest that that the relationships are positive and non-linear in both country groups<sup>2</sup>.

When considering the impact of alternative measures of finance deepening for the NRBC group, a positive finance-growth relationship emerges<sup>3</sup>. In contrast, the models including broad money supply-to-GDP ratio suggest that the development of the banking sector is harmful for long-term economic growth.

For the group of other countries, all of the estimators that use the bank assets-to-GDP ratio, the money supply-to-GDP ratio, and the broad money supply-to-GDP ratio yield positive associations between the banking sector depth measures and the economic growth proxies<sup>4</sup>.

## INSERT TABLE 1

### *A Synthesis of Estimated Models with Time Lags*

Table 2 presents the findings with respect to the time lag between a change in the banking sector depth measure and its effect on long-term economic growth. According to the models that assessed the finance-growth nexus for the NRBC group, the average lag period is 1.17, in comparison to the lag period of 1.58 found for the group of other countries.<sup>5</sup> In the case of the NRBC group only, the time lag average for the models using the credit-to-private sector-to-GDP ratio and the bank liabilities-to-GDP ratio is 0.40. In contrast, the average time lag for the estimators that used the bank assets-to-GDP ratio and the broad money supply-to-GDP ratio are 1.88 and 2, respectively.

Table 2 sets out the average time period between the change in credit-to-private sector-to-GDP ratio and economic growth, which is found to be 0.60 for the group of other countries. In the

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<sup>2</sup> The evidence indicates that in the NRBC cluster of countries out of 23 models, 13 register positive relationships, whilst in the other countries group 32 out of 38 models confirm the positive relationships of the underlying variables.

<sup>3</sup> When the credit-to-private sector-to-GDP ratio is used, four out of five estimated models indicate that the finance-growth relationship is positive as opposed to three out of five estimated models when the bank liabilities-to-GDP ratio is utilized.

<sup>4</sup> The estimates pertaining to the models that employ the credit to private sector to GDP ratio also reveal in four out of the five models a positive link between the two variables. The only exception is when banking liabilities-to-GDP ratio is used in which case in all five statistically significant models the results suggest that a higher level of banking liabilities-to-GDP ratio negatively affects economic growth.

<sup>5</sup> Note that the time lag averages are not empirical estimates of the lag between the cause and effect in the finance-growth relationships. The average time lags are reported here to compare in general the time length between the cause and effect for each country group and between the different banking sector depth proxies as discussed below.

case where the bank assets-to-GDP ratio is considered, the average time length for the models in the group of other countries is 2 time lags. Overall, the results suggest that the time lag between the cause and effect in the case of the NRBC group tends to be shorter than that for the rest of the world countries group.

## INSERT TABLE 2

### *A Synthesis of the Magnitude*

Once we establish the magnitude of the relationship between the banking sector depth measures and alternative measures of economic growth we subsequently average the total effects of five financial development indicators on each proxy for economic growth.

Table 3 provides a summary of the relationship of the estimated coefficients for the finance-growth models<sup>6</sup>. When real GDP per capita is used as the dependent variable - in the case of the NRBC group - only the models using the variables in levels are statistically significant. In contrast, in the case of the other countries group, the models in levels that render the weakest effect of financial development on the real GDP per capita growth rate is the one that utilizes the bank assets-to- GDP ratio in the estimation.

A similar effect is also established between banking sector development – when GNI per capita in the NRBC group is used – and the credit-to-private sector to GDP as well as the bank liabilities-to-GDP ratio<sup>7</sup>. Out of all models where the growth rate of real GNI per capita is regressed on the five different banking sector depth variables in the NRBC group, only the one utilising the broad money supply-to-GDP ratio generates statistically significant results whilst in the case of the other countries we find 14 statistically significant relationships. When considering the estimated coefficients of the models in levels form a significant variability is observed whilst a less pronounced variability is evident in non-monotonic specifications<sup>8</sup>.

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<sup>6</sup> For the models that include more than one time lag of the banking sector depth measure, the total effect is reported instead. The values of the total effect in the models using the squared values of the banking sector depth measures in the NRBC country group range from -0.02 to 0.02. In comparison, all the models that provide estimates of the effect of financial development on the level of real GDP per capita in the other countries group yield positive values ranging from 0.18 to 0.28 for models using the variables in levels and approximately 0.02 in the case of non-linear models.

<sup>7</sup> It should be stressed that, in the case of the other countries group, a positive relationship is also established between the money supply-to-GDP ratio and real GNI per capita. The non-linear models also yield similar results.

<sup>8</sup> Total effect of banking sector development on economic growth varies from -1.02 to 3.65 in level form; the non-monotonic models suggest that the total effect ranges from -0.22 to 0.35.

**INSERT TABLE 3**

As far as the impact of the financial development on the total investment-to-GDP ratio in the NRBC group is concerned it is found to be rather ambiguous as two estimated models suggest a positive and two other models suggest a negative correlation respectively<sup>9</sup>.

Finally, the evidence generated from all the non-linear models that assess the impact of financial development on the level of total private investment-to-GDP ratio is found to be negative<sup>10</sup>.

A summary and a comparison of the effects of the different measures of the banking sector depth on the economic growth indicators for each country group is presented in Table 4. The table provides the average total impact of the banking sector explanatory variables based on the models employing the level and squared values.

**INSERT TABLE 4**

The average total effect for the level models when the real GDP per capita level is the dependent variable is 0.14 for the NRBC group and 0.23 for the other countries group whilst the corresponding values for the non-linear models are found to be -0.01 and 0.02 respectively. In the case where we assess the impact of the growth rate of real GDP per capita, the average values are 3.44 for the NRBC group and 3.08 for the other countries group, respectively.<sup>11</sup>

The average total effect of the five financial development indicators on the real GNI per capita level is stronger for the other countries group than for the NRBC group for the models using the level as well the squared specifications<sup>12</sup>.

According to Table 4 the values are positive in 6 out of 10 of the average total effects corresponding to the NRBC group whilst all the 11 average values associated with the other countries group are positive. Comparing the magnitude between the two country groups reveals

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<sup>9</sup> The total effect ranges from -0.46 to 0.10 for the models in levels and is equal to 0.01 for the models using the squared values of the independent variable. The effect of a change in the level of the banking sector depth and the level of total investment-to-GDP ratio is positive in the case of the other countries group whilst in the level models lies between 0.09 and 0.35.

<sup>10</sup> The only statistically significant level model, however, indicates that a 1% fall in the bank assets-to-GDP ratio reduces the level of the total private investment-to-GDP ratio by 0.08%. The estimates of the level models that reflect the total influence of the five banking sector depth proxies on the ratio of the total private investment-to-GDP in the other countries group are found to be ranging between -0.08 and 0.23.

<sup>11</sup> The use of averages here is aimed at providing some indication of the magnitude of the impact of the banking sector depth measures on long-term economic growth.

<sup>12</sup> For the NRBC group, as 1% increase in the banking sector measures (here the broad money supply-to-GDP ratio) leads to a 10.7% fall in the growth rate of real GNI per capita whilst in the case of the other countries group economic growth is found to increase by 2.42%.

that the average total effect of a change in the banking sector depth measures on the long-term economic growth for the other countries group is stronger in 6 out of 9 instances in which the values for both country groups are available.

On the whole, the preceding empirical analysis contributes to the development of the finance-growth nexus literature by enhancing our understanding of the underlying relationship in the context of the resource based economies. To the best of our knowledge, this is the first comparative study that investigates in depth the relationship between banking sector development and long-term economic growth using a GMM methodological framework. Beck's (2011) is the only other empirical study in this area that considers the NRBC as a separate group and assesses whether its degree of dependence on natural resources influences the finance-growth relationship.

Due to the significance of economic diversification and the challenges of achieving sustainable long-term economic growth in the resource based countries, this paper provides policymakers with evidence supporting the notion that banking sector development contributes to the acceleration of economic growth. Hence, identifying such sectors may enable countries that are dependent on natural resources to diversify their economic structures and to some extent overcome the "natural resource curse".

## 6. Concluding remarks

Despite the renewed interest in researching the relationship between financial development and economic growth following the Global Financial Crisis of 2008/09, only one paper has considered the underlying finance-growth relationship when the NRBC are considered as a group. In the context of the natural resource curse literature, gaining further insight into the extant relationships between financial deepening and economic growth is of paramount importance.

The focal point of this study was to investigate the extent to which banking sector depth is associated with long-term economic growth in the NRBC *vis-à-vis* the rest of the world countries. To this effect, three dimensional characteristics in relation to the type, time lag between the cause and effect, and magnitude were considered.

The findings associated with the system GMM estimator for the dynamic panel data models demonstrate that the relationship between banking sector depth and economic growth measures is non-linear for both the NRBC group and the other countries group and is found to be only positive within certain levels of depth. The results confirm the findings of the literature in that below and above certain levels of banking sector depth the relationship turns negative (see for instance Arcand et al. (2012)). For policymakers, the findings are of extreme importance as having a clear idea of the exact stage of the banking sector development could potentially

trigger the right policy and regulatory response in order to optimise the benefits of the banking sector and therefore stimulate economic growth.

The estimated relationships also indicate that the time lag between the change in the banking sector depth and the effect on long-term economic growth is shorter in the NRBC group than in the other countries group whilst the total effect of the banking sector deepening on economic growth is lower in the NRBC group vis-à-vis the countries that are not dependent on natural resources. The findings relating to the time lag and the total effect pave the way for further research to explain the differences in the nature of the relationship, particularly in the context of the NRBC and in the light of the natural resource curse literature.

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TABLES

**Table 1.** Summary of the results: relationship type between banking sector depth and economic growth

			NRBC					Other Countries					
			CP	BA	BL	M	BM	CP	BA	BL	M	BM	
Real GDP per Capita	Simple Conditioning	Linear	+	+							+		
		Non-Linear	+			-						+	
	Full Conditioning	Linear			+								+
		Non-Linear			-								+
Real GDP per Capita Growth	Simple Conditioning	Linear		+					+		+		
		Non-Linear							-			+	
	Full Conditioning	Linear		-	+		+		+		+	+	
		Non-Linear									+	+	
Real GNI per Capita	Simple Conditioning	Linear	+		+						+		
		Non-Linear	+									+	
	Full Conditioning	Linear											
		Non-Linear		-									+
Real GNI per Capita Growth	Simple Conditioning	Linear					-	+	+	-	+	+	
		Non-Linear								-	+	+	
	Full Conditioning	Linear							+	-	+		
		Non-Linear							-		-	+	+
Investments to GDP	Simple Conditioning	Linear			-							+	
		Non-Linear				+							
	Full Conditioning	Linear		+			-					+	
		Non-Linear											
Private Investments to GDP	Simple Conditioning	Linear						+					
		Non-Linear	-	-								+	
	Full Conditioning	Linear		+						-	+		
		Non-Linear		-					+				
Number of Positive Relationships			4	4	3	1	1	4	4	0	10	14	
Number of Negative Relationships			1	4	2	1	2	1	0	5	0	0	

*Notes:* The table summarises the type of relationships between the economic growth measures and credit to private sector to GDP (CP), bank assets to GDP (BA), bank liabilities to GDP (BL), money supply to GDP (M), and broad money supply to GDP (BM) ratios using linear and non-linear models with different conditioning. In models with simple conditioning, the relationship is controlled for the initial level of economic growth measure and the education variable. This is while under full conditioning, the models include the simple conditioning variables plus measures of inflation, government consumption, trade openness, and foreign investment. The "+" and "-" signs refer to positive and negative relationships respectively.

**Table 2.** Summary of the results: time lag between banking sec. deepening and its effect on economic growth

			NRBC					Other Countries				
			CP	BA	BL	M	BM	CP	BA	BL	M	BM
Real GDP per Capita	Simple Conditioning	Linear	1	3							0	
		Non-Linear	1			2						2
	Full Conditioning	Linear			1							2
		Non-Linear			0							2
Real GDP per Capita Growth	Simple Conditioning	Linear		3					0		2	
		Non-Linear							3			1
	Full Conditioning	Linear		1	0		2		3		2	2
		Non-Linear									2	2
Real GNI per Capita	Simple Conditioning	Linear	0		0						3	
		Non-Linear	0									2
	Full Conditioning	Linear										
		Non-Linear		1								2
Real GNI per Capita Growth	Simple Conditioning	Linear					3	2	3		2	2
		Non-Linear								0	1	1
	Full Conditioning	Linear								2	1	1
		Non-Linear							1		0	3
Investments to GDP	Simple Conditioning	Linear			1							3
		Non-Linear				0						
	Full Conditioning	Linear		3			1					0
		Non-Linear										
Private Investments to GDP	Simple Conditioning	Linear						0				
		Non-Linear	0	1								3
	Full Conditioning	Linear		2						3	0	
		Non-Linear		1					0			
Average No. of Time Periods			0.40	1.88	0.40	1.00	2.00	0.60	2.00	1.40	1.60	1.86

*Notes:* The table summarises the time lag between the cause and effect in the relationships among the economic growth measures and credit to private sector to GDP (CP), bank assets to GDP (BA), bank liabilities to GDP (BL), money supply to GDP (M), and broad money supply to GDP (BM) ratios using linear and non-linear models with different conditioning. In models with simple conditioning, the relationship is controlled for the initial level of economic growth measure and the education variable. Under full conditioning, the models include the simple conditioning variables plus measures of inflation, government consumption, trade openness, and foreign investment.

**Table 3.** Summary of the results: total effect of banking sector deepening on economic growth

			NRBC					Other Countries				
			CP	BA	BL	M	BM	CP	BA	BL	M	BM
Real GDP per Capita	Simple Conditioning	Linear	0.03	0.30						0.18		
		Non-Linear	0.02			-0.02					0.02	
	Full Conditioning	Linear			0.10						0.28	
		Non-Linear			-0.02						0.02	
Real GDP per Capita Growth	Simple Conditioning	Linear		4.97					1.53		3.16	
		Non-Linear								-0.15	0.27	
	Full Conditioning	Linear		-1.67	1.68		8.79		0.73		3.03	
		Non-Linear									0.10	
Real GNI per Capita	Simple Conditioning	Linear	0.23		0.15						0.22	
		Non-Linear	0.01								0.02	
	Full Conditioning	Linear										
		Non-Linear			-0.01						0.02	
Real GNI per Capita Growth	Simple Conditioning	Linear					-10.7		3.26	1.67		
		Non-Linear									3.65	
	Full Conditioning	Linear								-0.11	0.09	
		Non-Linear							1.07	-1.02	3.02	
Investments to GDP	Simple Conditioning	Linear			-0.10						0.35	
		Non-Linear				0.01						
	Full Conditioning	Linear		0.10			-0.46				0.09	
		Non-Linear										
Private Investments to GDP	Simple Conditioning	Linear						0.23				
		Non-Linear	-0.05	-0.01							0.03	
	Full Conditioning	Linear		0.08						-0.08	0.13	
		Non-Linear		-0.02					0.01			

*Notes:* The table summarises total effect of credit to private sector to GDP (CP), bank assets to GDP (BA), bank liabilities to GDP (BL), money supply to GDP (M), and broad money supply to GDP (BM) ratios on the economic growth measures using linear and non-linear models with different conditioning. In models with simple conditioning, the relationship is controlled for the initial level of economic growth measure and the education variable. Under full conditioning, the models include the simple conditioning variables plus measures of inflation, government consumption, trade openness, and foreign investment.

**Table 4.** Summary of results: average total effect of banking sector deepening on economic growth

		NRBC	Other Countries	Higher Magnitude
Real GDP per Capita	Linear	0.14	0.23	Other Countries
	Non-Linear	-0.01	0.02	Other Countries
Real GDP per Capita Growth	Linear	3.44	3.08	NRBC
	Non-Linear	-	0.14	-
Real GNI per Capita	Linear	0.19	0.22	Other Countries
	Non-Linear	0.00	0.02	Other Countries
GNI per Capita Growth	Linear	-10.74	2.42	NRBC
	Non-Linear	-	0.08	-
Investments to GDP	Linear	-0.15	0.22	Other Countries
	Non-Linear	0.01	-	-
Private Investments to GDP	Linear	0.08	0.09	Other Countries
	Non-Linear	-0.03	0.02	NRBC

*Notes:* The table provides the average total effect of the banking sector depth measures on long-term economic growth for the NRBC group and the other countries group. For each dependent variable, the average total effects of the selected linear and non-linear models are reported. The table also compares the size of the average total effect on each dependent variable for the two country groups.

## APPENDIX A

**Table A1.** List of the NRBC group

1	Albania	19	Guyana	37	Peru
2	Algeria	20	Indonesia	38	Qatar*
3	Angola	21	Iran, Islamic Rep.	39	Russian Federation
4	Azerbaijan	22	Iraq	40	Saudi Arabia*
5	Bahrain*	23	Kazakhstan	41	Sudan
6	Bolivia	24	Kuwait*	42	Suriname
7	Botswana	25	Lao PDR	43	Syrian Arab Republic
8	Brunei Darussalam	26	Liberia	44	Timor-Leste
9	Cameroon	27	Libya	45	Trinidad and Tobago
10	Chad	28	Mali	46	Turkmenistan
11	Chile	29	Mauritania	47	United Arab Emirates*
12	Congo, Dem. Rep.	30	Mexico	48	Uzbekistan
13	Congo, Rep.	31	Mongolia	49	Venezuela, RB
14	Cote d'Ivoire	32	Niger	50	Vietnam
15	Ecuador	33	Nigeria	51	Yemen, Rep.
16	Equatorial Guinea	34	Norway	52	Zambia
17	Gabon	35	Oman*		
18	Guinea	36	Papua New Guinea		

*Notes:* \* Member of the GCC Countries Group

**Table A2.** List of the Other Countries

1	Afghanistan	56	Germany	111	Northern Mariana Islands
2	American Samoa	57	Ghana	112	Pakistan
3	Andean Region	58	Greece	113	Palau
4	Andorra	59	Greenland	114	Panama
5	Antigua and Barbuda	60	Grenada	115	Paraguay
6	Argentina	61	Guam	116	Philippines
7	Armenia	62	Guatemala	117	Poland
8	Aruba	63	Guinea-Bissau	118	Portugal
9	Australia	64	Haiti	119	Puerto Rico
10	Austria	65	Honduras	120	Romania
11	Bahamas, The	66	Hong Kong SAR,	121	Rwanda
12	Bangladesh	67	Hungary	122	Samoa
13	Barbados	68	Iceland	123	San Marino
14	Belarus	69	India	124	Sao Tome and Principe
15	Belgium	70	Ireland	125	Senegal
16	Belize	71	Isle of Man	126	Serbia
17	Benin	72	Israel	127	Seychelles
18	Bermuda	73	Italy	128	Sierra Leone
19	Bhutan	74	Jamaica	129	Singapore
20	Bosnia and	75	Japan	130	Sint Maarten (Dutch part)
21	Brazil	76	Jordan	131	Slovak Republic
22	Bulgaria	77	Kenya	132	Slovenia
23	Burkina Faso	78	Kiribati	133	Solomon Islands
24	Burundi	79	Korea, Dem. Rep.	134	Somalia
25	Cabo Verde	80	Korea, Rep.	135	South Africa
26	Cambodia	81	Kosovo	136	Spain
27	Canada	82	Kyrgyz Republic	137	Sri Lanka
28	Cayman Islands	83	Latvia	138	St. Kitts and Nevis
29	Central African	84	Lebanon	139	St. Lucia
30	Channel Islands	85	Lesotho	140	St. Martin (French part)
31	China	86	Liechtenstein	141	St. Vincent and the
32	Colombia	87	Lithuania	142	Swaziland
33	Comoros	88	Luxembourg	143	Sweden
34	Costa Rica	89	Macao SAR, China	144	Switzerland
35	Croatia	90	Macedonia, FYR	145	Tajikistan
36	Cuba	91	Madagascar	146	Tanzania
37	Curacao	92	Malawi	147	Thailand
38	Cyprus	93	Malaysia	148	Togo
39	Czech Republic	94	Maldives	149	Tonga
40	Denmark	95	Malta	150	Tunisia
41	Djibouti	96	Marshall Islands	151	Turkey
42	Dominica	97	Mauritius	152	Turks and Caicos Islands
43	Dominican Republic	98	Micronesia, Fed. Sts.	153	Tuvalu
44	Egypt, Arab Rep.	99	Moldova	154	Uganda
45	El Salvador	100	Monaco	155	Ukraine
46	Eritrea	101	Montenegro	156	United Kingdom
47	Estonia	102	Morocco	157	United States
48	Ethiopia	103	Mozambique	158	Uruguay
49	Faeroe Islands	104	Myanmar	159	Vanuatu
50	Fiji	105	Namibia	160	Virgin Islands (U.S.)
51	Finland	106	Nepal	161	West Bank and Gaza
52	France	107	Netherlands	162	Zimbabwe
53	French Polynesia	108	New Caledonia		
54	Gambia, The	109	New Zealand		
55	Georgia	110	Nicaragua		

**Table A3.** List of the dependent variables with their sources.

<i>Variables</i>	<i>Source</i>
<i>GDP per capita (constant 2005 US\$)</i>	World Development Indicators, World Bank
<i>GDP per capita growth (annual %)</i>	World Development Indicators, World Bank
<i>GNI per capita (constant 2005 US\$)</i>	World Development Indicators, World Bank
<i>GNI per capita growth (annual %)</i>	World Development Indicators, World Bank
<i>Gross capital formation (% of GDP)</i>	World Development Indicators, World Bank
<i>Gross fixed capital formation, private sector (% of GDP)</i>	World Development Indicators, World Bank
<i>Domestic credit to private sector by banks (% of GDP)</i>	World Development Indicators, World Bank
<i>Assets of Deposit Banks (US\$ mn) to Total GDP in Current Prices (US\$ mn)</i>	Euromonitor International
<i>Liabilities of Deposit Banks (US\$ mn) to Total GDP in Current Prices (US\$ mn)</i>	Euromonitor International
<i>Money and quasi money (M2) as % of GDP</i>	World Development Indicators, World Bank
<i>Liquid liabilities (M3) as % of GDP</i>	World Development Indicators, World Bank
<i>Foreign direct investment, net inflows (% of GDP)</i>	World Development Indicators, World Bank
<i>General government final consumption expenditure (% of GDP)</i>	World Development Indicators, World Bank
<i>Inflation, consumer prices (annual %)</i>	World Development Indicators, World Bank
<i>School enrollment, secondary (% gross)</i>	World Development Indicators, World Bank
<i>Trade (% of GDP)</i>	World Development Indicators, World Bank



## APPENDIX B

**Shortlisted models**

The tables below report the 61 statistically significant models selected using the general to specific approach. All models employ data for the period between 1964 and 2013 which is averaged over ten non-overlapping five-year periods. The models are based on the two-step estimation procedure and the Windmeijer corrected standard error. Robust *t*- or *z*-statistics are shown in parentheses, with significance levels at the 10% (\*), 5% (\*\*), and 1% (\*\*\*) levels indicated.

**Table B1.** Credit to private sector to GDP ratio and real GDP per Capita

Country Group	NR BC	
Dependent Variable	Real GDP per Capita	
<b>Independent Variables</b>		
<i>1st Lag of Initial Real GDP per Capita</i>	0.9475*** (0.111)	0.9896*** (0.068)
<i>1st Lag of Credit to Private Sector to GDP Ratio</i>	0.2171** (0.091)	0.0153** (0.007)
<i>2nd Lag of Credit to Private Sector to GDP Ratio</i>	-0.1878* (0.101)	
<i>1st Lag of Credit to Private Sector to GDP Ratio Squared</i>		-0.0002** (0)
<i>1st Lag of Gross Secondary School Enrolment Rate</i>	0.2947 (0.237)	0.1059 (0.164)
<i>Constant</i>	-0.6171 (0.6)	-0.3888 (0.589)
<b>Observations</b>	193	221
<b>Groups</b>	45	46
<b>Instruments</b>	31	39
<b>AR(2)</b>	-0.78	-1.33
<b>AR(2) p-value</b>	0.433	0.183
<b>Hansen Overidentification Test</b>	18.81	25.77
<b>Hansen p-value</b>	0.598	0.586

**Table B2.** Bank assets to GDP ratio and real GDP per capita

Country Group	NRBC	NRBC		Other	
Dependent Variable	Real GDP per Capita	Real GDP per Capita	Growth Rate	Real GDP per Capita	Growth Rate
<b>Independent Variables</b>					
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	0.8796*** (0.108)	-1.7097 (2.23)	-2.0931 (2.216)	-0.1752 (0.997)	-1.7778** (0.794)
<i>Bank Assets to GDP Ratio</i>				1.5269*** (0.491)	
<i>Bank Assets to GDP Ratio<sub>t-1</sub></i>			-1.6698* (0.965)		
<i>Bank Assets to GDP Ratio<sub>t-3</sub></i>	0.2953** (0.117)	4.9679* (2.86)			0.728** (0.366)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	0.1456 (0.172)	-1.3631 (3.413)	-0.3378 (2.074)	0.6169 (1.716)	2.9961** (1.299)
<i>Inflation Rate<sub>t-1</sub></i>			-0.76 (1.371)		2.0243 (2.824)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>			4.8785 (3.868)		0.3016 (0.903)
<i>FDI to GDP Ratio<sub>t-1</sub></i>			0.4645 (0.567)		0.4022 (0.441)
<i>Trade to GDP Ratio<sub>t-1</sub></i>			3.8558 (3.063)		-0.4904 (1.358)
<i>Constant</i>	0.4078 (0.917)	17.3786 (16.53)	-12.5448 (26.774)	-2.6128 (3.845)	3.5884 (5.62)
<b>Observations</b>	116	116	144	420	246
<b>Groups</b>	41	41	40	93	82
<b>Instruments</b>	23	23	34	29	54
<b>AR(2)</b>	-0.85	-0.09	0.16	-1.43	-0.85
<b>AR(2) p-value</b>	0.395	0.926	0.873	0.151	0.394
<b>Hansen Overidentification Test</b>	6.14	14.99	19.4	19.45	49.17
<b>Hansen p-value</b>	0.987	0.525	0.56	0.428	0.24

**Table B3.** Bank liabilities to GDP ratio and real GDP per capita

Country Group	NRBC	NRBC	NRBC	Other Countries
Dependent Variable	Real GDP per Capita	Real GDP per Capita	Real GDP per Capita Growth	Real GDP per Capita Growth
<b>Independent Variables</b>				
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	0.9502*** (0.076)	0.9189*** (0.076)	-2.062 (1.565)	-0.0182 (2)
<i>Bank Liabilities to GDP Ratio</i>		0.0374*** (0.011)	1.6795** (0.702)	
<i>Bank Liabilities to GDP Ratio<sub>t-1</sub></i>	0.1042* (0.056)	-0.0614** (0.024)		
<i>Bank Liabilities to GDP Ratio<sub>t-3</sub></i>				-0.1514** (0.063)
<i>Bank Liabilities to GDP Ratio Squared</i>		-0.0005*** (0)		
<i>Bank Liabilities to GDP Ratio Squared<sub>t-1</sub></i>		0.0017*** (0.001)		
<i>Bank Liabilities to GDP Ratio Squared<sub>t-3</sub></i>				0.0009* (0.001)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	-0.0251 (0.119)	0.1012 (0.109)	-0.3521 (2.773)	1.8282 (4.218)
<i>Inflation Rate<sub>t-1</sub></i>	-0.1368 (0.085)	-0.1855** (0.076)	-0.9661 (0.891)	
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>	0.1114 (0.159)	-0.0271 (0.116)	0.7326 (3.31)	
<i>FDI to GDP Ratio<sub>t-1</sub></i>	0.0224 (0.039)	0.0234 (0.023)	0.5652 (1.101)	
<i>Trade to GDP Ratio<sub>t-1</sub></i>	0.3936 (0.261)	0.0887 (0.163)	3.8314 (3.823)	
<i>Constant</i>	-1.6156 (1.226)	0.1614 (0.866)	-2.499 (18.572)	-4.5233 (4.078)
<b>Observations</b>	139	139	141	261
<b>Groups</b>	39	39	39	84
<b>Instruments</b>	34	34	34	26
<b>AR(2)</b>	-1.36	-0.92	0.31	-0.98
<b>AR(2) p-value</b>	0.175	0.357	0.756	0.329
<b>Hansen Overidentification Test</b>	19.91	13.83	17.18	22.58

**Table B4.** Money supply to GDP ratio and real GDP per capita

Country Group	NRBC	Other	Other	Other	Other
Dependent Variable	Real GDP per Capita	Real GDP per Capita	Real GDP per Capita	Capita Growth Rate	Real GDP per Capita Growth Rate
<b>Independent Variables</b>					
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	0.9657*** (0.085)	0.9298*** (0.043)	-1.5008 (1.159)	-2.2095* (1.302)	-0.9518 (0.818)
<i>Money Supply to GDP Ratio</i>		0.3878*** (0.115)			
<i>Money Supply to GDP Ratio<sub>t-1</sub></i>		-0.3015** (0.12)			
<i>Money Supply to GDP Ratio<sub>t-2</sub></i>	-0.017** (0.008)	0.0985** (0.043)	3.1648*** (1.155)	3.0299** (1.371)	0.098** (0.045)
<i>Money Supply to GDP Ratio Squared<sub>t-2</sub></i>	0.0001* (0)				-0.0007** (0)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	0.1969** (0.094)	0.0646 (0.076)	2.5003 (2.17)	3.6341* (1.892)	2.3793** (1.197)
<i>Inflation Rate<sub>t-1</sub></i>				-0.4888 (2.002)	1.4353 (1.635)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>				1.5335 (1.899)	-0.0304 (1.901)
<i>FDI to GDP Ratio<sub>t-1</sub></i>				-0.3873 (0.683)	-0.3267 (0.565)
<i>Trade to GDP Ratio<sub>t-1</sub></i>				2.9389* (1.637)	1.7096 (1.462)
<i>Constant</i>	-0.0155 (0.657)	-0.3049 (0.206)	-5.302 (10.362)	-23.3666** (9.595)	-7.9677 (6.025)
<b>Observations</b>	196	432	436	375	375
<b>Groups</b>	45	101	101	95	95
<b>Instruments</b>	36	35	31	60	67
<b>AR(2)</b>	-1.36	-1.6	1.06	0.69	0.23
<b>AR(2) p-value</b>	0.173	0.11	0.291	0.489	0.821
<b>Hansen Overidentification Test</b>	20.58	17.38	22.01	50.61	63.63
<b>Hansen p-value</b>	0.763	0.742	0.34	0.333	0.15

**Table B5.** Broad money supply to GDP ratio and real GDP per capita

Country Group	Other	Ot er	NRBC	Ot er	Other		
Dependent Variable	Real GDP per Capita	Real GDP per Capita	Real GDP per Capita Growth Rate	Real GDP per Capita Growth Rate	Real GDP per Capita Growth Rate		
<b>Independent Variables</b>							
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	1.0151*** (0.069)	0.9696*** (0.075)	0.9312*** (0.08)	5.7412 (8)	-0.0664 (1.125)	1.3857 (1.133)	-1.1771 (1.2)
<i>Broad Money Supply to GDP Ratio<sub>t-1</sub></i>						0.2731*** (0.101)	
<i>Broad Money Supply to GDP Ratio<sub>t-2</sub></i>	0.2849** (0.134)	0.0179*** (0.007)	0.0217*** (0.007)	8.7853*** (2.657)	6.9298*** (2.441)		0.3548** (0.139)
<i>Broad Money Supply to GDP Ratio Squared<sub>t-1</sub></i>						-0.002*** (0.001)	
<i>Broad Money Supply to GDP Ratio Squared<sub>t-2</sub></i>		-	-				-0.0021** (0.001)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	-0.0759 (0.129)	0.0455 (0.137)	0.0365 (0.199)	-11.035 (8.126)	-1.8248 (1.635)	-2.7123 (2.282)	0.0191 (1.586)
<i>Inflation Rate<sub>t-1</sub></i>	-0.0448 (0.253)		-0.1455 (0.238)	1.3364 (5.06)	3.0724 (3.495)		1.4061 (3.378)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>	-0.0364 (0.173)		0.0214 (0.21)	-5.8791 (6.379)	-1.3977 (2.51)		-0.6723 (2.748)
<i>FDI to GDP Ratio<sub>t-1</sub></i>	-0.0062 (0.041)		0.0266 (0.037)	()	0.1844 (0.835)		0.1566 (0.766)
<i>Trade to GDP Ratio<sub>t-1</sub></i>	-0.1359 (0.143)		-0.0475 (0.193)	6.4443 (13.072)	-4.4655 (2.875)		-3.5791 (2.822)
<i>Constant</i>	-0.0153 (0.379)	-0.1381 (0.401)	0.0911 (0.556)	-43.0211 (85.994)	6.4056 (8.181)	-1.3689 (3.771)	17.031 (10.901)
<b>Observations</b>	145	174	145	50	145	193	145
<b>Groups</b>	42	47	42	17	42	54	42
<b>Instruments</b>	34	38	38	27	41	41	38
<b>AR(2)</b>	0.31	-1.42	-0.98	1.2	0.88	-0.89	0.49
<b>AR(2) p-value</b>	0.758	0.155	0.325	0.229	0.38	0.373	0.626
<b>Hansen Overidentification Test</b>	20.03	26.56	23.02	3.54	28.59	31.1	23.72
<b>Hansen p-value</b>	0.52	0.433	0.519	0.998	0.433	0.313	0.478

Independent Variables	Capita	Capita	Capita Growth Rate	Capita Growth Rate
<b>International Review of Applied Economics</b>				
<i>Initial Real GNI per Capita<sub>t-1</sub></i>	0.8829*** (0.14)	0.8595*** (0.105)	-5.5953*** (1.999)	-1.2903 (0.931)
<i>Credit to Private Sector to GDP Ratio</i>	0.2339** (0.104)	0.0130** (0.006)		
<i>Credit to Private Sector to GDP Ratio<sub>t-1</sub></i>				-0.0995** (0.05)
<i>Credit to Private Sector to GDP Ratio<sub>t-2</sub></i>			3.2581*** (1.169)	
<i>Credit to Private Sector to GDP Ratio Squared</i>		-0.0001* (0)		
<i>Credit to Private Sector to GDP Ratio Squared<sub>t-1</sub></i>				0.0008** (0)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	-0.0819 (0.355)	0.0422 (0.188)	9.096*** (3.361)	3.6485*** (1.377)
<i>Inflation Rate<sub>t-1</sub></i>				1.0458 (1.214)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>				1.0241 (2.079)
<i>Lag of FDI to GDP Ratio<sub>t-1</sub></i>				-0.1658 (0.579)
<i>Lag of Trade to GDP Ratio<sub>t-1</sub></i>				-0.1053 (1.173)
<i>Constant</i>	0.4542 (0.805)	0.8462 (0.978)	5.0946 (10.466)	-2.9428 (5.043)
<b>Observations</b>	146	146	337	306
<b>Groups</b>	31	31	81	77
<b>Instruments</b>	28	31	31	69
<b>AR(2)</b>	-1.23	-1.44	0.81	0.4
<b>AR(2) p-value</b>	0.22	0.15	0.42	0.686
<b>Hansen Overidentification Test</b>	18.54	16.76	17.67	55.97
<b>Hansen p-value</b>	0.421	0.669	0.609	0.438

Dependent Variable	Real GNI per	Real GNI per	ita Growth
International Review of Applied Economics	per	Ca	Rate
<b>Independent Variables</b>			
<i>Initial Real GNI per Capita<sub>t-1</sub></i>	0.6713*** (0.099)	-1.1271 (1.614)	-2.4937 (2.269)
<i>Bank Assets to GDP Ratio<sub>t-1</sub></i>	- 0.0055***		
<i>Bank Assets to GDP Ratio<sub>t-2</sub></i>			1.0703** (0.517)
<i>Bank Assets to GDP Ratio<sub>t-3</sub></i>		1.6714** (0.678)	
<i>Bank Assets to GDP Ratio Squared<sub>t-1</sub></i>	0** (0)		
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	0.4032** (0.144)	0.7466 (2.825)	3.4873 (3.354)
<i>Inflation Rate<sub>t-1</sub></i>	-0.1835* (0.103)		3.726*** (1.377)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>	-0.3563 (0.255)		3.3562 (2.506)
<i>FDI to GDP Ratio<sub>t-1</sub></i>	0.016 (0.034)		1.0578** (0.514)
<i>Trade to GDP Ratio<sub>t-1</sub></i>	0.2733 (0.34)		-0.1611 (2.279)
<i>Constant</i>	0.9076 (2.132)	7.1284 (4.646)	-4.7785 (9.907)
<b>Observations</b>	103	203	230
<b>Groups</b>	27	70	70
<b>Instruments</b>	30	23	56
<b>AR(2)</b>	-0.25	0.8	0.39
<b>AR(2) p-value</b>	0.805	0.42	0.69
<b>Hansen Overidentification Test</b>	12.52	18.0	48.9
<b>Hansen p-value</b>	0.708	0.32	0.28

**Independent Variables**

<i>Initial Real GNI per Capita<sub>t-1</sub></i>	0.989*** (0.118)	-1.2825 (1.315)	-1.8211 (1.218)
<i>Bank Liabilities to GDP Ratio</i>	0.1475** (0.058)	-0.1064** (0.050)	-0.2230*** (0.079)
<i>Bank Liabilities to GDP Ratio Squared</i>		0.0010*** (0)	0.0019*** (0.001)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	-0.2719 (0.325)	3.7699 (2.334)	4.7601** (2.168)
<i>Inflation Rate<sub>t-1</sub></i>			-0.808 (0.959)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>			3.903* (2.24)
<i>FDI to GDP Ratio<sub>t-1</sub></i>			0.4643 (0.435)
<i>Trade to GDP Ratio<sub>t-1</sub></i>			-0.4093 (1.923)
<i>Constant</i>	0.6813 (0.549)	-2.5602 (4.413)	-10.0949 (10.94)
<b>Observations</b>	124	298	263
<b>Groups</b>	28	74	70
<b>Instruments</b>	26	35	65
<b>AR(2)</b>	-1.17	0.45	1.24
<b>AR(2) p-value</b>	0.243	0.651	0.215
<b>Hansen Overidentification Test</b>	18	24.58	51.73
<b>Hansen p-value</b>	0.389	0.429	0.445



Dependent Variable	International Review of Applied Economics				
	Real GNI per Capita	Real GNI per Capita	Real GNI per Capita	Real GNI per Capita	Real GNI per Capita
<b>Independent Variables</b>					
<i>Initial Real GNI per Capita<sub>t-1</sub></i>	0.8836*** (0.083)	-2.6731** (1.144)	-2.5162* (1.291)	-0.8558 (1.023)	-1.7552** (0.756)
<i>Money Supply to GDP Ratio<sub>t-1</sub></i>			3.0239** (1.337)	-0.2338** (0.091)	
<i>Money Supply to GDP Ratio<sub>t-2</sub></i>		3.6548*** (1.33)		0.327*** (0.091)	
<i>Money Supply to GDP Ratio<sub>t-3</sub></i>	0.2185** (0.089)				0.2135** (0.086)
<i>Money Supply to GDP Ratio Squared<sub>t-1</sub></i>				0.001** (0)	
<i>Money Supply to GDP Ratio Squared<sub>t-2</sub></i>				-0.0016*** (0)	
<i>Money Supply to GDP Ratio Squared<sub>t-3</sub></i>					-0.0017*** (0.001)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	0.2169 (0.158)	4.3329** (2.022)	3.5641 (2.178)	3.0245* (1.555)	2.1625 (1.385)
<i>Inflation Rate<sub>t-1</sub></i>			2.1285 (1.737)		2.2721 (3.953)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>			3.6766 (2.4)		1.2213 (1.774)
<i>FDI to GDP Ratio<sub>t-1</sub></i>			-0.0624 (0.386)		-0.2786 (0.549)
<i>Trade to GDP Ratio<sub>t-1</sub></i>			0.4215 (1.373)		1.2449 (1.394)
<i>Constant</i>	-0.5254 (0.376)	-10.687 (12.788)	-13.5414* (6.916)	-7.4746 (10.122)	-6.4599 (4.346)
<b>Observations</b>	297	317	294	317	271
<b>Groups</b>	76	81	77	81	72
<b>Instruments</b>	29	31	61	42	60
<b>AR(2)</b>	-1.62	0.6	1.16	0.94	1.37
<b>AR(2) p-value</b>	0.106	0.55	0.245	0.346	0.169
<b>Hansen Overidentification Test</b>	21.99	25.62	48.21	28.82	50.2
<b>Hansen p-value</b>	0.285	0.179	0.464	0.422	0.311

Dependent Variable	Real GNI per Capita	Real GNI per Capita	Real GNI per Capita	Real GNI per Capita	Growth Rate	Growth Rate
<b>International Review of Applied Economics</b>						
<b>Independent Variables</b>						
<i>Initial Real GNI per Capita<sub>t-1</sub></i>	1.0426*** (0.125)	1.011*** (0.075)	4.0821 (5.216)	0.6399 (1.787)	1.422 (1.901)	-0.2656 (1.673)
<i>Broad Money Supply to GDP Ratio<sub>t-1</sub></i>					0.3215*** (0.072)	
<i>Broad Money Supply to GDP Ratio<sub>t-2</sub></i>	0.0246* (0.014)	0.02*** (0.008)		5.3105* (3.115)		0.3519** (0.143)
<i>Broad Money Supply to GDP Ratio<sub>t-3</sub></i>			-10.7447** (4.08)			
<i>Broad Money Supply to GDP Ratio Squared<sub>t-1</sub></i>					-0.0022*** (0)	
<i>Broad Money Supply to GDP Ratio Squared<sub>t-2</sub></i>	-0.0002* (0)	-0.0001*** (0)				-0.0024** (0.001)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	-0.1914 (0.298)	-0.0751 (0.13)	3.024 (4.788)	-3.1449 (3.791)	-3.6784 (3.003)	-0.4945 (3.374)
<i>Inflation Rate<sub>t-1</sub></i>		1.4201* (0.854)				26.972** (13.107)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>		0.0206 (0.167)				0.7125 (4.296)
<i>FDI to GDP Ratio<sub>t-1</sub></i>		-0.0321 (0.055)				-0.755 (0.958)
<i>Trade to GDP Ratio<sub>t-1</sub></i>		-0.0608 (0.165)				-1.7743 (2.482)
<i>Constant</i>	-0.0906 (0.289)	-0.0324 (0.623)	-6.2535 (27.475)	-10.7023 (7.538)	-3.2222 (4.087)	0.5887 (6.877)
<b>Observations</b>	139	124	47	139	150	124
<b>Groups</b>	37	35	15	37	42	35
<b>Instruments</b>	36	30	15	31	37	30
<b>AR(2)</b>	-1.28	-1.41	-1.17	0.31	-0.31	0.81
<b>AR(2) p-value</b>	0.2	0.157	0.241	0.76	0.758	0.42
<b>Hansen Overidentification Test</b>	24.53	9.88	4.81	19.77	19.05	13.07
<b>Hansen p-value</b>	0.432	0.873	0.569	0.472	0.749	0.667

Dependent variable	Private Investment to GDP Ratio	Private Investment to GDP Ratio	Private Investment to GDP Ratio	Private Investment to GDP Ratio
<b>International Review of Applied Economics</b>				
<b>Independent Variables</b>				
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	0.1131 (0.083)	-0.0814 (0.078)	0.0173 (0.075)	0.0237 (0.079)
<i>Private Investment to GDP Ratio<sub>t-1</sub></i>	0.432*** (0.14)	0.493*** (0.126)	0.4369*** (0.125)	0.6103*** (0.141)
<i>Credit to Private Sector to GDP Ratio</i>	-0.0518** (0.022)	0.2293** (0.114)	0.0151* (0.008)	0.0108* (0.005)
<i>Credit to Private Sector to GDP Ratio Squared</i>	0.0008** (0)		-0.0001* (0)	-0.0001** (0)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	0.5785* (0.299)	0.0304 (0.102)	0.042 (0.081)	-0.0609 (0.106)
<i>Inflation Rate<sub>t-1</sub></i>				0.0459 (0.184)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>				0.2451 (0.17)
<i>FDI to GDP Ratio<sub>t-1</sub></i>				0.0476 (0.065)
<i>Trade to GDP Ratio<sub>t-1</sub></i>				-0.0123 (0.341)
<i>Constant</i>	0.7455 (1.709)	0.9236* (0.481)	0.7896 (0.604)	0.3114 (1.551)
<b>Observations</b>	128	269	269	238
<b>Groups</b>	32	68	68	65
<b>Instruments</b>	32	40	49	60
<b>AR(2)</b>	-0.06	-1.28	-1.43	-0.75
<b>AR(2) p-value</b>	0.951	0.2	0.154	0.454
<b>Hansen Overidentification Test</b>	12.95	28.83	29.1	37.48
<b>Hansen p-value</b>	0.88	0.474	0.82	0.779

Dependent Variable	Investment to GDP Ratio	Private Investment to GDP Ratio	Private Investment to GDP Ratio	Private Investment to GDP Ratio
<b>International Review of Applied Economics</b>				
<b>Independent Variables</b>				
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	-0.015 (0.049)	0.2489* (0.138)	-0.0157 (0.05)	0.0262 (0.242)
<i>Investment to GDP Ratio<sub>t-1</sub></i>	0.6682*** (0.143)			
<i>Private Investment to GDP Ratio<sub>t-1</sub></i>		0.3256 (0.514)	0.8179*** (0.09)	0.6154* (0.348)
<i>Bank Assets to GDP Ratio<sub>t-1</sub></i>			-0.0108*** (0.002)	-0.0171*** (0.004)
<i>Bank Assets to GDP Ratio<sub>t-2</sub></i>		-0.3935** (0.154)		
<i>Bank Assets to GDP Ratio<sub>t-3</sub></i>	0.102*** (0.035)	0.4749** (0.197)		
<i>Bank Assets to GDP Ratio Squared<sub>t-1</sub></i>			0.0001*** (0)	0.0001*** (0)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	-0.1701* (0.088)	-0.0984 (0.296)	0.1446* (0.078)	0.3716 (0.251)
<i>Inflation Rate<sub>t-1</sub></i>	-0.1266 (0.105)	-0.2537 (0.445)		-0.2349 (0.216)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>	-0.2824** (0.128)	-0.4381 (0.408)		-0.6598** (0.268)
<i>FDI to GDP Ratio<sub>t-1</sub></i>	-0.0483** (0.023)	0.2128* (0.12)		0.0358 (0.112)
<i>Trade to GDP Ratio<sub>t-1</sub></i>	-0.1266 (0.111)	-0.6794 (0.793)		-0.1645 (0.475)
<i>Constant</i>	2.9311*** (0.797)	4.3195 (2.887)	0.1586 (0.431)	1.9579 (1.564)
<b>Observations</b>	89	61	122	98
<b>Groups</b>	36	25	31	29
<b>Instruments</b>	28	30	31	33
<b>AR(2)</b>	-0.16	-0.68	1.17	0.7
<b>AR(2) p-value</b>	0.872	0.497	0.242	0.482
<b>Hansen Overidentification Test</b>	20.15	12.42	10.09	11.93
<b>Hansen p-value</b>	0.214	0.774	0.966	0.851

Dependent Variable	Investment to GDP Ratio	Private Investment to GDP Ratio
<b>International Review of Applied Economics</b>		
<b>Independent Variables</b>		
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	-0.0148 (0.07)	-0.0309 (0.192)
<i>Investment to GDP Ratio<sub>t-1</sub></i>	0.7874*** (0.095)	
<i>Private Investment to GDP Ratio<sub>t-1</sub></i>		0.3737** (0.19)
<i>Bank Liabilities to GDP Ratio<sub>t-1</sub></i>	-0.103*** (0.033)	
<i>Bank Liabilities to GDP Ratio<sub>t-3</sub></i>		-0.0825** (0.042)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	-0.0484 (0.091)	0.0949 (0.156)
<i>Inflation Rate<sub>t-1</sub></i>		-0.2181 (0.389)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>		0.1777 (0.191)
<i>FDI to GDP Ratio<sub>t-1</sub></i>		0.0768 (0.092)
<i>Trade to GDP Ratio<sub>t-1</sub></i>		-0.1956 (0.217)
<i>Constant</i>	1.1501** (0.492)	2.0591* (1.068)
<b>Observations</b>	176	132
<b>Groups</b>	42	47
<b>Instruments</b>	35	42
<b>AR(2)</b>	1.33	-0.93
<b>AR(2) p-value</b>	0.184	0.354
<b>Hansen Overidentification Test</b>	26.81	25.31

**Independent Variables**

	Ratio	to GDP Ratio
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	-0.0006 (0.082)	0.0059 (0.101)
<i>Investment to GDP Ratio<sub>t-1</sub></i>	0.8322*** (0.105)	
<i>Private Investment to GDP Ratio<sub>t-1</sub></i>		0.5569*** (0.18)
<i>Money Supply to GDP Ratio</i>	0.027** (0.01)	0.4531** (0.217)
<i>Money Supply to GDP Ratio<sub>t-1</sub></i>	-0.0212** (0.009)	-0.4464* (0.259)
<i>Money Supply to GDP Ratio<sub>t-2</sub></i>		0.1271* (0.077)
<i>Money Supply to GDP Ratio Squared</i>	-0.0002** (0)	
<i>Money Supply to GDP Ratio Squared<sub>t-1</sub></i>	0.0002** (0)	
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	0.0163 (0.135)	-0.0797 (0.09)
<i>Inflation Rate<sub>t-1</sub></i>		-0.0175 (0.199)
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>		0.3046 (0.188)
<i>FDI to GDP Ratio<sub>t-1</sub></i>		0.0428 (0.038)
<i>Trade to GDP Ratio<sub>t-1</sub></i>		0.0545 (0.165)
<i>Constant</i>	0.3031 (0.459)	-0.1505 (0.78)
<b>Observations</b>	204	230
<b>Groups</b>	45	65
<b>Instruments</b>	41	58
<b>AR(2)</b>	0.73	-0.74
<b>AR(2) p-value</b>	0.463	0.46
<b>Hansen Overidentification Test</b>	30.79	30.32
<b>Hansen p-value</b>	0.28	0.91

Dependent Variable	Investment to GDP Ratio	Investment to GDP Ratio	Investment to GDP Ratio	Private Investment to GDP Ratio	Private Investment to GDP Ratio
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<b>Independent Variables</b>					
<i>Initial Real GDP per Capita<sub>t-1</sub></i>	-0.0971 (0.201)	-0.1183* (0.063)	-0.0787* (0.047)	-0.0901 (0.09)	-0.0385 (0.226)
<i>Investment to GDP Ratio<sub>t-1</sub></i>	0.983*** (0.284)	0.6391*** (0.201)	0.4722*** (0.168)	0.508** (0.204)	
<i>Private Investment to GDP Ratio<sub>t-1</sub></i>					0.6259*** (0.218)
<i>Broad Money Supply to GDP Ratio</i>			0.5163*** (0.165)		
<i>Broad Money Supply to GDP Ratio<sub>t-1</sub></i>	-0.4559** (0.189)		-0.428** (0.195)		
<i>Broad Money Supply to GDP Ratio<sub>t-2</sub></i>				0.4201** (0.203)	
<i>Broad Money Supply to GDP Ratio<sub>t-3</sub></i>		0.3516* (0.186)			0.0323** (0.014)
<i>Broad Money Supply to GDP Ratio Squared<sub>t-3</sub></i>					-0.0002** (0)
<i>Gross Secondary School Enrolment Rate<sub>t-1</sub></i>	0.0693 (0.146)	0.1227 (0.136)	0.168 (0.116)	0.0088 (0.136)	-0.0303 (0.175)
<i>Inflation Rate<sub>t-1</sub></i>	0.1039 (0.43)		-0.5867 (0.427)	-0.0091 (0.548)	
<i>Government Consumption to GDP Ratio<sub>t-1</sub></i>	0.4652 (0.536)		0.0121 (0.122)	0.314 (0.277)	
<i>FDI to GDP Ratio<sub>t-1</sub></i>	-0.0101 (0.091)		-0.0747* (0.044)	-0.0125 (0.08)	
<i>Trade to GDP Ratio<sub>t-1</sub></i>	0.1046 (0.357)		-0.1229 (0.149)	-0.5205** (0.252)	
<i>Constant</i>	0.6161 (1.807)	0.2832 (0.608)	1.7552*** (0.664)	1.7537** (0.802)	0.5804 (1.353)
<b>Observations</b>	50	163	124	143	94
<b>Groups</b>	21	36	44	41	22
<b>Instruments</b>	30	37	40	38	26
<b>AR(2)</b>	-0.21	-1.24	-0.78	-1.56	-1.29
<b>AR(2) p-value</b>	0.835	0.216	0.436	0.119	0.199
<b>Hansen Overidentification Test</b>	6.09	22.83	21.18	26.59	4.57
<b>Hansen p-value</b>	0.987	0.642	0.683	0.324	0.995

# Banking sector depth and economic growth nexus: a comparative study between the natural resource-based and the rest of the world's economies

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2017-03-13

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Al-Moulani A, Alexiou C. (2017) Banking sector depth and economic growth nexus: a comparative study between the natural resource-based and the rest of the world's economies.

International Review of Applied Economics, Volume 31, Issue 5, 2017, pp. 625-650

<http://dx.doi.org/10.1080/02692171.2017.1299115>

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