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Financial Reforms and Industrialisation: Evidence from Nigeria

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Financial Reforms and Industrialisation: Evidence from Nigeria

Oludele E. Folarin

Abstract

Nigeria adopted the Structural Adjustment Programme (SAP) in 1986 after the crash in world oil price in the early 1980s. Financial reforms are part of the reforms implemented during the SAP. Since, industrialisation is seen as an engine of growth, we conduct an empirical assessment of the effects of financial sector reforms on industrialisation in Nigeria using an annual time series data over 1981 - 2015. Using an autoregressive distributed lag (ARDL) model, our findings show that financial reforms have a positive and significant impact on industrialisation.

Keywords: Financial reforms, Financial repression, Industrialisation, ARDL bounds test.
*JEL classification***:** C32, E44, O14, O55

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1. Introduction

The government of Nigeria introduced various reform packages in the late 1980s in an attempt to address the harsh economic condition faced then. These reforms became necessary due to the inability of the government to continue with the import substitution industrialisation strategy. This is as a result of the poor state of the economy caused by the crash of the crude oil price leading to a significant drop in the oil revenue (Chete et al., 2014). As a result, the government had to introduce the Structural Adjustment Programme (SAP) in 1986 (Akinlo, 1996). This programme entailed the implementation of series of economic reforms by the government. Part of the economic reforms implemented under SAP is financial reform[1].

Reforms in the Nigeria financial sector started with the privatisation of the banking sector in 1986. This proceeded with the deregulation of interest rates in 1987. Prior to this period, the financial sector was characterised by: (i) imposition of interest rate ceilings, (ii) high reserve requirement, (iii) heavy taxation of the financial sector, (iv) foreign exchange regulation and (v) direct government intervention in the allocation of credit to corporations. The financial reforms focused on abolishing directed credit allocation; interest rate liberalisation; bank restructuring and privatisation; and strengthening of prudential regulation and supervision (Andersen & Tarp, 2003; Fowowe, 2008; Folarin & Asongu, 2017). Thus, the Nigerian financial system, prior to 1986, could be regarded as financially repressed (Fowowe, 2008; Fowowe, 2013; Batuo & Asongu, 2015). According to McKinnon (1973) and Shaw (1973) repressed financial systems are associated with lagging economy[2]. In their separate studies, they argued that the distortion associated with financial repression prevents the financial system from performing its financial intermediation role efficiently.

When the financial sector is repressed, deposits are unattractive, which in turn implies that the financial sector will be unable to mobilise adequate deposits that could be transformed into credit for domestic investment purposes, thereby leading to low level of investment both in terms of quantity and quality (Andersen & Tarp, 2003). The implication of financial repression is that industrial expansion will be minimal. This contributes to slowdown in the rate of growth in the economy, as experienced in most lagging economy in the 1970s. To spur growth in lagging economy, McKinnon (1973) and Shaw (1973) advocated for

[1] Other reforms implemented include trade reforms and exchange rate reforms.
[2] The implementation of repressed policies where driven by its passive gained such as cheap tax revenue to the government (Gibson and Tsakalotos,1994; Fowowe, 2013)

financial liberalisation policies, that is, financial reforms. Financial reform is the process of ensuring that the interest rates charged by the financial institutions are market-determined, as against government-regulated rates of interest (Adeleye, et al., 2018). McKinnon argued that for developing countries to experience significant growth, the financial sector needs to be liberalised through the implementation for appropriate financial reforms.

Gibson & Tsakalotos (1994, p. 578) further argued that the reform of the financial system in developing countries should be anchored on two reasons. First, to increase the level of efficiency within the financial market. Second, to develop the financial market to serve the needs of the real economy. Given the two reasons above, financial reforms are expected to aid industrialisation, which is presumed to be the engine of growth. Wells & Thirlwall (2003, p.100-101) and Rodrik (2007, p.10) had shown that industrialisation contributes to economic growth. Financial reforms are expected to stimulate economic growth, with industrialisation acting as a transmission channel. This submission is based on the premised that financial liberalisation spurs growth, and the growth is enhanced by industrialisation. This is because industrialisation serves as engine of growth.

The level of industrialisation of an economy can be ascertained through the contribution of the manufacturing sector to the economy (UNECA, 2011). The Nigerian manufacturing sector performed poorly over the past four decades. The share of manufacturing sector value added in GDP, an indicator of industrialisation, fell from 9.9% in 1981 to 7.1% in 1987, and then rose slightly to 7.9% in 1988, a year after the deregulation of the interest rates (World Bank, 2016). However, the share of manufacturing sector value added in GDP declined afterward to 2.4% in 2008 before picking-up and then rising to 9.5% by 2015 (World Bank, 2016). Over the period of 1981 to 2015, the average share of manufacturing sector value added in GDP in Nigeria was 6.1%, while the average for the continent is 12.2%. The implication of this is that over the same period, the continent average is approximately twice of what is recorded in Nigeria (World Bank, 2016).

Actions toward transforming the Nigerian economy from an agrarian economy to an industrialised economy over the first two decades after gaining independence were documented in the first National Development Plan (1962-68), the second National Development Plan (1970-74) and the third National plan (1975-80) (Chete, et al., 2014). Under the first National Development Plan, import-substitution strategy (ISI) was adopted as the government policy trust to bring about the desired industrialisation. The ISI was complemented by industrial infrastructural development in order to accelerate industrial take-

off in Nigeria. The second National Development Plan of 1970-74 addressed the weakness of the first plan in the area of industrialising, by initiating efforts and policy actions in order to upgrade the local production of intermediate and capital goods. While the third National Development Plan encouraged public sector investment in industry, most importantly in the heavy industry.

The economic challenges that defaced the country in the early 1980s as a result of fallen oil revenue, which later led to economic recession, challenged the then industrialisation strategies put in place by the government from early 1960s to mid-1980s. As a result, Structural Adjustment Programme was implemented. This Programme sought to make the economy market-driven by liberalising key sectors of the economy, including the financial sector. In 2000, Bank of Industry was established as a development institution with the objective of accelerating industrial development through provision of long-term loans, equity finances and technical assistance to industrial enterprises (Chete, et al., 2014). Recently, after the country experienced economy recession in the second quarter of 2016, the Economy Recovery Growth Path was developed as the mid-term policy strategy of the government. In the document, the role of industrialisation was highlighted as a medium through which inclusive growth can be realised (Ministry of Budget and Planning, 2017).

Industrialisation has been highlighted for its role in boosting income and living standard through its effect on sustainable job creation, accumulation of capital, economies of scale and technological changes (UNECA, 2013; UNIDO, 2013, Weiss, 2018). In addition, Szirmai (2012 p. 417) remarked that for any economy to experience successful economic development, the development has to be driven by industrialisation. Despite the positive role of industrialisation, UNECA (2011) adjudged the level of industrialisation in Africa low when compared to what is observed in East Asian and pacific countries. Three reasons were put forward in the UNECA study, namely: (i) the comparative advantages of the continent in the production of primary product limits industrialisation, (ii) the technology capacity is adjudged to be grossly inadequate in the continent and (iii) inadequate financial resources available to finance the development of the manufacturing sector in the continent. These reasons could also be extended to explain low level of industrialisation in Nigeria. Thus, this study focuses on the third factor, via the financial liberalisation hypothesis.

In the light of the above, this study contributes to existing literature by conducting an empirical assessment of the effect of financial reforms on industrialisation in Nigeria. In the study, annual time series data over the period of 1981 to 2015 was used. Also, the study

explicitly accounts for financial reforms, using a financial index. This index was derived using Principal Component Analysis (PCA), based on seven dimensions of financial reforms as identified by Abiad, Detragiache, & Tressel (2010). Instead of relying on summation for an index as in Abiad et al. (2010), a composite index by means of the PCA has the advantage of not arbitrarily attributing weights to components of the index. Moreover, this is preferred over summation as it reduces a larger set of correlated variables into a smaller set of uncorrelated variables called principal components, which account for most of the information in the original data set (Tchamyou, 2017).

This study is important for a number of reasons. First, the study utilises a broad and comprehensive dataset on financial reforms developed by Abiad et al (2010). The dataset is used as an input to compute the index used in the study. Thus, the index enables us to account for both progressions in financial reforms and policy reversal, as well as provides the overall effect of financial reforms on industrialisation in Nigeria. This is because the use of one dimension of financial reforms might yield incomplete information on the effect of financial reforms (Abiad, et al, 2010; Batuo & Asongu, 2015)[3]. Whereas the dataset developed by Abiad et al (2010) ends in 2005, we follow the guidelines provided by them to extend the data to 2015.

Second, Chenery (1955) highlighted the role of industrialisation in raising the level of income in developing countries. Recently, there has been an intensifying advocacy for developing countries to capitalise on industrialisation to drive growth and create sustainable jobs (UNIDO, 2013, Weiss, 2018). UNIDO (2013) points out that through the development of the manufacturing sector in developing countries, these nations might realise two main benefits. First, the ability to move away from low-value-added sectors to high-value-added sectors. Second, realise wide employment due to high labour productivity. From the above propositions, this study enhances our understanding of the effect of financial reforms on industrialisation, using Nigeria as a case study.

In this study, an autoregressive distributive lag (ARDL) bounds test cointegration approach developed by Pesaran *et al* (2001) is used to test for the existence of a long-run relationship between financial reforms and industrialisation, an approach also used by Bahmani-Oskooee & Oyolola (2007). The justification for the use of this test is based on the nature of our

[3] The studies by Fowowe (2008) and Owusu & Odhiambo (2014) on the effect of financial liberalization also utilized financial reform index to address the issue of incomplete effect associated with the use of a singular measure.

dataset. It combines variables that are integrated of different orders. Furthermore, this model enables us determine both the long-run and short run effects of financial reforms on industrialisation.

This study therefore serves as the foremost study that examines the effect of financial reforms on industrialisation in Nigeria. The findings emanating from the study show that financial reforms have a positive effect on industrialisation in Nigeria. The implication of our findings is that financial reforms contribute positively to the level of industrialisation in Nigeria. Although the level of industrialisation is currently low, the current level can be argued to be achieved in conjunction with financial reforms that were in place in the country. The implication of this is that the level of industrialisation in Nigeria would have been lower than what is currently observed if the financial sector had not been liberalised. Thus, the study findings support financial liberalisation hypothesis, which is the position that financial liberalisation promotes industrialisation.

The rest of the study is structured as follows: the literature review is engaged in Section 2, while Section 3 discusses the construction of the financial reform index. Model specification, data and methodology issues are covered in Section 4, whereas the empirical results are disclosed in Section 5. Section 6 concludes with policy implications.

2. Literature review

According to McKinnon (1973) and Shaw (1973), slow economic development experienced in developing countries is the resultant effect of their repressed financial market. A repressed financial market is synonymous with distortion in the financial market. Distortion in the financial market in developing countries makes McKinnon (1973) advocates for the liberalisation of the financial sector. The author viewed liberalisation as the only condition through which developing countries could experience significant economic development.

The liberalisation of the financial sector entails removal of all distortions to the proper functioning of the financial market (Gibson & Tsakalotos, 1994; Batuo & Asongu, 2015). Government regulation on interest rate ceiling and credit control are highlighted as sources of distortion in the financial market. Interest rate ceiling lowers savings and, hence, reduces the quantity of investment that ought to be financed. In addition, it reduces the quality of investment. This is because profitable investments are associated with high risks. Hence, at a low interest rate, such investments are less likely to be financed. The joint effect of both low

quantity and quality of investment is the low level of economic development experienced in developing countries. Thus, financial liberalisation theory advocates for interest rates to be market-determined as well as removal of credit control.

Financial liberalisation is assumed to increase savings. This is because an increase in interest rate serves as an incentive for discouraged savers to save. Since the prevailing market interest rate is above the interest rate ceiling, the resulting increase in savings tends to increase the level of investment. In recent times, the concept of financial liberalisation has extended beyond interest rate liberalisation and removal of credit control. It also includes the development of the stock exchange (Singh, 1997), proper regulation, and supervision of the financial institution (Gibson & Tsakalotos, 1994; Abiad, et al. 2010). These additional features of financial reforms became important due to series of financial crises that follow the initial liberalisation of the financial market in many developing countries in the early 1990s. Thus, financial liberalisation is expected to bring about efficient allocation of capital. Following the transmission channel emphasised by Shaw (1973), financial reforms lead to improvement in financial intermediation. The fundamental function of financial intermediation includes: mobilisation of savings, allocation of resources, risk management, exertion of corporate control and facilitation of exchange (Levine, 1997). Thus, financial market ensures that an economic agent with surplus financial resources is linked with those with deficit financial resources. The improvement in the intermediary role of the financial sector due to financial reforms is expected to contribute to industrialisation. In addition, the study by Da Rin & Hellmann (2002) provides the theoretical formulation that addresses the importance of banks in industrialisation.

Financial liberalisation theory is faced with criticism. Stiglitz & Weiss (1981) argued that financial liberalisation could not address information asymmetric problem associated with the financial market. Due to the asymmetric problem, they argued that credit rationing still persists in the financial market. As a result, the level of credit availability is reduced. Thus, the effect of financial liberalisation might not be as predicted. Furthermore, neo-structuralists argued that financial liberalization leads to further reduction in the credit availability, thus lowering the level of investment. According to the neo-structuralists, financial liberalization leads to a reduction in "curb loans". Curb loans are loans issued in the informal financial market.

Financial liberalisation is expected to lead to a reduction in the deposits of the informal financial market, in favour of deposit in the formal market. Neo-structuralists argued that due

to the reserve requirement in the formal financial market that is absent in informal market, the overall loanable fund within the economy reduces. However, if the degree of substitution between deposits and currency in the formal financial market is higher than what is obtainable in the informal financial market, the loanable fund within the economy would increase. Singh (1997) also cast doubt on the role of financial reforms on industrialisation, that is, economic development. According to the author, the development of the stock market is associated with financial liberalisation. In relation to this, the author argued that the relative fluctuation in the stock price, thus, undermine the role of the market in bringing about efficient investment allocation in developing countries (p.780).

In the separate studies by Fowowe (2008) and Owusu & Odhiambo (2014), their findings suggest that financial liberalisation contributes to economic growth in Nigeria. Both studies make use of a financial liberalisation index to capture different financial sector reforms. In the study by Fowowe (2008), the index used to measure financial sector reforms were derived by summing up the different financial sector reforms. On the other hand, Owusu & Odhiambo (2014) used PCA in their study to compute financial sector reform. Despite the different approach used to compute, financial sector reforms index in the separate studies.

Studies that attempt to link financial reforms to industrialisation are limited[4]. A recent study by Kabango & Paloni (2011) on the Malawi economy points out that financial liberalisation leads to decrease in net firm's entry as well as industrial concentration. This is in contrast to the findings in a study by Rajan & Zingales (1998). Rajan & Zingales found that financial dependence contributes positively to industrial growth. Also, Burhop (2006) pointed out that the banking sector plays a crucial role in the industrialisation experienced in the German economy during the early industrial development era of the 19th century. Khanna (1999) documented financial reform episodes in India and then linked it up to the performance of the industrial sector. According to Khanna (1999) India industrial sector did not fare well after the liberialisation of the financial sector. Kouame and Tapsoba (2018) examined the impact of financial reforms as part of board structural reforms on the productivity of firms in developing countries. They found that financial reforms, as well as structural reforms, contribute positively to firm productivity in developing countries.

[4]Bulk of the literature on the impact of financial liberalization in developing countries focused on economic with little on industrialisation. This paper extends the study on the impact of financial liberalization by examining its impact on industrialization.

3. Construction of financial reform index

Increasing emphasis has been placed on the multifaceted nature of financial reforms in ensuring that efficient financial system is achieved in an economy (Abiad, et al. 2010). As a result of this, the use of interest rate liberalisation or credit control restriction has been underscored as a measure of financial reforms. Thus, this study constructs financial reform index. The constructed index allowed us to capture the multifaceted nature of financial reforms. In addition, it enables us to track the different reforms implemented. Thus, we could account for policy progression as well as policy reversal in the different financial reforms in Nigeria.

In this study, the approach laid down by Abiad, *et al.* (2010) was followed. Different approaches are used in the literature to track financial reforms in developing countries. Laeven (2003) developed one of the approaches. Laeven (2003) advocated the use of binary score. The use of binary score connotes assigning a value of one (1) to the different financial reforms when it is liberalised and zero (0) period prior to liberalisation. The limitation of this approach is that it does not recognise the fact that financial reforms policy might be implemented in a gradual approach. To address this shortcoming, Abiad, *et al.* (2010) introduced a grading score approach. The grading score approach follows an ordered scale pattern. It ranges from 0 to 3. Based on this approach, a score of zero (0) is assigned for years when the component of the financial reforms under examination is fully repressed, one (1) when it is partially liberalised, two (2) when it is largely liberalised, and three (3) when it is fully liberalised.

Following Abiad, *et al.* (2010), seven financial reforms elements were identified. They are: (i) credit control and reserve requirement[5], (ii) interest rate control, (iii) entry control, (iv) bank regulation control and supervision, (v) privatisation, (vi) financial account, (vii) security market. Thus, we arrived at a matrix for the seven variables, as presented in Table 1. The information presented in Table 1 indicates changes in policies over time toward the liberalisation of the financial sector. Based on the information in Table 1, we observed that the liberalisation of the Nigeria financial sector follows sequences. It started with the privatisation of government owned banks in 1986. This was followed by interest rate liberalisation in 1987. And then the liberalisation of the stock market in 1988. By 1990, the banking sector entry became fully liberalised. As pointed out by Fowowe (2008), the

[5] The final score for this dimension involved the use of the weight of two subsections (see Abiad, et al., 2010 p.296 for details).

liberalisation of the financial sector in the late 1980's resulted in financial distress in the financial sector. To control this, banking sector supervision was introduced in 1991. Thus, we conclude that financial liberalisation in Nigeria follows a sequence.

The information provided in Table 1 revealed that along the seven dimensions of financial reforms, reforms were implemented in a gradual pattern. It follows a gradual progression from one scale level to another. In most cases, it progressed from fully repressed to partially liberalised. It then progressed to largely liberalised and then to fully liberalised. Furthermore, the table revealed that the possibility of policy reversal cannot be exempted from the process of financial liberalisation. This is in line with the study of Fowowe (2008) where the author also observed policy reversal during financial liberalisation process. As documented in Table 1, policy reversal occurs in the following dimensions of financial reforms: (i) interest rate liberalisation, (ii) credit controls, reserve requirement and financial account transaction. The reversal observed in these dimensions point out that government commitment to financial liberalisation is not consistent. However, for dimensions such as (i) bank sector entry, (ii) bank sector supervisor, (iii) privatisation and (iv) security market, financial reforms reversal have not been observed over the period covered in this study.

To derive the financial reform index, we applied Principal Component Analysis (PCA). In line with studies such as Bandiera, Caprio, Honoham, & Schiantarelli, (2000), other methods used in the literature include: (i) multiplication of the first eigenvectors of the principal component with each of the financial reforms measures and then summing them up and (ii) the use of summation. The latter approach was used by Fowowe (2008) and Abiad et al. (2010) while the former was used by Shrestha & Chowdhury (2006)[6]. In this paper, PCA is preferred over summation as it reduces a larger set of correlated variables into a smaller set of uncorrelated variables called principal components (PCs). PC accounts for most of the information in the original data. The result of the PCA is presented in Table 2. In order to choose the most appropriate index for this study, we follow the selection approach documented in the study by Jolliffe (2002). Thus, we select the PC with eigenvalue that is greater than one (1). Based on the PC result presented in Table 2, only the first PC has an eigenvalue greater than one. Thus, the first PC is used to compute the index used for the analysis in this study. The first PC is found to represent more than 78% of the information in

[6]. The method used in the study was found to be highly correlated with the other two methods. The correlation coefficient is higher than 95% for both measures.

the financial reforms combined. This further justifies the appropriateness of the use of the first PC.

The financial reform index trend derived from the PCA is graphically presented in Figure 1. The trend provides clear and concise information about the gradual approach in the implementation of financial reforms in Nigeria. It complements the description provided earlier in this section on the pattern of financial reforms in the country. From the pattern of the financial reform index, the following could be deduced: (i) Financial reforms in Nigeria follow a gradual trend, (ii) Financial reforms policies were intensified in the 1990s, (iii) Reintroduction of repressed policies after the mid-2000s.

4. Model specification, Methodology and Data Issues

4.1. Model Specification

The primary objective of this study is to assess the effects of financial reforms on industrialisation in Nigeria. Thus, the primary variable of interest is the financial reform index. This index summarises the different financial reforms. To support financial liberalisation hypothesis, this variable ought to be positive and significant. In addition to the financial reforms index, control variables were included. These variables were included to avoid bias estimation arising from omission of variables that determine the level of industrialisation. These variables were informed by the Big Push Industrialisation Theory and the Theory of Export-led Industrialisation.

Big push industrialisation theory assumed that domestic demand, which is referred to as market size, is a major determinant of industrialisation. An increase in the market size is predicted to lead to industrialisation. This is because increased domestic demand for industrial products compels firms to utilise increasing return to scale technology. This technology cannot be used when demand is low. Thus, high domestic demand arising from an increase in income enables firms to utilise return to scale technology. The use of such equipment results in an industrial expansion (Murphy et al. 1989; Gui-Diby & Renard, 2015). Hence, the coefficient of income is expected to be positive and significant.

Gui-Diby & Renard (2015) pointed out that industrial expansion as advocated in the Big Push Industrialisation Theory is a product capital accumulation, since an increase in investment level and industrialisation occurs simultaneously. Thus, an increase in

investment level is expected to drive industrialisation. Hence, the coefficient for investment is expected to be positive and significant (Rowthorn & Ramaswamy, 1999; Gui-Diby & Renard, 2015).

According to Export-led Industrialisation, growth in export and industrial development are complementary. As a result, growth in export stimulates industrial development. This is so because export growth increases the demand for manufacturing output. Thus, export growth complements domestic demand of the manufactured goods (Chow, 1987; Gui-Diby & Renard, 2015). Hence, the coefficient for export growth is expected to be significant and positive.

The share of agricultural output is also used as control variable. The inclusion is based on the premise that the stages of economic development require that, as the share of agricultural output in total output falls, the share of industrial output in total output is increased. In other words, the contraction in the agricultural output should be compensated for via expansion in industrial output (Gui-Diby & Renard, 2015). Thus, the coefficient of the share of agricultural output in total output is expected to be negative and significant.

Based on the above arguments, the study estimation model is expressed in Equation 1.

$$IND_t = \alpha_0 + \alpha_1 FIN_t + \alpha_2 lnGDPPC_t + \alpha_3 INV_t + \alpha_4 EXG_t + \alpha_5 AGR_t + \varepsilon_t , \quad (1)$$

where IND is industrialisation, we proxy it as share of manufacturing value added in GDP (Chow, 1987; Gui-Diby & Renard, 2015); FIN is a measure of financial index; INV is investment, it is proxy by gross fixed capital formation as percentage of GDP; EXG is growth rate of export growth; GDPPC is real GDP per capita; AGR is share of agricultural value added in GDP; ln is natural logarithm; ε is the error term;α' is the coefficient the parameter estimated while t represents time.

4.2. Methodology

Since the study utilised macro-variables, estimating Equation (1) without testing for the stationary property of each of the variables used might lead to spurious regression results. Thus, the stationary properties of the variables used in the study were determined through the use of Ng-Perron unit root test. This test was carried out after conducting both the descriptive and correlation analysis. We utilised Ng-Perron unit root test because it has been adjudged to be efficient and reliable over other well-known unit root tests such as Augmented Dickey

Fuller (ADF) and Phillip-Perron (PP) tests. This is because Ng-Perron unit root test addresses the weak power associated with ADF and PP tests (Harris & Sollis, 2003).

Thereafter, we deployed autoregressive distributed lag (ARDL) bounds test. This test is a cointegration test that was developed by Pesaran *et al.* (2001) to assess the existence of long-run relationships among variables. This test was used in the study due to its merit over other tests, such as the Engel and Granger and Johansen tests. When compared to these tests, the ARDL test does not require all variables to be integrated of the same order because it accommodates variables of a different order of integration.

The ARDL model for the study is specified in Equation (2).

$$\Delta(IND)_t = \delta_0 + \delta_1(IND)_{t-1} + \delta_2(FIN)_{t-1} + \delta_3 lnGDPPC_{t-1} + \delta_4 INV_{t-1} + \delta_5 EXG_{t-1} + \delta_6 AGR_{t-1} + \sum_{j=1}^{l} \tau_{1j} \Delta(IND)_{t-j} + \sum_{j=0}^{m} \tau_{2j} \Delta FIN_{t-1} + \sum_{j=0}^{n} \tau_{3j} \Delta lnGDPPC_{t-1} + \sum_{j=0}^{o} \tau_{4j} \Delta INV_{t-1} + \sum_{j=0}^{p} \tau_{5j} \Delta EXG_{t-1} + \sum_{j=0}^{q} \tau_{6j} \Delta AGR_{t-1} \varepsilon_t \quad (2)$$

Performing Bounds test involves estimating Equation (2). This is carried out using the ARDL estimation technique. The optimal lag for each of the variables was determined based on the Akaike Information Criterion (AIC). The possible maximum lag length was set at 3. Afterward, we estimate the F-statistics through Wald restriction by imposing a restriction on the lag value of all the level series in Equation (2) as stated in Pesaran *et al.* (2001). The value of the F-statistics was used to adjudge the existence of a long-run relationship among the variables used in the study. The Wald restriction imposed on Equation (2) is that: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = 0$. This above restriction signifies non-existence of a long run relationship. The value of F-statistics obtained is compared with the upper and lower critical values which are given by Pesaran *et al.* (2001). According to this cointegration test, if the calculated F-statistics is more than the upper critical value, we reject the null hypothesis of no cointegration. This implies that the long run relationship holds. On the other hand, if the calculated F-statistics is less than the lower critical value, a long run relationship does not hold. An inconclusive scenario is said to hold when the value of the calculated F-statistics falls between the lower and upper critical values.

Based on the result obtained from the cointegration test, we proceed to the Error Correction Model (ECM). This test indicates the speed of adjustment back to long-run equilibrium, after a short run shock. In addition to the speed of adjustment, the ECM enables us to estimate the effect of income, interest rate and exchange rate on demand for money, both in the long run and short run. The ECM estimation process entails two steps. The first step is aimed at

arriving at the Error Correction Term (ECT). This is obtained by regressing the independent variables on dependent variables and then subtracting the actual value of the dependent variable from the estimated value. This is illustrated as follows.

$$ECT = IND_t - (\alpha_0 + \alpha_1 FIN_t + \alpha_2 lnGDPPC_t + \alpha_3 INV_t + \alpha_4 EXG_t + \alpha_5 AGR_t) \quad (3)$$

The ECT obtained from equation (3) is incorporated into the dynamic form of equation (2) to arrive at equation (4), which is used to estimate the ECM. The value of τ measures the speed of adjustment. It is expected to be negative and significant for the restoration of long-run equilibrium after an exogenous shock, which ranges between 0 and 1. A value of 0 indicates no adjustment while 1 implies full adjustment one period after the time the shock occurs. On the contrary, a positive value of τ suggests that convergence to equilibrium after exogenous shock is not feasible. This implies that whenever an exogenous shock occurs, it leads to a permanent deviation from the equilibrium.

$$\Delta(IND) = \gamma_0 + \sum_{j=1}^{a} \gamma_{1j} \Delta(IND)_{t-j} + \sum_{j=0}^{b} \gamma_{2j} \Delta FIN_{t-1} + \sum_{j=0}^{c} \gamma_{3j} \Delta lnGDPPC_{t-1} + \sum_{j=0}^{d} \gamma_{4j} \Delta INV_{t-1} + \sum_{j=0}^{e} \gamma_{5j} \Delta EXG_{t-1} + \sum_{j=0}^{f} \gamma_{6j} \Delta AGR_{t-1} \varepsilon_t + \tau ECT_{t-1} + \varepsilon_t \quad (4)$$

Several diagnostic tests are conducted on the result obtained from the ECM. These diagnostics tests reveal the goodness of fit of the estimated model. Tests conducted include: Jarque-Bera test for normality; Breusch-Godfrey (BG) test for serial correlation, and Autoregressive Conditional Heteroscedasticity (ARCH) test for heteroscedasticity.

4.3. Data Issues

The study utilised annual data, spanning over the period of 1981 to 2015[7]. Except for financial reforms, all other data used in the study were obtained from World Development Indicators (WDI). The dependent variable industrialisation is measured, in the literatures reviewed, in two ways. First, the share of manufacturing sector value added in GDP. Second, share of manufacturing sector employment in total employment. In this study, the

[7]The study period started in 1981 and not 1987 when financial reforms started. Our decision was informed by two factors: first, the need to have a relatively large sample size that is sufficient for econometric analysis and second, the need to incorporate pre and post reform period. This is important because the measure of financial reforms used in the study captures gradual implementation of the reform. Hence, there is need to combine periods before the implementation as well as periods after commencement of the reforms. While the ending date (2015) was informed by data available.

first method is used. This choice is guided by the reliability of sectoral output dataset over employment dataset in Nigeria. The primary variable of interest, financial reforms, is sourced from financial reforms dataset developed by Abiad, *et al.* (2010). Although the data ends in 2005, we extended the dataset to 2015 based on the note provided by the authors on how they arrived at the financial reforms dataset. The control variables used in the study are income, investment, export growth and share of agricultural value added in total output. In this study, we followed other studies such as Murphy *et al.* (1989); Rowthorn & Ramaswamy (1999); and Gui-Diby & Renard (2015) to measure income as gross domestic product per capita (GDPPC). Investment is measured as gross fixed capital formation as a ratio of gross domestic product (Rowthorn & Ramaswamy, 1999; Gui-Diby & Renard, 2015). Furthermore, we controlled for the effect of foreign direct investment, human capital and exchange rate.

5. Empirical Result

The focus of this study is to assess the effect of financial reforms on industrialisation in Nigeria. The study employed ADRL model within an ECM framework to explore both the long run and short run effects of financial reforms on industrialisation in Nigeria. The results obtained are presented and discussed in this section.

5.1. Descriptive and correlation analysis

The descriptive statistics of the variables used for this study is presented in Table 3. Table 3 shows that the average value of industrialisation in Nigeria is 6.1%. This is less than 9.8% reported by Gui-Diby & Renard (2015) for sub-Saharan African countries. Also, it is less than 12% in low income industrialising countries and 7% in Sub-Saharan African countries, excluding South Africa and 12% with South Africa (UNIDO, 2013 p.207). This clearly shows that the level of industrialisation in Nigeria is lower and hence, the need to investigate the role of financial reforms in boosting industrialisation in Nigeria. The mean value of the financial reform index is zero. This is because the index is arrived at through a normalisation process. The standard deviation value is 2.3, which suggests that financial reform policies have been implemented in Nigeria. This is further reflected in the value of the median financial reform index being positive[8]. The mean value of income in Nigeria over the period examined in this study is $1, 631. The investment level in Nigeria is low, since the share of

[8] Detailed information on financial reforms in Nigeria has been explained and can be found in Section 3

gross fixed capital formation in GDP is less than 20%. The share of agricultural value added in GDP is more than 30%. This therefore suggests that the share of agricultural value added in GDP is five times the share manufacturing value added in GDP.

The correlation matrix, which is reported in Table 4, shows that the relationship between industrialisation and the financial reforms index is negative and significant. Furthermore, the correlation matrix shows that industrialisation and investment have a significant and positive relationship. Other variables in the study do not have a significant relationship with industrialisation, expect for exchange rate. More specifically, income has a positive relationship with industrialisation but insignificant. On the other hand, export growth and share of agricultural value added in GDP have a negative but insignificant relationship with industrialisation. Financial reform index has a positive and significant effect on income, while the relationship between investment and share of agricultural value added in GDP is negative and significant. The above nature of the degree of correlation between the main variable of interest and variables used as control variables further justify the use of ARDL model. This technique addresses the endogeneity problem.

5.2. Unit root and cointegration analysis

Advancement in time series econometrics advocates for the need to ascertain the stationary properties of variables used in estimating the regression equation. This is to avoid the spurious regression associated with variables that exhibit unit root in level. Furthermore, it has been argued that variables that exhibit unit root could be stationary after first difference. When this is ascertained, it is believed that a long-run relationship might hold. Given this situation, the long-run relationship is ascertained through the use of cointegration (Engle and Ganger, 1994). Thus, in this section, we will determine the stationary properties of the variables used in the study. The results obtained are documented in Table 5. The results show that industrialisation, income, investment, the share of agricultural value added in GDP, foreign direct investment, human capital and exchange exhibit unit root in level. However, they became stationary after first difference, while growth in export exhibits stationarity in level. Thus, industrialisation, income, investment, the share of agricultural value added in GDP are integrated of order one, i.e. I(1) while export growth is integrated of order zero, i.e. I (0).

The result of the cointegration test, based on Pesaran *et al.* (2001), is presented in Table 6, which shows that long-run relationship holds. This conclusion is arrived at as the calculated

F-statistics is greater than the upper critical value at 1%. Overall, the result points out that the explanatory variables considered in this study (income, investment, growth in export, the share of agricultural value added in GDP), jointly influence the long-run level of industrialisation in Nigeria.

5.3. Regression Analysis

5.3.1. Main results

The study set out to assess the effect of financial reforms on industrialisation in Nigeria, over the period of 1981 to 2015. The study's main regression result is presented in Table 7. It shows the effect of financial reforms on industrialisation, both in the long-run and short-run. Controlling for other determinants of industrialisation, we found that financial reforms stimulate industrialisation in Nigeria. More specifically, the findings of the study point out that financial reform stimulate industrialisation, both in the short-run and in the long-run. The implication of this finding is that financial repression limits industrialisation. Overall, the results are consistent with the financial liberalisation hypothesis.

The findings in this study do not support the findings reported by Kabango & Paloni (2011) on the Malawi economy. In their study, they found that financial liberalisation does not promote entrance of new firms into the industrial sector. In addition, the authors argued that financial liberalisation has not resulted in an increase in the level of competition within the industrial sector. According to them, through improved access to finance, resulting from an efficient financial system engineered by financial reforms, the level of competition within the industrial sector ought to be intensified. However, our findings support the prediction by Da Rin & Hellmann (2002). In their study, the authors argued that banks serve as a catalyst to industrialisation through the financial services they render to firms. Since banks serve as a financial intermediary, their duty is to ensure that financial resources are allocated within the economy effectively.

In addition, the study revealed that income has a positive and significant effect on industrialisation in the long-run. However, in the short-run, it does not promote industrialisation. This is because in the short-run, an increase in income leads to a reduction in the share of manufacturing value added in GDP. The observed effect of income on industrialisation in the short-run is found to contradict the prediction in the Big Push Industrialisation Theory on a first sight. However, on a closer look, the study findings support

the Big Push Industrialisation Theory. The findings revealed the weak preference for locally produced goods compared to imported goods by Nigerians. Thus, a large fraction of the extra income is spent on imported goods rather than on domestic goods. The positive effect of an increase in income on industrialisation in the big push industrialisation theory is based on the premised that an increase in income is used to purchase domestically produced goods. This explains the result obtained in this study. This suggests that the government needs to institutionalise policies that will encourage the demand for locally produced goods. Through such policies, an increase in income will be accompanied by increasing demand for domestically produced goods, thus, creating an avenue for industries to expand. On this note, the current government advocacy for made in Nigeria goods needs to intensify.

The study's results confirm similar studies findings such as Rowthorn & Ramaswamy, (1999) and Gui-Diby & Renard (2015) on the positive role of investment on industrialisation. In this study, an increase in industrialisation is associated with an increase in investment level both in the long-run and the short-run, although, in the short-run, the effect of investment on industrialisation is weak. Thus, the low level of investment in the country could be linked to the low level of industrialisation. Export growth is found to have positive and significant effect in the long-run. Also, in the short-run, export growth exerts a positive and significant effect on industrialisation. This study confirms the findings of Chows (1987). Thus, supporting the export-led industrialisation strategy in the short-run. The positive effect of export growth in the short-run implies that an increase in the demand for domestically produced goods by the foreigner creates an avenue for industrial expansion. Also, in this study, we found that the effect of a reduction in the share of agricultural value added on industrialisation is negative and significant. This is in line with the recent study by Gui-Diby & Renard (2015) for Africa. The implication of this finding is that industrialisation is associated with a reduction in the share of agricultural value added in GDP. The findings support the view that industrialisation is achieved through the movement of resources from a low productivity sector to a high productivity sector.

Furthermore, we found that foreign direct investment exert negative effect on industrialisation in Nigeria. The observed effect is not surprising since foreign direct investment into the country is characterised by rent seeking (Jerome and Ogunkola, 2004). The result that is surprising is the effect of human capital on industrialisation; we found that an increase in human capital contributes to a deindustrialisation. Industrialisation is found to improve when the exchange rate depreciates. This is because depreciation of the currency is

usually associated with harsh economic condition that compels the government to look inwards to develop the industrial sector in an attempt to reduce the demand for foreign currency.

A look at the diagnostic section in Table 7 revealsthat the estimated model is devoid of both serial and autocorrelation problems. Also, the value of the R-squared indicated that the model has a good fit.

5.3.2. Robustness check

We used another approach to derive the financial reform index: by multiplying the first eigenvectors of the principal component with each of the financial reforms measures and then summing the value obtained together to arrive at the financial reform index for a given year (Shrestha and Chowdhury, 2006). The results obtained from the use of the alternative measure are reported in Table 8. The positive effect of financial reforms on industrialisation still holds.

In addition, instead of using financial reform index we used two prominent financial reforms component. They are: (i) credit control and reserve requirement and (ii) interest rate liberalisation. The results obtained are presented in Table 9. The results were found to be consistent with earlier findings presented in this study. More precisely, the use of credit control and reserve requirement has a positive and significant effect on industrialisation. The results point out that credit ceiling limits industrialisation. Thus, relaxation of credit control and reserve requirement supports industrialisation in Nigeria. In addition, we found that low investment level reduces the level of industrialisation in Nigeria over the long run.

6.3.3 Granger causality analysis

In this section, we examined the nature of causality that exists between industrialisation and financial reforms, as well as other variables used in the study. The results obtained are presented in Table 10. We found that there is no causality that runs between industrialisation and financial reforms. However, the following causalities were established among other variables used. Unidirectional relationship from investment to industrialisation, unidirectional relationship from human capital to industrialisation, unidirectional relationship from economic development to financial reforms, unidirectional relationship from industrialisation to economic development, as well as unidirectional relationship from financial reforms,

economic development, export growth, foreign direct investment and exchange rate to human capital development.

6. Conclusion and policy implication

This study conducts an empirical assessment of the effect of financial reforms on industrialisation in Nigeria. Industrialisation has been identified as the route to development. That is, countries that have experienced economic development were driven by industrialisation (Szirmai, 2012). This is because industrialisation is associated with capital accumulation, economies of scale and acquisition of new technologies as well as foster technological changes than other sectors of the economy (Szirmai, 2012; UNIDO, 2013). As a result of these factors, industrialisation stimulates economic growth and development. In this study, an annual time series data over the period of 1981 to 2015 was used. Furthermore, we explicitly account for financial reforms using a financial index. The index was computed through PCA.

Our results showed that financial reforms have positive effects on industrialisation in Nigeria, both in the long-run and in the short-run. The results are robust to different methods of deriving the index as well as the major component of financial reforms. The study revealed that financial reforms contribute positively to industrial development in Nigeria. The findings of this study also showed that the level of investment matters a lot in achieving industrialisation. In addition, the study findings showed that export growth promotes industrialisation in the short-run.

In this study, our findings confirm the financial liberalisation hypothesis. Thus, financial reforms can be seen as medium through which the government could actualise its goal of enhancing the performance of the industrial sector.

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Table 1: Financial reforms matrix

Year	Interest rate liberalization	credit controls and reserve requirements	Banking sector entry	Banking sector supervision	Privatization	Financial account transaction	Securities market
1981	0.0	0.8	2.0	0.0	1.0	1.0	1.0
1982	0.0	0.8	2.0	0.0	1.0	1.0	1.0
1983	0.0	0.8	2.0	0.0	1.0	1.0	1.0
1984	0.0	0.8	2.0	0.0	1.0	1.0	1.0
1985	0.0	0.8	2.0	0.0	1.0	1.0	1.0
1986	0.0	0.8	2.0	0.0	2.0	0.0	1.0
1987	1.0	0.8	2.0	0.0	2.0	0.0	1.0
1988	1.0	0.8	2.0	0.0	2.0	0.0	2.0
1989	1.0	0.8	2.0	0.0	2.0	1.0	2.0
1990	1.0	0.8	3.0	0.0	2.0	1.0	2.0
1991	0.0	0.8	3.0	1.0	2.0	1.0	2.0
1992	1.0	0.8	3.0	1.0	2.0	1.0	2.0
1993	1.0	0.8	3.0	1.0	2.0	1.0	2.0
1994	1.0	0.8	3.0	1.0	2.0	0.0	2.0
1995	1.0	0.8	3.0	1.0	2.0	0.0	2.0
1996	2.0	3.0	3.0	1.0	2.0	0.0	2.0
1997	2.0	3.0	3.0	1.0	2.0	0.0	2.0
1998	2.0	3.0	3.0	1.0	3.0	0.0	2.0
1999	3.0	2.3	3.0	2.0	3.0	0.0	2.0
2000	3.0	3.0	3.0	2.0	3.0	1.0	3.0
2001	3.0	2.3	3.0	2.0	3.0	1.0	3.0
2002	3.0	2.3	3.0	2.0	3.0	1.0	3.0
2003	3.0	3.0	3.0	2.0	3.0	0.0	3.0
2004	3.0	3.0	3.0	2.0	3.0	0.0	3.0
2005	3.0	3.0	3.0	2.0	3.0	0.0	3.0
2006	2.0	2.5	3.0	2.0	3.0	0.0	3.0
2007	2.0	2.5	3.0	2.0	3.0	0.0	3.0
2008	2.0	2.5	3.0	2.0	3.0	0.0	3.0
2009	2.0	2.5	3.0	2.0	3.0	0.0	3.0
2010	2.0	2.5	3.0	2.0	3.0	0.0	3.0
2011	2.0	2.5	3.0	2.0	3.0	0.0	3.0
2012	2.0	2.5	3.0	2.0	3.0	0.0	3.0
2013	2.0	1.8	3.0	2.0	3.0	0.0	3.0
2014	2.0	1.8	3.0	2.0	3.0	0.0	3.0
2015	2.0	1.0	3.0	2.0	3.0	0.0	3.0

Sources: Abiad, et al. (2010) and author's compilation.

Table 2: Principal component analysis results

Principal components	Component matrix							Prop.	Cum. Prop.	Eigenvalue
	CR	BS	INT	BE	BS	PRV	FIN			
First PC	0.367	0.402	0.368	0.414	0.414	-0.249	5.295	0.756	0.756	0.367
Second PC	-0.087	0.095	0.257	0.145	-0.026	0.925	0.758	0.108	0.865	-0.087
Third PC	0.725	0.378	-0.448	-0.149	-0.124	0.219	0.431	0.062	0.926	0.725
Fourth PC	-0.364	0.164	-0.731	0.099	0.401	0.071	0.263	0.038	0.964	-0.364
Fifth PC	0.361	-0.670	-0.221	0.413	-0.245	0.013	0.121	0.017	0.981	0.361
Sixth PC	0.219	-0.256	0.122	-0.763	0.307	0.047	0.074	0.011	0.992	0.219
Seventh PC	0.146	-0.380	0.001	0.156	0.705	0.163	0.058	0.008	1.000	0.146

CR, credit controls and reserve requirements; INT interest rate liberalisation; BE banking sector entry; BS banking sector supervision; PRV privatization; FIN financial account transaction; SEC securities market; PC Principal component; Prop. Proportion; Cum. Prop Cumulative proportion.

Table 3: Descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.
IND	6.109	5.701	10.437	2.410	2.566
FIN1	0.000	1.176	2.560	-3.926	2.301
GDPPC	1631.201	1398.523	2535.068	1141.060	459.587
INV	12.718	11.965	35.221	5.459	6.415
EXG	6.195	2.636	60.218	-30.702	22.092
AGR	32.691	32.755	48.566	20.236	6.760
FDI	2.653	1.539	8.841	0.189	2.657
HC	47.895	46.345	53.049	45.852	2.397
EXCH	71.409	22.065	192.441	0.618	66.185

Where IND is industrialization, INV is the level investment, AGR is the share of agricultural sector value added in GDP, EXG is the growth rate of export, FIN1 is financial reform index, GDPPC is gross domestic product per capita, FDI is foreign direct investment, HC is life expectancy at birth, and EXCH is official exchange rate (Naira to dollar). Std. Dev is the standard deviation.

Table 4: Correlation Matrix

	IND	FIN	GDPPC	INV	EXG	AGR	FDI	HC
FIN	-0.615***	1						
GDPPC	0.113	0.511***	1					
INV	0.735***	-0.561***	0.187	1				
EXG	-0.130	0.166	0.115	-0.113	1			
AGR	-0.229	-0.317*	-0.667***	-0.211	-0.048	1		
FDI	-0.267	0.635***	0.829***	-0.077	0.175	-0.469***	1	
HC	0.060	0.603***	0.975***	0.069	0.126	-0.652***	0.841***	1
EXCH	-0.288*	0.854***	0.811***	-0.224	0.133	-0.476***	0.757***	0.870***

Notes: *, ** and *** signifies significant at 10%, 5% and 1% respectively. Where IND is industrialization, INV is the level of investment, AGR is the share of agricultural sector value added in GDP, EXG is the growth rate of export, FIN1 is financial reform index, GDPPC is gross domestic product per capita, FDI is foreign direct investment, HC is life expectancy at birth, and EXCH is official exchange rate (Naira to dollar).

Table 5: Ng-Perron unit root test

Variables	Levels				First differences				Remark
	MZa	MZt	MSB	MPT	MZa	MZt	MSB	MPT	
IND	-2.363	-1.042	0.441	10.080	-16.359	-2.857	0.175	1.510	I(1)
INV	-1.180	-0.722	0.612	19.133	-12.683	-2.510	0.198	1.962	I(1)
AGR	-8.223	-1.918	0.233	3.380	-32.837	-4.052	0.123	0.747	I(1)
EXG	-15.436	-2.778	0.180	1.587					I(0)
FIN1	-5.486	-1.582	0.288	4.669	-16.468	-2.837	0.172	1.607	I(1)
GDPPC	0.261	0.173	0.662	29.812	-14.859	-2.725	0.183	1.650	I(1)
FDI	-2.536	-0.937	0.369	29.203	-16.021	-2.765	0.173	1.769	I(1)
HC	-3.451	-1.159	0.336	23.665	-109.133	-7.385	0.068	0.228	I(1)
EXCH	-5.819	-1.652	0.284	15.562	-16.407	-2.683	0.164	2.144	I(1)
1%	-13.800	-2.580	0.174	1.780	-13.800	-2.580	0.174	1.780	
5%	-8.100	-1.980	0.233	3.170	-8.100	-1.980	0.233	3.170	

Notes: The asymptotic critical values correspond to the 1% and 5% levels of significance respectively for each of the four Ng-Perron tests as reported in Ng-Perron (2001). *, ** and *** imply significance at 10%, 5% and 1% respectively. IND is industrialization, INV is the level of investment, AGR is the share of agricultural sector value added in GDP, EXG is the growth rate of export, FIN1 is financial reform index, GDPPC is gross domestic product per capita, FDI is foreign direct investment, HC is life expectancy at birth, and EXCH is official exchange rate (Naira to dollar).

Table 6: Co-integration test-Bound test

	ARDL structure	F-Statistics	Adj. Squared	Normality	ARCH test(1)	ARCH test (3)	BG LM test(1)	BG LM test(3)
F(IND/INV, AGR, EXG, FIN1, GDPPC, FDI, HC, EXCH)	(3,3,1,3,3,2)	26.558***	0.943	0.492	0.500	0.860	0.120	0.399

Note: The upper (lower) bounds critical value at 1% and 5% are 4.68(3.41) and 3.79(2.62) respectively. The reported value for Normality test, ARCH test, and BG LM test are the probability value of the f-statistics. BG is Breusch-Godfrey Serial correlation LM test. In addition, *** implies statistically significant at 1%.

Table 7: Main estimation, Dependent variable: Industrialization

	Coefficient	Standard error
Long-run estimation		
Constant	379.702***	131.081
FIN	4.000**	1.515
GDPPC	0.039**	0.013
INV	0.465*	0.219
EXG	0.058**	0.016
AGR	0.593**	0.212
FDI	-0.268	0.256
HC	-0.097**	0.033
EXCH	0.263**	0.073
Short-run estimation		
ΔIND(-1)	-0.903***	0.156
ΔIND(-2)	-0.646***	0.133
ΔFIN1	0.704**	0.201
ΔFIN1(-1)	-1.251***	0.258
ΔGDPPC	0.006***	0.001
ΔGDPPC(-1)	-0.007***	0.002
ΔINV	0.070	0.087
ΔEXG	0.009**	0.003
ΔEXG(-1)	-0.013***	0.003
ΔAGR	0.092**	0.027
ΔAGR(-1)	-0.037	0.032
ΔFDI	-0.010	0.098
ΔHC	-0.985***	0.062
ΔHC(-1)	0.591***	0.060
ΔEXCH	0.010	0.007
ΔEXCH(-1)	-0.078***	0.007
ECT(-1)	-0.520***	0.127
Diagnostic test		
R-square	0.997	
Adjusted R- Squared	0.984	
F-statistics(prob. Value)	0.000	
Jarque-Bera normality test	0.492	
Breusch-Godfrey serial correlation LM test	(1) 0.120; (2) 0.337; (3) 0.399	
ARCH test	(1) 0.500; (2) 0.824; (3) 0.860	
CUSUM	Stable	
CUSUM of Squares test	Stable	

Note:IND is industrialization, INV is the level of investment, AGR is the share of agricultural sector value added in GDP, EXG is the growth rate of export, FIN1 is financial reform index, GDPPC is gross domestic product per capita, FDI is foreign direct investment, HC is life expectancy at birth, EXCH is official exchange rate (Naira to dollar), Δis difference operator. * implies significance at 10%, ** implies significance at 5% and *** implies significant at 1%. Jarque-Bera normality test, Breusch-Godfrey serial correlation LM test, ARCH test and Ramsey RESET test are based on F-statistics and the corresponding reported value is the probability value

Table 8: Alternative measure of financial reform index
Main estimation, Dependent variable: Industrialization

	Coefficient	Standard error
Long-run estimation		
Constant	259.732***	72.718
FIN2	3.247**	1.047
GDPPC	0.030***	0.008
INV	0.236*	0.113
EXG	0.040**	0.015
AGR	0.406**	0.131
FDI	-0.136	0.134
HC	-0.070***	0.019
EXCH	0.195***	0.040
Short-run estimation		
ΔIND(-1)	-0.784***	0.171
ΔIND(-2)	-0.601***	0.160
ΔFIN1	1.143***	0.324
ΔFIN1(-1)	-1.220**	0.350
ΔlnGDPPC	0.005**	0.002
ΔlnGDPPC(-1)	-0.006**	0.002
ΔINV	-0.028	0.078
ΔEXG	0.012**	0.003
ΔEXG(-1)	-0.008*	0.004
ΔAGR	0.083**	0.033
ΔAGR(-1)	-0.033	0.034
ΔFDI	-0.092	0.099
ΔHC	-0.928***	0.083
ΔHC(-1)	0.534***	0.076
ΔEXCH	0.011	0.007
ΔEXCH(-1)	-0.077***	0.009
ECT(-1)	-0.680***	0.115
Diagnostic test		
R-square	0.994	
Adjusted R- Squared	0.973	
F-statistics(prob. Value)	0.000	
Jarque-Bera normality test	0.356	
Breusch-Godfrey serial correlation LM test	(2) 0.401; (2) 0.705; (3) 0.331	
ARCH test	(2) 0.802; (2) 0.807; (3) 0.861	
CUSUM	Stable	
CUSUM of Squares test	Stable	

Note: IND is industrialization, INV is the level of investment, AGR is the share of agricultural sector value added in GDP, EXG is the growth rate of export, FIN2 is financial reform index derived following Shrestha and Chowdhury (2006), GDPPC is gross domestic product per capita, FDI is foreign direct investment, HC is life expectancy at birth, EXCH is official exchange rate (Naira to dollar), Δis difference operator. * implies significant at 10%, ** implies significant at 5% and *** implies significant at 1%. Jarque-Bera normality test, Breusch-Godfrey serial correlation LM test, ARCH test and Ramsey RESET test are based on F-statistics and the corresponding reported value is the probability value

Table 9: Using key component of financial reform

	Credit control and reserve requirement		Interest rate liberalization	
	Coefficient	Standard error	Coefficient	Standard error
Long-run estimation				
Constant	100.704**	38.609	78.308*	40.748
CR	0.983***	0.300		
INT			1.735**	0.566
GDPPC	0.012**	0.005	0.014**	0.005
INV	0.011	0.065	0.107*	0.050
EXG	0.012	0.009	0.022	0.013
AGR	0.152**	0.057	0.161**	0.047
FDI	-0.276	0.167	-0.478**	0.178
HC	-0.025**	0.010	-0.021*	0.011
EXCH	0.111***	0.021	0.065**	0.021
Short-run estimation				
ΔIND(-1)	-0.317	0.207	0.044	0.250
ΔIND(-2)	0.293*	0.158	-0.296	0.188
ΔCR	0.500**	0.217		
ΔCR(-1)	-0.653*	0.315		
ΔINT			1.474**	0.489
ΔGDPPC	0.004	0.003	0.005	0.003
ΔGDPPC(-1)			-0.009**	0.003
ΔINV	-0.141	0.003	0.049	0.097
ΔINV(-1)			-0.144	0.085
ΔEXG	0.009	0.006	0.000	0.009
ΔEXG(-1)			-0.018**	0.007
ΔAGR	0.057	0.047	0.083*	0.037
ΔFDI	-0.322	0.196	-0.370*	0.191
ΔHC	-0.778***	0.143	-0.854***	0.127
ΔHC(-1)	0.426**	0.139	0.472***	0.123
ΔEXCH	0.014	0.013	-0.018	0.017
ΔEXCH(-1)	-0.075***	0.018	-0.072***	0.014
ECT(-1)	-1.168***	0.143	-1.604***	0.257
Diagnostic test				
R-square	0.952		0.989	
Adjusted R Squared	0.898		0.952	
F-statistics(prob. Value)	0.000		0.000	
Jarque-Bera normality test	0.586		0.399	
Breusch-Godfrey serial correlation LM test	(1)0.145; (2) 0.253; (3) 0.418		(1)0.008; (2) 0.021; (3) 0.064	
ARCH test	(1)0.698; (2) 0.900; (3) 0.931		(1)0.857; (2) 0.952; (3) 0.296	
CUSUM	Stable		Stable	
CUSUM of Squares test	Stable		Stable	

Note:IND is industrialization, INV is the level of investment, AGR is the share of agricultural sector value added in GDP, EXG is the growth rate of export, CR is Credit control and reserve requirement, INT is Interest rate liberalization, GDPPC is gross domestic product per capita, FDI is foreign direct investment, HC is life expectancy at birth, EXCH is official exchange rate (Naira to dollar), Δis difference operator. * implies significant at 10%, ** implies significant at 5% and *** implies significant at 1%. Jarque-Bera normality test, Breusch-Godfrey serial correlation LM test, ARCH test and Ramsey RESET test are based on F-statistics and the corresponding reported value is the probability value.

Table 10: Granger causality (Error correction)

	ΔIND	ΔFIN	ΔGDPPC	ΔINV	ΔEXG	ΔAGR	ΔFDI	ΔHC	ΔEXCH
ΔIND		0.570 (0.450)	2.785* (0.095)	2.617 (0.106)	0.001 (0.981)	0.002 (0.965)	0.434 (0.510)	0.072 (0.788)	0.011 (0.916)
ΔFIN	0.500 (0.480)		0.124 (0.725)	1.000 (0.317)	0.894 (0.344)	2.596 (0.107)	0.246 (0.620)	4.190** (0.041)	0.237 (0.626)
ΔGDPPC	1.316 (0.251)	$2.80*10^{-5}$ (0.996)		1.643 (0.200)	0.003 (0.957)	1.555 (0.213)	0.247 (0.619)	2.807* (0.094)	0.019 (0.890)
ΔINV	4.462** (0.035)	0.906 (0.341)	0.078 (0.779)		0.110 (0.741)	0.124 (0.724)	1.476 (0.224)	0.924 (0.336)	0.011 (0.915)
ΔEXG	0.041 (0.839)	0.013 (0.910)	0.887 (0.346)	0.386 (0.535)		0.124 (0.725)	0.034 (0.854)	4.355** (0.037)	0.014 (0.906)
ΔAGR	0.565 (0.452)	0.030 (0.863)	0.289 (0.591)	0.397 (0.529)	0.892 (0.345)		0.702 (0.402)	0.218 (0.641)	0.540 (0.462)
ΔFDI	0.714 (0.398)	0.000 (0.990)	0.048 (0.827)	1.364 (0.243)	0.049 (0.824)	0.025 (0.874)		6.796*** (0.009)	0.110 (0.740)
ΔHC	3.571* (0.059)	2.567 (0.109)	1.011 (0.315)	0.306 (0.580)	0.324 (0.569)	1.959 (0.162)	0.797 (0.372)		0.044 (0.833)
ΔEXCH	1.757 (0.185)	0.072 (0.788)	0.002 (0.965)	1.313 (0.252)	1.039 (0.308)	5.341** (0.021)	1.996 (0.158)	29.316*** (0.000)	
All	10.281 (0.246)	6.501 (0.591)	4.956 (0.762)	8.966 (0.345)	3.228 (0.919)	9.174 (0.328)	5.553 (0.697)	51.177*** (0.000)	1.522 (0.992)

Note: IND is industrialisation, INV is the level of investment, AGR is the share of agricultural sector value added in GDP, EXG is the growth rate of export, CR is Credit control and reserve requirement, INT is Interest rate liberalization, GDPPC is gross domestic product per capita, FDI is foreign direct investment, HC is life expectancy at birth, EXCH is official exchange rate (Naira to dollar), Δis difference operator. * implies significant at 10%, ** implies significant at 5% and *** implies significant at 1%

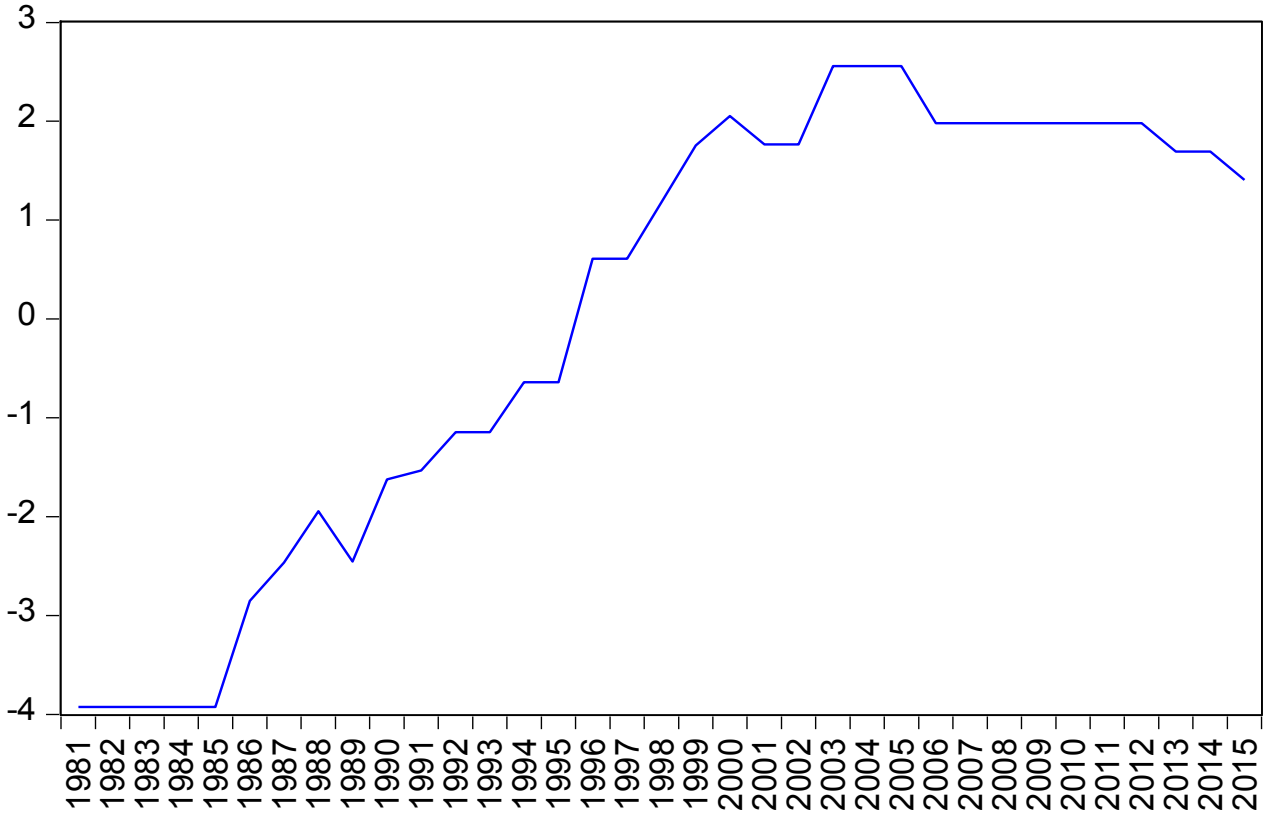

Figure 1: Trend of Financial reform index

Source: Based on underlining data from PCA analysis.