EMPIRICAL RELATIONSHIP BETWEEN ENERGY INFRASTRUCTURE, PROJECT FINANCE AND OTHER CONVENTIONAL SOURCES OF FINANCING USING GENERALISED METHOD OF MOMENTS TO EXPLAIN THE VARIATIONS IN ENERGY PROJECTS IN DEVELOPING NATIONS (NIGERIAN ENERGY SECTOR).

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Overview

Current funding of infrastructure assets in developing countries (such as Nigeria) using traditional financing as the main sources falls far short of the required investment needs. Traditional (conventional) financing methods such as government budgets and corporate finance have not been sufficient to provide the finance needed for the development of energy infrastructures (power generation, in the context of this paper) to catalyse socio-economic development in Nigeria. In classical economics, it is the responsibility of the government to provide needed infrastructure to the citizens. However, reality has shown that this sovereign power cannot solely be responsible for meeting the requirements of the teeming population in the present day. With time and population growth, the deficit in infrastructure assets (power generation plants) started to manifest itself in obsolete equipment, inadequate access to energy products and services, and lack of electricity and clean gas for cooking or fuel to power automobiles, and it thus became imperative to enlarge or build more of those assets. However, due to the limited funding available, government had to look for other sources of finance, such as private or institutional investors.

Subsequently, with the advent of private sector investors, ownership is being transferred, gradually, from government to private individuals, in the form of privatisation, deregulation, and build, own and transfer. With this comes the transfer of the financial burden to these private investors. The availability of energy is not the solution to all the problems the citizens contend with in their daily activities: access to sustainable energy is, nevertheless, one of the necessary ingredients for social and economic growth and sustainable development in any country which aspire to raise their standard of living. The research question of interest is thus: to what extent does project finance reduce the gaps in energy infrastructure financing? The research is organised as follows. Section two is systematic literature review and section 3 reviews the theoretical framework underpinning this paper, while section 4 discusses the econometric model and justifies the use of the generalised method of moment used in explaining variation in project finance and energy project and the data (variable) used in the study. Section 5 shows the results/analysis including other tests and robustness checks carried out in the study and, finally, section 6 discusses the conclusions that can be drawn and makes suggestions for future work.

Methods

Time series data, using Generalized Method of Moments (GMM) estimation techniques. The research uses the GMM to study the empirical relationship between energy infrastructure financing, project finance, and other conventional finances, including control variables. The data used were quarterly data for a 31-year period (1984 to 2014). The GMM estimation method provides a straightforward way to test the specification of models for which there are more moment conditions than model parameters: that is, it allows the parameters to be over-identified. This estimation method is proposed to account for the possibilities of reverse causality (in which energy infrastructure financing affects the financing methods used), endogeneity and omitted variable bias in the model. In addition, GMM does not require complete knowledge of the distribution of the data. The central focus of the research is to examine which of the financing methods, particularly project finance, can explain variations in energy infrastructure financing in Nigeria. Given that the effects of energy infrastructure financing are not instantaneous, the changes are, for the most part, distributed over time. The slowness to respond may be due to the time delays in putting up the infrastructure, such as engineering, procurement and construction contracts for the energy project, amongst others. Consequently, it is appropriate to make some provisions in the model for such dynamic responses that are distributed over time. The study introduces an element of feedback into the model by including one lag value of the dependent variable $ener\_proj_{t-1}$ on the right-hand of the equation, as part of the explanatory variables. To achieve this objective, a reduced form model was specified.

Results

There is a positive and statistically significant relationship between energy project and the various sources of financing, such as project finance, corporate loan and government budget (explanatory variables). It can be seen that a one percent increase in project finance will lead to an increase in funding available to finance energy projects by 27%, suggesting that using project finance as an alternative source of financing an energy project or as part of the financing mix will help to reduce the funding gap. Furthermore, a one percent increase in corporate loan will lead to an increase in funding available to finance energy projects by 29%. Increasing yearly appropriation to the power sector by one percent, increases the finances of the energy sector by 15%. The control variables, which include country risk, proxied by corruption, income from oil as a percentage of GDP and inflation, are all statistically significant, while there is positive relationships between energy project and country risk, oil income as a percentage of GDP, including inflation, have a linear negative relationship with energy project and statistically significant. Controlling for corruption, an increase of one percent in risk level will increase the cost of the energy project by 118%, thereby reducing the number or the capacity of power plants and making it difficult to raise the funds needed to build power plants because of country risk elements. For oil income as a percentage of GDP, one percent additional increase in oil income will lead to a reduction of funds by 1.59 percent. The norm should have been more money means more funds available for power projects. Thus, this supports the assertion that country risk, measured as corruption, has negative effect on the country growth and development, because the country was supposed to benefit from high oil revenue and utilize this income to build infrastructure, but the reverse was the case.

Conclusions

The results show that the sources of finance are significant in explaining variations in energy project financing. Moreover, it was shown that increments in sources of financing will lead to increase in power generation, and this will have a multiplier effect economic growth and development. The use of project financing to finance energy infrastructure assets contributes significantly in reducing financing gaps and the energy shortage in a developing country; particularly, it mitigates the challenge of the country risk (with regard to energy project investment) in Nigeria. Using other sources apart from public financing (government budget) frees up resources to finance other critical areas of the economy. With regard to capital formation roles, having more individuals, private and institutional investors investing in the large infrastructure projects such as power generation will increase the amount of money in circulation in the local economy and this gives the economy more depth in terms of quality and quantity of money available to finance long-term investments.

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