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PRIVATIZAVIMO POVEIKIS VALSTYBĖS ĮMONIŲ EFEKTYVUMUI	THE IMPACT OF PRIVATIZATION ON THE EFFICIENCY OF STATE-OWNED ENTERPRISES

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INTRODUCTION

The relevance of the topic: The relevance of the thesis topic stems from the fact that numerous scholars are of the view that privatization affects organizational effectiveness positively and brings about systematic improvement in economic efficiency of firms. Another streak of the scholarly position on the subject of privatization of state owned enterprises (SOEs) is that privatization has a significant positive effect on profitability indicators. Hence, the study is aimed at finding out the impact of privatization on recently privatized state-owned enterprises in Nigeria to ascertain if the claims and findings of some scholars on privatization of SOEs are obtainable in Nigerian privatized companies.

The level of exploration of the topic: The impact of privatization on the efficiency of state-owned enterprises has been studied by many scholars with focuses on operational performance, financial performance, organizational effectiveness, etc. In the developing countries where privatization has in the past three decades been pursued as part of economic development policies, the impact of privatization appears to have been understudied. For instance, in Nigeria, the effect of privatization of the performance of the most privatized state owned enterprises has grossly been understudied. Hence, this study is designed to analyse the impact of privatization on the efficiency of Power Distribution Companies of Nigeria.

Novelty of the thesis: Several empirical studies have been conducted locally and internationally on the impact of privatization on different sectors like banks, Power generation, power distribution, food and beverage companies, cement factories, breweries, and other sectors. Some of these empirical studies were focused on the only impact of privatization on financial performance (Jumare, 2015; Manyaga et al. 2016; Ntiri 2016; Miguel 2016; Amo and Gyamerah, 2016; Tari et al., 2017; Pham and Nguyen 2019), some were focused only on the impact of privatization on operational and organizational efficiency (Jerome 2008; Bosch and Vergés 2016; Musoke, 2018; Nwankwo 2016) some were focused on the effect of privatization on waste elimination (Nwangi , 2014; Amo and Gyamerah 2016; Nwali et al., 2019) while some were focused on the impact of privatization on power generation efficiency only (Aminu and Perterside 2014; Adedeji 2017). These existing literature, as mentioned above, revealed that there is a lacuna in literature as it concerns a holistic empirical study that will integrate and incorporate the major areas of impact of privatization, namely, financial

performance, operational performance, waste elimination, and power distribution efficiency in one study, particularly for power Distribution Company, covering effects of privatization based on some years before and after privatization experience.

Thus, this present study is designed to fill this lacuna by developing an empirical research on “The Impact of Privatization on The Efficiency Of State-Owned Enterprises.” This empirical study would integrate the four major areas of privatizations impacts, namely; financial performance, operational performance, waste elimination, and power distribution efficiency using two formal state-owned power distribution companies in Nigeria, namely Enugu power Distribution Company and EKO Power Distribution Company, and five years pre and post-privatization experience.

Research problem: In Nigeria, full privatizations of most state-owned enterprises were concluded within the past two decade. However, despite the fact that some of these privatised enterprises have operated for close to or over a decade without serious scholarly efforts aimed at appraising the performance. The power sector for instance which is a very critical sector that had become privatised has not been effectively evaluated to ascertain if the aim of it privatization is being achieved. Studies on the effect of privatization on the effectiveness of the successor companies of the Power Holding Company of Nigeria are obviously lacking. Hence, this research is designed to analyse the impact of privatization of state-owned enterprises.

The main research questions that will guide the study are:

What is the effect of privatization on financial and operational performance?

What is the effect of privatization on waste elimination?

What is the effect of privatization on power generation and distribution?

The final aim of the research: Based on analysis of scientific literature and empirical research, **to** investigate the impact of privatization on the efficiency of state owned enterprises.

OBJECTIVES:

- I. Based on scientific literature to analyse the effect of privatization on financial and operational performance of state owned enterprises;
- II. Based on scientific literature analysis to identify if privatization had eliminated wastage that characterizes state owned enterprises
- III. Based on empirical analysis to identify the effect of privatization on power generation and distribution capacity of successor companies of PHCN;

IV. To carry out an empirical quantitative study on the impact of privatization on the efficiency of state-owned enterprises.

Research methods: A published financial reports of selected SOEs(secondary data) to examine the post-privatization and for the pre-privatization for the period of 2008-2018 (five years before and five years after privatization). A regression analysis OLS shall be used to test the nature of relationship between privatization variable and efficiency variable of the post and pre-privatization and significance of the privatization variables in predicting efficiency of the firms (quarterly data was used in order to get sufficient data sample regression)

Empirical research is based on inferential and descriptive analysis using statistical tools such as mean, standard deviation, skewness, and Kurtosis and Wilcoxon Signed Ranks tests, Coefficient value ,R-square value,Probability value (P-value).Results will be presented using these statistics tools mentioned.

The structure and scope of the thesis: The thesis consists of several parts: the first part is introduction, followed by the Theories of privatization impacts on organizational effectiveness, financial, operational and elimination of wastage in public enterprises as given in scientific literature and also the conceptual models of privatization and organizational efficiency. Research methodology part provides information about methods used in the thesis and how received data will be analysed and processed. Results part shows the results of analysis on the impact of privatization (Financial performance, operational performance, waste elimination and power generation and distribution) on the efficiency of state owned enterprises.

1.1 THEORETICAL ASPECTS OF THE IMPACT OF PRIVATIZATION ON THE EFFICIENCY OF STATE-OWNED ENTERPRISES

1.1.1 Defining Privatization

Over the years, the topic of Privatization has received much global attention for discussion. Since, some privatized enterprises have not performed well in the economy. This section provides insight on privatization. It will look at some of the most relevant topics contributing to finding solutions to the research objectives. The chapter highlighted a few definitions of privatization from different authors. The section also looked at theories of impact of privatization on organizational effectiveness, elimination of waste, financial, and operational performance of the state owned enterprises.

Starr (2011) defined privatization as "the transfer of public assets to the private sector through different means such as sale, lease or management contract." Ezeani (2004, p. 24) defined privatization as "a deliberate government policy of encouraging economic growth and efficiency by reducing state intervention and broadening the scope of private sector activity through transfer of state-owned assets to private ownership through sale of shares, private control or management of state-owned assets, encouraging some private sector involvement in former public activity and shifting decision making to agents operating in accordance with market indicators." Aminu and Peterside (2014) defined privatization as a process by the public sector towards the quest of efficiency and effectiveness in achievement of objectives through the adoption of management styles that reward good and penalize poor performance.

Furthermore, Nwankwo (2016) defined privatization as the transfer of government owned shareholding in designated enterprises to private shareholders, comprising individuals and corporate bodies."

From the scholars' positions on the concept of privatization, we can summarily state that privatization is the transfer of a state-owned company or enterprise to private ownership and control.

From the opinion of most authors, privatization can be classified in twoways: full privatization and partial privatization.

Full privatization: Often the process starts with partial sale of assets before full relinquishing of assets. According to Falae, (1986) and Nankani, (1991) full

privatization, the entire ownership and control of public organizations are transferred to the private individuals.

Partial privatization: This Involves limited transfer of the ownership and control.

According to Nandini Gupta (2005) partial privatization is where the government remains the control ownership. The partial privatization is of theoretical interest because of its insight into the long-standing debate over why state-owned firms perform poorly. The political view, Shleifer and Vishny (1994) argues that governments pursue objectives in addition to and in conflict with profit maximization, and this political interference can distort the objectives and constraints faced by managers.

1.1.2 Characteristics of privatisation

According to Winiecki (2016), the main characteristics of privatization are: (i) limitation of government's participation in economic activities which safeguards the private sector and (ii) establishment of economic democracy that allows private sectors to carry out economic activities freely. For Estrin and Pelletier (2018), the characteristics of privatization include economic democracy, reduction of state dominance in the economic sphere, and assumption. Economic democracy according to Winiecki (2016) involves the provision of opportunity for private sector to carry out economic activities without undue government interference.

Another characteristic of privatization as identified by Estrin and Pelletier (2018) is reduction of state dominance in economic sphere. The authors are of the view that privatization leads to reduction of state dominance in the economic sphere. Assumption is also identified by Estrin and Pelletier (2018) as another characteristic of privatization. Estrin and Pelletier (2018) stated that privatization is anchored on the assumption that the private sector is more efficient in managing and controlling an enterprise than the public sector. Gupta, and Svejnar (2008) also identified process as another characteristic of privatization. According to them, privatization involves processes which may include denationalization, decontrol, deregulation and economic liberalization. Privatization is mostly viewed as a means of stimulating efficiency and effectiveness in state-owned enterprises. The process of privatization entails full or partial transfer of state assets to the private sector through sale lease or management contract.

Through privatization, state-owned enterprises are freed of government control and are allowed to compete with other enterprises in the free market. It is often assumed that

by privatization, state-owned enterprises would adopt best business practices that would make them stay afloat and profitable instead of relying on government intervention for their survival.

1.2 Organizational effectiveness

In the light of this, several authors, An et. al(2011),Henry, E. A. (2011) and Siddiqui, A. (2010), have written on the concept of organizational effectiveness on the basis of their perception of the subject matter but this paper simply, views Giti Ashraf (2012)organizational effectiveness as an organization's ability to survive and make progress in its business environment through the attainment of set goals and objectives.

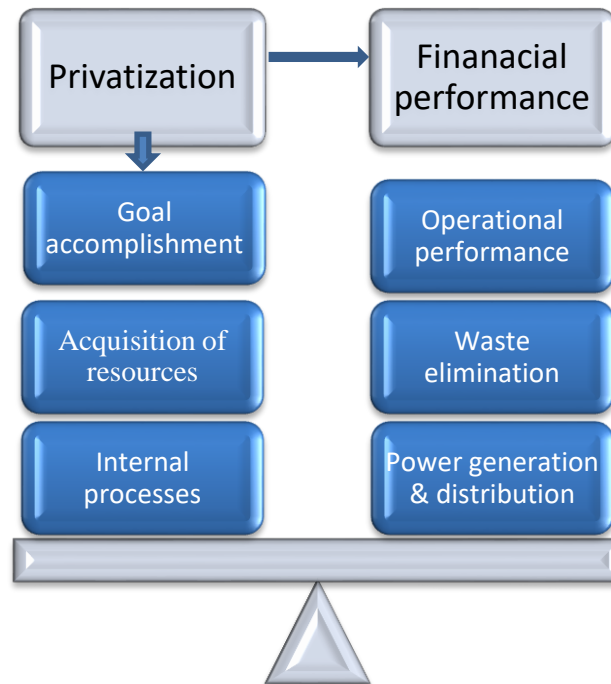
According to Nwankwo (2016), organizational effectiveness as "the extent to which an organization achieves its goals, needs and the objectives of its stakeholders, in order sustains itself over time. Herman and Renz (2004), posited that organizational effectiveness is the relationship between the organizations' outcomes achieved and its planned objectives. The higher productive outcomes refer to more effectively achievable objectives. According to Isoraite (2005), organizational effectiveness is the measurement of the extent to which the objectives or degree to which management can achieve along with control organizational and environmental conditions in order to ensure the availability of products expected by the community. Similarly, Forbes, (2007), organizational effectiveness is an idea of great interest in the nature of dynamism to the degree of relationship between the management and customers.

Besides, it is the ability of an organization to manage its internal operations along with taking benefit from its internal and external environment, acquire scarce resources and exploit them to achieve the objectives of the organization.

However, it can be clarified by giving indicators to managers in order to govern their organizations in the form of multiple scales. Hellriegel (2001) pointed out that the importance of organizational effectiveness lies in being one of the basic indicators used by those interested in the reality of the organization and its future on the organizational ability to perform its tasks in a desirable way to achieve organizational success. Kerr and Leander (2004) indicates that organizational effectiveness is vital for the organization in order to promote the achievement of goals since it is the key to the initiative to succeed by adopting a final measure of a successful initiative. Esfahani et al. (2013), believes that the active organization is when an organization is characterized by the high performance of its workers.

Figure 1

Conceptual model of privatization impact on organizational effectiveness



Source: Made by the author based on the impact of privatization on the organizational effectiveness.

Effects of privatization on effectiveness organization manifest in various measures. Following the intrigues that the concept of organizational effectiveness has generated, its measures have always been in the contest. This is unconnected to the arguments from certain quarters that what constitutes effectiveness in an organization may not likely constitute effectiveness in another organization.

On this, financial performance, operational performance, waste elimination and power generation and distribution and, on the other hand, goal accomplishment, resource acquisition, and internal processes, amongst others have been identified as measures of organizational effectiveness. Still, this study will focus on the financial performance, operational performance, elimination of waste and power generation and distribution as organizational effectiveness measures which will be discussed below.

1.2.1. Privatization impact on financial and operational performance

Some studies that focused on the impact of privatization are of the view that privatization has affected the financial performance of state-owned enterprises positively. Such studies examined the effects of privatization on financial performance of state enterprises. According to Nassar and Oqdeh (2011), privatized enterprises'

financial and operational performance can be evaluated through the measurement of the indicators such as profitability, operational efficiency, capital expenditure, employment level, leverage, dividend pay-out ratio and liquidity.

Profitability

According to Anggraini, & Tanjung, (2020), "Profitability consists of several ratios that measure overall management effectiveness and are shown by the size of the profit gained in relation to sales and investment. The better of the profitability, the level of the company's ability to make a profit will be better."

Gunawan, Y., dan Mayangsari, S. (2015), profitability is the company's ability to generate profits with all the capital working in it, a ratio that shows the company's ability to benefit from the use of its capital".

The ratio used to measure profitability is Return on Assets (ROA), which can be formulated as follows: $ROA = \text{Net income available to common stockholders} / \text{Total Assets}$.

Operational performance

According to Akinrinola, O, (2018), operational efficiency is an important strategic initiative which ensure sustainability of an organisation or dwindle the fortune of a business organisation if not properly addressed.

This could be measured by (a). Sales efficiency (SALEFF) equal to $\text{Sales} / \text{Number of Employees}$. (b). Net Income Efficiency (NIEFF) equal to $\text{Net Income} / \text{Number of Employees}$. (c). Asset turnover (AT) equal to $\text{Sales} / \text{Assets}$.

Capital expenditure

According to Rahayu, S. (2020), Capital expenditures are associated with output and for the acquisition of fixed assets and other assets that provide benefits over one accounting period, including costs for maintaining facilities or infrastructures over a period of time or costs which can increase asset capacity and quality.

The capital expenditures can be measure by the following ratios: (a) Capital Expenditures to Sales (CESA) = $\text{Capital Expenditures} / \text{Sales}$. (b). Capital Expenditures to Total Assets (CETA) = $\text{Capital Expenditures} / \text{Total Assets}$. The current study's capital expenditure is measured by an outlay of cash to acquire or upgrade a business fixed asset.

Employment level

According to Nassar and Oqdeh (2011), the total number of employees (EMPL) is used to measure the employment level.

Leverage

According to Susanti, N, et al, (2021) leverage ratio is the ratio used to measure the extent to which the company's assets are financed with debt. This simply means that the leverage ratio is a ratio used to measure how large the debt burden a company should bear in the order of asset fulfilment. Leverage is measured by (a). Debt to Asset (LEV1) = Total Debt /Total Assets. (b). Long-term Debt to Equity (LEV2) = Long-Term Debt /Equity. (c). the inverse of times interest earned = Interest/Net Income. The inverse of times interest earned ratio is used because many firms do not pay interest; if interest is zero, this ratio's outcome will yield infinity. Since many firms in our sample did not pay interest, and avoid losing observations, this ratio considers interest as a percentage of net income (Interest/Net Income).

Dividend pay-out ratio

According to Subramanyam, (2010), Dividend Payout Ratio (DPR), is a ratio that measures the proportion of net income per one share of ordinary shares paid in the form of dividends. Dividend Payout Ratio is an indicator in measuring dividend policy expressed in per cent (%). The pay-out variable is measured by (a). Dividends to Sales (DIVSAL) = Cash Dividends /Sales. (b). Dividend Pay-out (PAYOUT) = Cash Dividends/Net Income. Liquidity could be defined as the capacity of the company to meet its short-term financial obligations. Continued solvency is a permanent requirement for companies. And

Liquidity

According to Baraja et al, (2019), the liquidity ratio is a ratio that demonstrates the company's ability to fill the short term obligations (debt). This can be divided into three namely: current ratio, quick ratio and cash ratio. Fahmi (2012) states that the Current ratio commonly measures that used for short-term solvency of the ability towards a company to meet up debt needs when due date. And quick Ratio according to Baraja et al, (2019), stated that is the current ratio that shows the company's ability to meet up, pay the obligations or current debt (short-term debt) with a current asset without calculating the available value (inventory). He also added that the Cash Ratio is a tool used to manage how much cash is available to pay currents debts.

Pham (2020) stated that enterprise financial performance could be analysed through the measurement of indicators such as: total assets, total net sales, total expenses, income before tax, total debts, total owner equity, and fixed assets. Pham (2020) applied three (3) key financial indicators to assess the level of operating efficiency, which may include, Profit margin, Return on assets and Return on equity.

Popoola (2016), from his study, agrees that privatization enhances the performance of enterprises and increases profitability. Similarly, is of the view that privatization is the panacea to inefficiency and dismal performance that characterize public enterprises. For privatization brings technical and managerial expertise to the economic sector. It improves operating efficiency and results in a large-scale injection of capital and greater efficiency in using that capital. Privatization increases responsiveness to consumer needs and preferences.

According to Al-Taani (2013), privatization results in some achievements such as; lower cost of doing business, maintenance of a safer capital structure, greater capacity to expand at a rate commensurate with private firm's capacity and demand.

Some other scholars have also posited that privatization leads to a very significant increase in financial performance and operational efficiency. For instance, Miguel (2016) stated that privatization leads to significant profitability, output, operating efficiency, and dividend payments. He also noted that capital expenditures increased significantly in absolute terms after privatization, but not relative to sales while employment declines insignificantly. From Miguel's submission, privatization yields significant performance improvements. Another scholar, Makokha (2015), after examining the pre-and post-privatization financial and operating performance of 208 firms privatized in Pakistan from during the period 1990-2007, noted that privatization has led to improvements in real output and sales efficiency though with the marginal effect of profitability. Thus, from these scholars' views, it could be deduced that privatization can improve the financial and operational performance of public enterprises. The models of privatization impact on financial and operational performance as provided in figure 2.

Figure 2

The impact of privatization on financial and operational performance



Source: compiled by the author based on (Nassar and Oqdeh 2011, Pham 2020, Makokha 2015).

Figure 2, shows that privatization impacts on the efficiency of state-owned enterprises by improving financial and operational efficiency. Operational efficiency measures the sales efficiency, net income efficiency. While the financial efficiency measures how the firm uses its assets to generate revenues. When the operational performance of firm increases, it will reduce working capital spending and this will increase the financial sustainability of the firm. Thus, when there are no improvements on financial and operational performance after privatization, the privatization process is said to have yielded no benefits. Financial performance can be ascertained through the measurement of some indicators such as profitability can be measured by return on sales, return on assets, return on equity, expenditure, etc. on the other hand, operational efficiency can be measured by the sale efficiency, net income and asset turnover.

In conclusion, the findings of scholars on the impact of privatization on financial and operational performance of state-owned enterprises are mixed. Some are of the view that privatization has significant positive impact on performance of organizations while others are of the view that it has marginal or no significant positive impact on operational performance. In assessing the impact of privatization on financial and operational performance of state-owned enterprises most studies measured some financial and operational performance indicators. Privatization was considered to have

positive impact on the efficiency of state-owned enterprises when the measured financial and operational performance indicators are positive.

1.2.2. Elimination of wastages in public enterprises

One of the major motives for privatizing state-owned enterprises is to eliminate wastages associated with public enterprises. The study of Nwali et al. (2019) reveals that privatization helps governments eliminate waste in public enterprises. Muhammad (2015) also stated that privatization leads to a reduction in budget deficits and the elimination of wastes associated with public enterprises. According to Hargrave (2020), a major factor in privatization is to reduce the large size of the existing government interests characterized by unnecessary layers of bureaucracy. He also noted that by shrinking the public sector's size, total expenditure is reduced while government revenue is increased through tax generated from the privatized enterprises.

Poole (1996) also stated that privatization helps government to generate fund and thereby reduced the endemic cycle of over-borrowing in order raise fund to revitalize public enterprises and also reduced the national debt.

Mwangi (2014) stated that privatization can eliminate corruption and indiscipline, which has resulted in resource wastages in public enterprises.

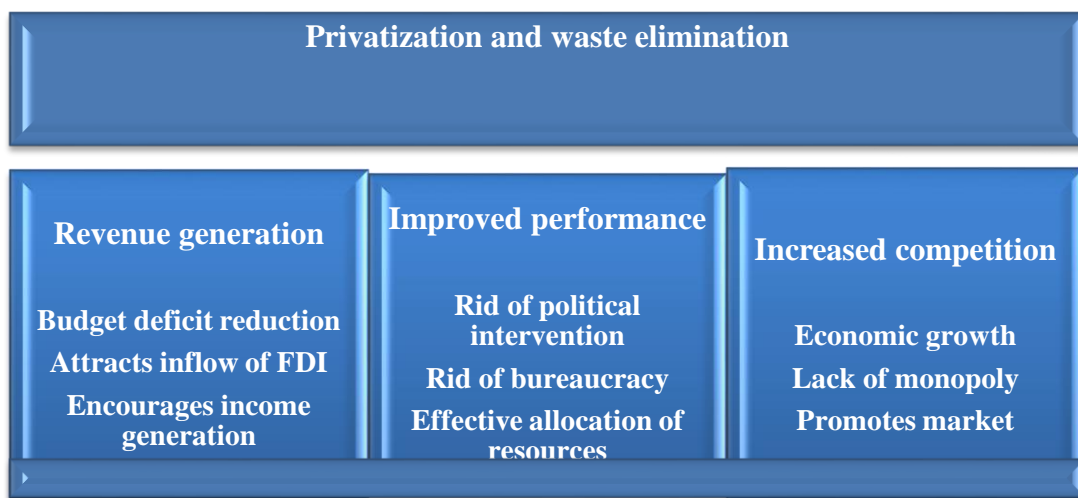
According to Mwangi (2014), privatized enterprises are motivated by reward and have the ability to allocate scarce resources effectively, unlike the public sector that is riddled with inefficiency and seldom has economic goals. According to Amo and Gyamerah (2016), when public and private sectors are compared in terms of the cost of producing similar output, the private sector outperforms the public sector. They further noted that many public enterprises operate in competition with the private sector enterprises, and many of them have been seen to have incurred huge losses and debts and have earned records that are poorer than the private sector. Hence, privatization is considered a paradigm shift to improve efficiency.

For Aminu and Peterside (2014), privatization eliminates corruption, nepotism, gross indiscipline, which has led to the colossal wastage of public resources in the public enterprises in Nigeria. Asaolu (2015) also noted that, qualified employees are often not recruited in the public enterprises in Nigeria due to parochial considerations such as ethnicity, religion, godfatherism, political affiliation, etc., thereby leading to a significant level of inefficiency and resource wastage. Asaolu further noted that in most public enterprises, employees are in excess as politicians give jobs indiscriminately to

their supporters even when the enterprises are under-performing. Furthermore, Musoke (2008) noted that the transitional nature of government gives room for unaccountability and mismanagement of public enterprises. Every government that comes in power starts afresh to reposition the public sector. Privatization is, therefore, considered by these authors as a viable means of eliminating the wastages that are associated with public enterprises. (See figure 3).

Figure 3

Model of privatization and elimination of wastage



Source: compiled by the author based on Nwali et al.2019, Muhammad 2015, Hargrave 2020, Mwangi 2014, Amo & Gyamerah 2016).

Privatization eliminates waste, monopoly and allows private companies to participate in economic activities democratically. It encourages Revenue generation, improved performance and increased competition.

Companies being owned by government enjoy monopoly and remain unconcerned by competition in the market while Privatization allows private sectors to be actively involved in the market and encourages competition.

Several governments have resorted to privatization in the past for revenue generation especially when faced with fiscal crisis.

Privatization encourages market dynamism. The economy is liberated from state control. The market is allowed to operate organically from government interference.

Since private companies are profit - oriented, unnecessary bureaucratic elements are eliminated. Companies assess their employees based on performance and performances are adequately incentivized.

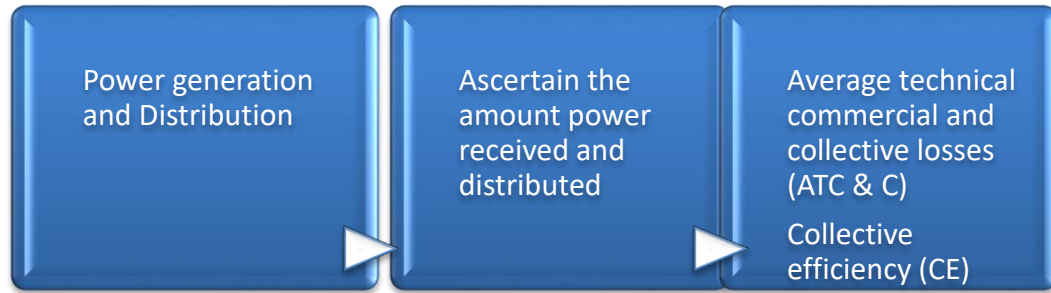
1.3. Privatization impact on power generation and distribution

Olalere (2014), in his study, conducted a year after the consummation of the electricity sector in Nigeria, measured the electricity generation capacity of power generation companies in Nigeria and compared to the pre privatization status. From his finding he noted that only marginal improvements were made. He was however, optimistic that privatization would bring out tremendous improvements in the power sector in Nigeria. According to Akanonu (2019), measured the power distribution capacity of the Enugu and Port Harcourt Electricity Distributions Companies, from his finding, the distribution companies were able to attain optimal distribution of the generated electrical power in these areas. Akanonu also measured the power generation capacity of the electric power generation companies. His findings revealed that five years after privatization, operational generation capacity has dropped by 33 percent, and only 23 percent of the cost of power supply production is recovered, and revenue has fallen by 85 percent. He attributed the cause of the poor performance of PHCN successor companies to include flawed privatization model, low electricity pricing, gas supply shortage, and liquidity crisis.

Adekitan, Ajike and Okoro (2016) examined the service quality of the privatized Enugu Electricity Distribution Company and from their study, found that the privatization of the Power Sector in Nigeria has brought about an improvement in service delivery in the Enugu Electricity Distribution Company in terms of power supply, prompt rectification of electricity faults and customer's attention. They also noted that although the privatization of Power Sector has brought about increased wages, it is marred by loss of employment, intimidation of workers, casualization of workforce, etc. they further stated that the privatization in power sector has led to improved conditions of service, regular staff training and development, which are indicative of worker's advancement and their increased productivity.

Figure 4

Privatization and power generation and distribution



Source: compiled by the author based on (Olalere 2014, Akanonu, 2019, Adekitan et al., 2016)

From fig. 4, privatization can be said to have positive impact on power generation if it results in increase in power generation, and increase in the number of megawatts transmitted to the distribution companies (DISCOs). Also, privatization can be said to impact on power distribution positively if it amounts of power generated and transmitted from the generating companies (GENCOs) are optimally distributed to consumers and if there is increase in the number of households connected to the power distribution grid.

Empirical evidence of privatization impact on organizational efficiency of state-owned enterprises

The popular assumption that privatization fosters performance effectiveness state-owned enterprises has informed the quest of many scholars across the globe to find the relationship between privatization and performance effectiveness. Jumare (2015) studied the effect of privatization on the financial performance of state-owned enterprises using the Nigerian Brewery as his case study. His findings revealed that privatized enterprises showed every sign of improved financial performance but were caught unawares by the global economic meltdown that crept in silently and heightened in the years 2008 and 2009.

Similarly, Ntiri (2016) studied the impact of privatization on the financial performance of privatized state-owned enterprises in Ghana. The results obtained from the study show that, on average, there are no significant improvements in the financial performance indicators after the privatization, even though there are significant improvements in income efficiency in two Ghanaian firms. Such improvements were due to higher exchange rates from the US dollar to cedis and employment reduction,

respectively. This research contradicts with most of the earlier empirical studies in developed and developing countries, but it supports some studies (Caves and Christenson, 1980), and (Boardman and Vining, 1989).

Miguel (2016) carried out a study to determine the impact of privatization on REN's financial performance. His findings indicate that, in the short-term, privatization had only a significant or positive impact on the increase of the Total Assets value and subsequently, a significant decrease in the Asset Turnover Ratio. Concerning the remaining ratios associated with REN's financial performance, none of them suffered any significant effect despite some indicators' slight improvements.

Pham and Nguyen (2019) studied the differences in enterprises' financial performance before and after privatization in order to find out the influence of privatization on the state enterprises' performance. His finding revealed that the proportion of state ownership, economic growth, operating period, enterprise's size, and business risk have a positive influence on the financial performance of research firms. However, the leverage of the privatized firms has a negative impact on the financial performance. In accordance with the obtained results, his study suggests that the privatization process should be continued regardless of firm size or business type.

In the same vein, Tari, Mohammadi, Shakeri, and Fadavi (2017) examined the effect of privatization on the financial performance of the banking sector, comparing the performance of privatized banks in terms of profitability before and after privatization. Their findings revealed that Privatization has a positive and significant effect on profitability indicators. The performance of privatized banks in terms of profitability has improved after privatization. The private banks have relatively similar performance to privatized banks, and privatized banks have better performance than state banks in their profitability indices.

Musoke (2008) assessed the effects of privatization on the operational performance of Uganda Commercial Bank, now Stanbic Bank. He found that by privatization, the bank's mission, which was to give the indigenous Africans access to banking services and promote economic development through the provision of small business loans to rural dwellers was abandoned after privatization as the bank's services after privatization were more expensive to be accessed by many local people. He further noted that the bank in its bid to reach the local people it was intended to serve; carried expansion of its branch network beyond what was profitable and sustainable.

Nwali et al (2019) studied the impact of privatization on the elimination of waste. Their study found that privatization eliminated some that characterize public enterprises in Nigeria such as over bloated budgets, over staffing, low employee output, and resource mismanagement. They also found that privatization was able to eliminate layers of bureaucracy that often result to waste of time in production or service delivery.

Amo and Gyamerah (2016) also investigated the impact of privatization on production cost. Results from their study indicate that some wastage associated with production was successfully eliminated by privatization thereby leading to minimized cost of production. In a similar vein, Nwangi (2014) studied the effect of privatization on wastage minimization. His study found that wastages associated with corrupt leadership and management of public enterprises were significantly reduced by privatization.

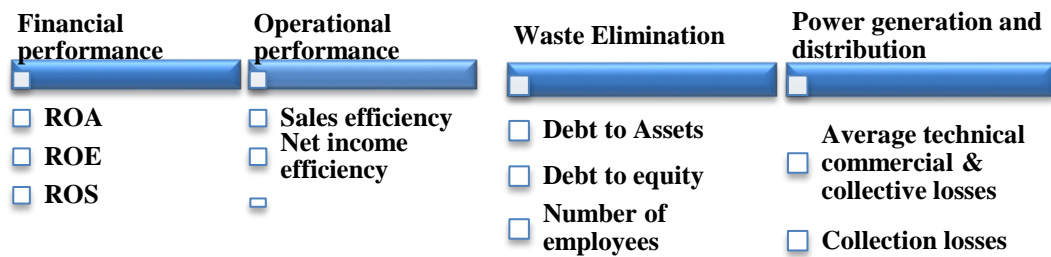
Subair and Oke (2018) investigated the impact of privatization on power generation and distribution in Nigeria through a comparative analysis. They found that privatization repositioned the power sector for a more effective performance noting that significant increase in power generation and distribution has been recorded since the full privatization of the power sector.

Adedeji (2017) studied the impact of privatization on the power generation and distribution in Nigeria. His findings reveal that privatization has yielded little or no benefit in terms of power generation and distribution. According to him, in the course of the privatization process, the Nigerian Government was more interested in selling off national assets such as the Power Holding Company of Nigeria without any resolve to put an effective regulatory framework in place in order to ensure better service delivery. He also noted that the 11 successor electricity distribution companies that emerged from the privation of the PHCN have blamed their poor performance on factors exogenous to them such as the moribund facilities acquired from the PHCN.

Aminu and Perterside (2014) also examined the impact of privatization on electric power generation and distribution in Nigeria through a comparative study. The results from their investigation revealed that privatization has not brought about any significant increase in power generation and distribution. They further noted that Nigeria through its privatization of the power sector has succeeded in entrusting the collective wealth of the people from the hands of few elites, and that retrenchment of workers and high electricity tariff were the major consequences of taxation.

Figure 5

The empirical evidence of privatization impact on organizational efficiency



Source: compiled by the author based on Jumare, 2015, Manyaga, & sewe. 2016, Ntiri.2016, Miguel 2016, Al-Tan 2015, Pham & Nguyen 2019, Nwali et al, 2019, Subair & Oke 2018, Adedeji 2017)

From the figure, the empirical evidence of impact on organizational efficiency could be viewed into four parts namely financial performance, operational performance, waste elimination and power generation and distribution (see table 1).

Table 1
Empirical evidence of privatization impact on organizational efficiency of state-owned enterprises

Variables	Sectors and Country	Author and year	Method employed	Findings
Financial performance	Nigeria brewery	Jumare (2015)	Regression analysis	Impacted positively
	Banking sector (Ghana)	Ntiri (2016)	Wilcoxon signed rank test	Positively impacted
	REN sector (Ghana)	Miguel (2016)	Regression	positively
	Vietnam SOEs	Pham and Nguyen (2019)	Regression analysis	Positively impacted
Operational performance(efficiency)	Banking sector (Uganda)	Musoke (2018)	Wilcoxon signed rank test	Positively impacted
Waste elimination	Public sector (Nigeria)	Nwali et al (2019)	Regression analysis	Positive and significant
	Cocoa processing company (CPC) (Ghana)	Amo and Gyamerah (2016)	Comparative study	Negatively impacted
Power generation and distribution	PHCN (Nigeria)	Subair and Oke (2018)	Comparative Analysis	Significant increase
	PHCN	Adedeji (2017)	Comparative Analysis	Negatively impacted
	PHCN	Aminu and Perterside (2014)	Comparative Analysis	Negatively impacted

Source: compiled by the author based on Jumare (2015), Ntiri (2016), Miguel (2016), Pham and Nguyen (2019), Musoke (2018),Nwali et al (2019), Amo and Gyamerah (2016), Subair and Oke (2018), Adedeji (2017) and Aminu and Perterside (2014).

From the reviewed studies, it could be seen that the position of scholars is mixed. Some consider privation has been beneficial while others did not see any benefits resulting from privatization. Hence, this study is intended to come out with its position on how privatization has impacted on the effectiveness state-owned enterprises in terms of

financial performance, operational performance, organizational efficiency, waste elimination and power generation and distribution.

2. THE METHODOLOGY EVALUATION OF THE IMPACT OF PRIVATIZATION ON THE EFFICIENCY OF STATE-OWNED ENTERPRISES

This section deals with the methods and strategy for data collection. The method and instruments of research are to aid the data analysis procedure. The study shall examine the impact of privatization of state-owned enterprises using explanatory study, follows quantitative design in collecting and analyzing data on the performance of the privatized firms on profitability, operational performance, waste elimination and power generation and distribution using the quarterly financial report of firms for the post-privatized firm (2008-2012) and pre-privatization period for (2014-2018) and privatization starts in 2013. Also a regression analysis was done using the percentage of state-ownership as the factor to capture the privatization

2.1 The Aim, Model and hypothesis of the research

The aim of the study is to determine the impact of privatization on the efficiency of State-owned enterprise and the objectives are: Based on empirical analysis to identify the effect of privatization on power generation and distribution capacity of successor companies of PHCN.

To carry out an empirical quantitative study on the impact of privatization on the efficiency of state-owned enterprises.

2.1.1 Research Variables

The variables used in this study are as follows.

I. Financial performance: The financial performance variables which are ROA, ROE and ROE used to access financial performance which is to assess the firm's ability to generate profit relating it with other financial features such as equity, assets, or expenses. These are used to compare the firm's results concerning other competitor and also determine whether the company is profitable over the year of operations. The following ratios are to be measured.

Return on Sales (ROS); this measures the company efficiency in generating operating profits from the sales which is given as

$$ROS = \text{Total income before tax} / \text{Total sales} \quad (1)$$

Return on Asset (ROA); shows how company is using assets to generate profit. And this gives investors' confidence on how effectively a firm is converting its assets into net income. A higher percentage shows the firm is earning more money on less investment, the mathematical equation for ROA is given as:

$$ROA = \text{Total income before tax} / \text{Total asset} \quad (2)$$

Return on Equity (ROE): Measure how much operating profit a company can make with shareholder's funds, and how effectively shareholders' funds are utilized.

$$ROE = \text{Total income before tax} / \text{Total equity} \quad (3)$$

II. Operational performance this allows the firms to ensure its operational performance within in its area of operation in order to boost production efficiency. The following operational performance were measured as the factors.

$$\text{Sales Efficiency (SELEFF)} = \text{Sales} / \text{Number of Employees} \quad (4)$$

$$\text{Income Efficiency} = \text{Net Income} / \text{Number of Employees} \quad (5)$$

III. Waste elimination includes the following indicators

$$\text{Debt to Asset (DTA)} = \text{Total debt} / \text{Total Assets} \quad (6)$$

$$\text{Debt to Equity (DTE)} = \text{Term Debt} / \text{Equity} \quad (7)$$

$$\text{Number of employees (NE)} = \text{Number of employees} \quad (8)$$

IV. Power generation and Distributions (Average Technical, Commercial & Collection losses (ATC&C), Collection Efficiency (CE) = *The amount of power generated and distributed to consumers* (9)

All these factors and indicators mentioned above will be used in the paper to determine the impact privatization on the efficiency of state-owned enterprises. All these factors and indicators mentioned above will be used in the paper to determine the impact privatization on the efficiency of state-owned enterprises.

Summary of Research variables drawn up for the purpose of this study include: (1) financial performance (2) Operational Efficiency (3) waste elimination (4) Power generation and distribution. (See table 2)

Table 2**Performance Measures: and Expected Changes**

Performance Measure	Expected Change
Financial Performance	
Return on Assets (ROA)	Increase
Return on Sales (ROS)	Increase
Return on Equity (ROE)	Increase
Operational Efficiency	
Sales Efficiency (SALEFF)	Increase
Net Income Efficiency(NIEFF)	Increase
Waste Elimination	
Debt to Assets (LEV1)	Decrease
Debt to Equity (LEV2)	Decrease
Employees	Decrease
Power generation and distribution	
Power generation and distribution capacity	Increase

Source: Megginson et al. (1994) as cited in Mwangi (2014)

2.1.2 The models considered in this study are as follows**Proportional Test Models**

The proportional tests were used to determine whether the proportion of firms experiencing changes in a given direction is greater than what would be expected by chance. A proportional method used by Mohammed (2004) to calculate the absolute and relative change in mean performance for firm, and the post-privatization performance relative to the pre-privatization for firm was used in this study to ascertain whether there was change in mean of the two companies before and after privatization.

And the formulas for the two models are as follows:

$$APC = P_{i,t} - P_{i,t-1}, \quad RPC = (P_{i,t} - P_{i,t-1}) / P_{i,t-1} \quad (10)$$

Where

APC = the absolute performance change

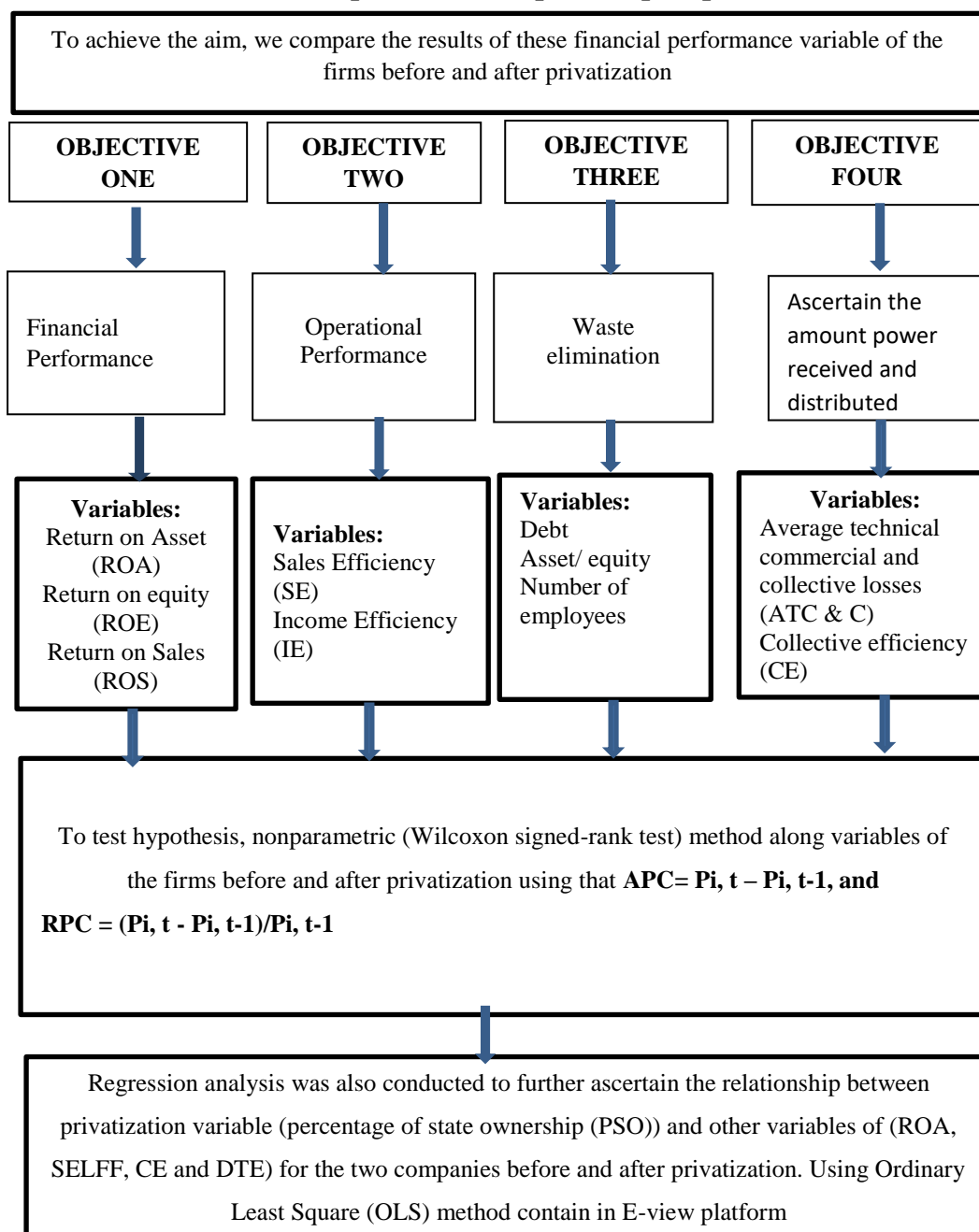
RPC = the relative performance change

P_{i,t} = the mean performance in the post-privatization period, and

P_{i,t-1} = the mean performance in the pre-privatization period

Figure 6

Scheme of research: Comparison of the pre and post privatization



Source: Made by the author

Results from the test will show if there were change in performance in the firm under study after privatization. This will provide some clues on the pattern of privatization induced changes if there were any.

The decision rule in propotional test are as follows

I.If APC is positive, then there is increase in performance variables considered, which in this case means that privatization improves the performance with respect to the variable being considered.

II. when APC is negative, decrease in performance variable,(privatization hindered performance as concerned the variable).

when APC is zero, no change in performance variable considered, (privatization has no effect on performance as concerned the variable being considered

IV.If $RPC > 1$, the change in performance observed is greater that the initial performance relative to initial performance variable considered.

V. $RPC < 1$, is less than the initial performace recorded relative to the same initial performance

And when is equal to 1, is equal to initial performance.

Wilcoxon sign-rank test

Wilcoxon sign-rank test will be used in testing for significant changes in the variables. According to Kaur, A. (2015), Wilcoxon signed-rank test is a non-parametric statistical test used when comparing two samples that are related, or repeated measurements on a single sample to assess whether there is significant difference between two data sample particularly when the data samples cannot be assumed to be normally distributed. The procedure tests whether the average difference in variable values between pre and post–privatization samples is zero. Write how you interpret the results of this test.

In this study Wilcoxon test was used to ascertain whether there is significant difference between the mean values of the performance variables before and after privatization. This was done to confirm whether privatization of these firms matters or not.

The decision rule for Wilcoxon sign-rank test is as follows

If the p-value is greater than 0.05 then, there is no significant difference between the means of the two data sets considered, thus null hypothesis will be accepted and alternate hypothesis rejected. And if p-value is less than 0.05 then, there is significant difference between the means of the two data sets, thus null hypothesis will be rejected and alternate hypothesis accepted

Ordinary Least Square Analysis

The regression was conducted to ascertain the nature of relationship between privatization captured using percentages of state ownership (PSO) as independent variable and selected variables of financial performance (Return on Assets (ROA)), organizational performance (Sales Efficiency SELEFF), waste elimination (debt to asset ratio DTA) and power generation efficiency (collection efficiency (CE) as dependent variables. The regression models will be of the form

$$Y = F(X) + C$$

Where y represents the dependent variables and x is the independent variable

In this case, y represents financial performance, operational performance (Sales Efficiency SELEFF), waste elimination (debt to asset ratio DTA) and power generation efficiency (collection efficiency (CE), x is the percentage of state ownership and C is the constant, Because the privatization of the companies are still in the early stage and the data required to have a good regression model will be insufficient on yearly basis, quarterly data was used for the regression in order to have enough data for the regression.

In order to confirm that privatization processes actually cause change in performance of the firm, ordinary least square (OLS) regression was used to model the relation between privatization variable and performance variables of the two firms before and after privatization. Percentage of State ownership (PSO) is used to capture the effect of privatization as independent variable while the four variables mentioned are used to capture the financial efficiency, operational efficiency, waste elimination and Power distribution efficiency respectively. And also to ascertain the relation between privatization variable and performance variables of the two firms before and after privatization using the percentage of the state-ownership.

According to Wei et.al (2003) large percentage of the state ownership leads to less efficiency because of the debt removal, etc. Similarly, Chu et al, (2015), firms with state ownership of less than 50 percent have greater financial performance than others. Therefore when the coefficient is negative it means there is inverse relationship and if the coefficient is positive, it means there is direct relationship. It actually protrude that increasing the percentage of state-ownership the ROA will decrease which means the more you reduce the privatization the more the financial performance increases which

actually mean that privatization helped increase the ROA which is financial performance indicator

Diagnostic test on regression analysis were also conducted and they include; Normality test, Linearity test, Stability test, Auto-Correlation Test and Heteroskedasticity Test;

Normality test, when p-value in histogram chart is greater than 0.05 the data set is normally distributed and if less than 0.05 is not normally distributed.

Linearity test if T-stats and F-stats of the Ramsey RESET Test is greater than 0.05 the relationship between the variables is linear and if less than 0.05 the relationship between the variables is not linear

Auto-Correlation Test; the F-stats and R-square value of the Breusch-Godfrey Serial Correlation LM Test is greater than 0.05 then there is no problem of serial correlation between the variables considered, when less than 0.05, there is problem of serial correlation between the variables.

Heteroskedasticity Test If the F-stats and R-square value of the Breusch-Pagan-Godfrey test is greater than 0.05 there is no problem of Heteroskedasticity between the variables and if less than 0.05 there is problem of Heteroskedasticity between the variables considered

2.2. Organization and Instrument of the research

The organization considered in this study is electricity generation and distribution companies that succeeded the Power holding company of Nigeria in October 2013. The name of these companies is presented in annexes and they comprise of one (1) electricity generation company (GENCOs) and one (1) electricity distribution company (DISCOs).

Electricity generation in Nigeria was established in 1896 but the first electric utility company was the Nigerian Electricity Supply Company, which was established in 1929. In 2000, a state-owned monopoly, the National Electric Power Authority (NEPA), was in charge of the generation, transmission, and distribution of electric power in Nigeria. Reform of the electricity sector started with the promulgation of the National Electric Power Policy in 2001 for an efficient electricity market in the country.

In 2005, the Power Holding Company of Nigeria (PHCN) was formed as a transitional corporation that comprises 16 successor companies (5 generation

companies, 11 distribution companies, and 1 transmission company) created from NEPA.

In October 2013, the privatization of all generation and 10 distribution companies was completed with the Federal Government retaining the ownership of the transmission company, and privatization was completed in October 2014

Two major research instruments were used in this study and they are the Statistical Package for Social Sciences version 10 (SPSS) and E-view version 10. The SPSS was used to carry out the proportion tests (APC and RPC) and Wilcoxon rank test while E-view was used to carry out the regression analysis.

2.3. Selection of Respondents and sample characteristics

Since the data used in this study is purely secondary data obtained from the financial report of the companies considered, there was no need for respondents. However, Out of the 16 electricity companies that constitute the study population of this study, 2 companies were purposively selected. Therefore, the financial report of the selected companies was studied and evaluated in line with the aim and objectives of the research.

Since we purposively sampled two companies and the quarterly data of the companies were collected five years before privatization (2008-2012) and five year after privatization (2014-2018), it means that we have twenty data samples before privatization and twenty after privatization thus the sample size of the research is 40.

Moreover, since the objective of the research is to provide detailed information pertaining to the impact of privatization on the efficiency of privatized state-owned enterprises, the necessary precondition for the inclusion into the research sample is that firms to be involved in the research must have originally been configured as state-owned enterprises and were subsequently privatised. A second qualifying criterion for inclusion of firms in the research sample was the availability of financial statement data for the period under review.

The validity of the obtained data was ascertained from the data documented by the Nigerian Electricity Regulation Commission (NERC) on the performance of the electricity firms involved in the study.

Limitation of the research

The scope research is considered limited to sufficiently serve for the appraisal of the impact of privatization. The constrain to the study is the difficulty in assessing information on privatised SOE's some of the information on the firm before and after privatization was not fully listed only two firm was fully listed in the Nigerian Stock exchange.

Moreover, the use of two out of sixteen energy firms that were privatized may not be very sufficient for evaluating the impact of privatization of the power sector as these firms. Furthermore, the use of the immediate five-year post privatization may not be also sufficient as some of the firm have the long term plans. Thus, the findings of the research are valid to the extent that these limitations allow.

3. THE EMPIRICAL RESULTS ANALYSIS OF THE IMPACT OF PRIVATIZATION ON THE EFFICIENCY OF STATE-OWNED ENTERPRISES

The section contained four subsections that covered each of the tests that are contained in the methodology and they include Proportional test results, Wilcoxon test results. Regression analysis test results and pre and post diagnostic test results for two power distribution companies and the data covered five year pre and post privatization program in this company excluding year 2013 which is the privatization year.

3.1 Proportional Test Results

The proportional tests were employed to determine whether the proportion of firms experiencing changes in a given direction is greater than what would be expected by chance using APC and RPC models.

Table 3 and table 4 are tables of the proportional test results for the company A and B respectively.

Table3**Proportional Test results for Company A**

Variables	Proxies	Mean(before Privatization)	Mean(after privatization)	APC	RPC	Decision
Financial Performance	ROS	0.0184	0.0325	0.0141	0.7663	Privatization increased ROS
	ROA	0.0259	0.0611	0.0352	1.3590	Privatization increased ROA
	ROE	0.0901	0.1364	0.0463	0.5138	Privatization increased ROE
Operational performance	SELEFF	120.0676	160.8322	40.7646	0.3948	Privatization increased SELEFF
	INEFF	320.6714	360.4696	30.7982	0.1163	Privatization increased INEFF
Waste elimination	DTA	0.0207	0.0134	-0.0037	-0.73527	Privatization reduced DTA
	DTE	0.0299	0.0191	-0.0108	-0.36125	Privatization reduced DTA
	NE	2344.00	2179.00	-165.00	-0.0704	Privatization reduced NE
Power generation and Distribution	ATC&C losses %	38.800	32.200	-6.600	-0.1701	Privatization reduced ATC&C
	CE	32.200	34.800	2.600	0.0807	Privatization reduced CE

Source: Researcher's analysis using Spss

Table 4:**Proportional Test Results for Company B**

Variables	Proxies	Mean(before Privatization)	Mean(after privatization)	APC	RPC	Decision
Financial Performance	ROS	0.0136	0.0221	0.0085	0.6250	Privatization increased ROS
	ROA	0.0209	0.0596	0.0387	1.8517	Privatization increased ROA
	ROE	0.1368	0.1526	0.0158	0.1155	Privatization increased ROE
Operational performance	SELEFF	120.2668	190.9756	70.7088	0.6284	Privatization increased SELEFF
	INEFF	260.8670	300.6696	30.8026	0.1415	Privatization increased INEFF
Waste elimination	DTA	0.0227	0.0193	-0.0034	-0.1459	Privatization reduced DTA
	DTE	0.0222	0.0176	-0.0046	-0.2072	Privatization reduced DTA
	NE	2092.00	2110.00	10.00	0.0086	Privatization increased NE
Power generation and Distribution	ATC&C losses (%)	38.800	32.200	-6.600	-0.1701	Privatization reduced ATC&C
	CE	32.200	34.800	2.600	0.0807	Privatization reduced CE

Source: Researcher's analysis using Spss

Financial Performance: These results in Table 3 and table 4 revealed that privatization resulted to increase in financial performance for company A and company A. These results are as expected because one of the main reasons for privatization of state-owned enterprises is to improve the financial and other monetary activities of the companies which will, in turn, increase their financial prowess. These results concurred with theories of Miguel (2016) who stated that privatization leads to increased profitability, output, operating efficiency, and dividend payments.

Operational Performance: The results in 3 and 4 also revealed that privatization of these two state-owned power companies increased their operational performance which is also as expected because another reasons for privatization is also to increase operations and activities of the companies which will be translated to increase operational performance of the firm. These results concurred with results of the study by Ntiri (2016) on the impact of privatization on financial and operational performance of privatized state-owned enterprises in Ghana. The results obtained from the study show that, on average, that privatization increases operational performance for two Ghanaian firms.

Waste elimination: in similar manner the tables 3 and 4 also revealed that privatization reduced waste involve in operation and funding of the two power generation companies. This is also as expected because it is supposed that privatization will help to reduce unnecessary borrowing and excess number of workers in the two power generation companies. This work concurred with study by Nwali et al (2019) on the impact of privatization on the elimination of waste in which they found that privatization eliminated some public enterprises waste in Nigeria such as over bloated budgets, excessive staffing, low employee output, and resource mismanagement.

Power Generation and Distribution: finally, the results in table 3 and 4 also revealed that privatization of the two companies A and B increased power generation and reduce power distribution losses. This is also as expected because it is believed and supposed that privatization these two power generation firms would increase and improve the operational activities in the companies which will, in turn, increase the power generation and lower distribution losses. This study disagrees with work of Adedeji (2017) who studied the impact of privatization on the power generation and distribution in Nigeria. His findings reveal that privatization has not improved power generation and distribution. According to him, in the course of the privatization process, the

Nigerian Government was more interested in selling off national assets such as Power Holding Company of Nigeria without any resolve to put effective regulatory framework in place to ensure better service delivery

However, the proportional test results are not enough because they did not explain whether this increase or decrease in these variables is significant or not. This inadequacy in proportional test results informed of the need for further test, thus Wilcoxon Rank test.

3.2 Wilcoxon Rank Test Results

Wilcoxon test was employed to ascertain whether there is significant difference between the mean values of the performance variables before and after privatization.

Table 5 and 6 are tables of the proportional test results for the company A and B respectively

Table 5

Wilcoxon Rank Test results for company A

Variables	Proxies	Z-statistics	Wilcoxon test coefficient	Decision
Financial Performance	ROS	-2.023	0.043	Accept alternative hypothesis that privatization matters
	ROA	-0.944	0.345	Accept null hypothesis that privatization does not matters
	ROE	-0.944	0.345	Accept null hypothesis that privatization does not matters
Operational performance	SELEFF	-1.753	0.045	Accept alternative hypothesis that privatization matters
	INEFF	-2.023	0.043	Accept alternative hypothesis that privatization matters
Waste elimination	DTA	-1.483	0.138	Accept null hypothesis that privatization does not matters
	DTE	-1.753	0.080	Accept null hypothesis that privatization does not matters
	NE	-2.023	0.043	Accept alternative hypothesis that privatization matters
Power generation and Distribution	ATC&C losses %	-1.841	0.066	Accept null hypothesis that privatization does not matters
	CE	-1.841	0.066	Accept null hypothesis that privatization does not matters

Source: Researcher’s analysis using Spss

Table 6

Wilcoxon Rank Test results for company B

Variables	Proxies	Z-statistics	Wilcoxon test coefficient	Decision
Financial Performance	ROS	-2.023	0.080	Accept null hypothesis that privatization does not matters
	ROA	-0.944	0.345	Accept null hypothesis that privatization does not matters
	ROE	-0.944	0.345	Accept null hypothesis that privatization does not matters
Operational performance	SELEFF	-2.023	0.043	Accept alternative hypothesis that privatization matters
	INEFF	-2.023	0.080	Accept null hypothesis that privatization does not matters
Waste elimination	DTA	-1.483 ^b	0.043	Accept alternative hypothesis that privatization matters
	DTE	-1.753	0.138	Accept null hypothesis that privatization does not matters
	NE	-2.023	0.686	Accept null hypothesis that privatization does not matters
Power generation and Distribution	ATC&C losses(%)	-1.841	0.066	Accept null hypothesis that privatization does not matters
	CE	-1.841	0.066	Accept null hypothesis that privatization does not matters

Source: Researcher’s analysis using Spss

Financial Performance: The results in table 5 and 6 for company A and company B respectively revealed that positive change reported by the proportional test for financial performance are not significant except for ROS. This means that privatization has no appreciable or notable impact on ROA and ROE but only on ROS. This is probably because the privatization program is in its early stage and some of the financial terms and condition integrated into the privatization program have not being fully implemented. However these results are not as expected because it is expected that privatization will impact on all the proxies of financial performance of the companies

These results concurred directly with results of Ntiri (2016) who studied the impact of privatization on the financial performance of privatized state-owned enterprises in Ghana. The results obtained from the study show that, on average, there are no significant improvements in the financial performance indicators after the privatization, and also empirical work of Gyamerah (2016) who investigated the privatization impact on the financial performance of Cocoa Processing Limited (CPL) and found that the privatization process in CP has resulted in no significant financial performance changes in achieving the objectives of privatization.

This results concurred with work of Makokha (2015) who conducted empirical studies to examine the pre-and post-privatization impacts on financial and operating performance for 208 firms privatized in Pakistan during the period 1990-2007, He noticed that privatization has led to improvements in return on sales, but do not align with this part of the results that privatization has marginal significant effect of profitability factor like ROE and ROA. Therefore, from these observed results, it could be deduced that privatization can improve the financial of public enterprises but its improvement is not significant, this results also disagree with theories of Miguel (2016) who stated that privatization leads to significant profitability, output and dividend payments.

Operational Performance: The results in table 5 for company A revealed that the positive change reported in the proportional test in table 3 is significant for both proxies of operational performance. This means that privatization has notable impact in operational performance of company A, which is as expected because one of the main reasons for privatization is to appreciably increase operational performance of the firms. As for company B results presented in table 6, it was revealed that privation significantly improved Sales efficiency (SELEFF) but not for income efficiency

(INEFF) which is not as expected because privatization is supposed to significantly improve all aspect of operational performance. .

These results above aligned with empirical work Ntiri (2016) on the impact of privatization on the financial and operational performance of privatized state-owned enterprises in Ghana. The results obtained from the study show that, on average, there are significant improvements in income efficiency (operational performance) in two Ghanaian firms. These results disagreed with empirical work of Al-Tan (2015) who researched on the impact of privatization on the financial and operational performance of Jordanian Cement Factories. His study revealed the privatization did not significantly affect Jordanian Cement Factories' operating performance

Waste Elimination: the results from table 5 revealed that the reduction in waste in company A" as reported in proportional test is not significant except for number of employees (NE) while for company B" the results from table 6 revealed the reduction in waste as reported in proportional test results is not significant except for Debt to Assets. These results are not as expected because it is supposed that privatization is meant to appreciably reduce waste of the companies in all aspects.

These results concurred with empirical studies of Nwali et al (2019) on the impact of privatization on the elimination of waste in which they found that privatization eliminated some public enterprises waste in Nigeria such as over bloated budgets, over staffing, low employee output, and resource mismanagement. They also found that privatization was able to eliminate layers of bureaucracy that often result to waste of time in production or service delivery and also Nwangi (2014) studies on the effect of privatization on wastage minimization in which they found that wastages associated with corrupt leadership and management of public enterprises were significantly reduced by privatization. The results also aligned with work of Amo and Gyamerah (2016) who investigated the impact of privatization on production cost and their results indicated that some wastage associated with production was successfully eliminated by privatization thereby leading to minimized cost of production.

Power Generation and Distribution: The results revealed in table 5 and 6 for company A and B that, though privatization reduced power generation loses and increased power collection efficiency in the company as reported by proportional test results, but these change was not significant. These results are also not as expected

being that privatization of power stations is supposed to appreciably reduced power generation losses and improve collection efficiency.

These empirical results above align with Adedeji (2017) who studied the impact of privatization on the power generation and distribution in Nigeria. His findings reveal that privatization has not produced significant impact on power generation and distribution. According to him, in the course of the privatization process, the Nigerian Government was more interested in selling off national assets such as Power Holding Company of Nigeria without any resolve to put effective regulatory framework in place to ensure better service delivery. He also noted that the 11 successor electricity distribution companies that emerged from the privation of the PHCN have blamed their poor performance on factors exogenous to them such as the moribund facilities acquired from the PHCN.

The results also concurred with empirical work of Aminu and Perterside (2014) who examined the impact of privatization on electric power generation and distribution in Nigeria through a comparative study. The results from their investigation revealed that privatization has not brought about any significant increase in power generation and distribution. They further noted that Nigeria through its privatization of the power sector has succeeded in entrusting the collective wealth of the people in the hands of few elites, and that retrenchment of workers and high electricity tariff were the major consequences of taxation.

These results disagree with empirical work of Subair and Oke (2018) who investigated the impact of privatization on power generation and distribution in Nigeria through a comparative analysis. They found that privatization repositioned the power sector for a more effective performance noting that significant increase in power generation and distribution has been recorded since the full privatization of the power sector.

From these results, analysis and discussions presented above, it could be summarized that privatization of the two state-owned of power distribution companies in Nigeria helped to improve their financial and operational performance, eliminate waste and also improve their power generation and distribution. However, these improvements are mostly insignificant probably because the privatization program is still in its early stage and all the strategic procedures and technique deployed to create significant effects are not fully implemented.

3.3 Regression Analysis Results

The regression analysis test was employed to ascertain the relationship between privatization and performance factors such as financial performance, operational performance, waste elimination and power generation and distribution. To make these results simple, only return on assets (ROA) Sales efficiency (SELEF). Debt-to-assets ratio (DTA) and Collection efficiency (CE) were used to captures the performance factors, while percentage of state-ownership (PSO) was used to capture privatization. Table 7 and table 8 are tables of regression test results for company A and B respectively.

Table 7

Regression Analysis Results for Company A

Regression	Period	Coefficient value	R-square value	p- Value	Decision
ROA/PSO	Before privatization	-0.005736	0.004650	0.7751	Insignificant
	After privatization	-0.075466	0.520410	0.0003	Significant
SELEFF/PSO	Before privatization	-4.083810	0.000373	0.9356	Insignificant
	After privatization	-146.6857	0.214216	0.0399	Significant
DTA/PSO	Before privatization	0.026235	0.137737	0.1072	Insignificant
	After privatization	0.008962	0.047903	0.3539	Insignificant
CE/PSO	Before privatization	2.534751	0.009656	0.6802	Insignificant
	After privatization	-26.36902	0.822421	0.0000	Significant

Source: Researcher's analysis using E-view 10

Table 8

Regression Analysis Results for Company B

Regression	Period	Coefficient value	R-square value	p- Value	Decision
ROA/PSO	Before privatization	-0.019633	0.094008	0.1886	Insignificant
	After privatization	-0.087525	0.492190	0.0008	Significant
SELEFF/PSO	Before privatization	310.7636	0.933600	0.0000	Significant
	After privatization	294.1963	0.838140	0.0000	Significant
DTA/PSO	Before privatization	0.013150	0.269696	0.0189	Significant
	After privatization	0.030623	0.397821	0.0029	Significant
CE/PSO	Before privatization	-13.91630	0.206547	0.0441	Significant
	After privatization	-26.22850	0.229794	0.0325	Significant

Source: Researcher's analysis using E-view 10

Financial Performance: from table 7 and table 8 it was observed that before privatization, there was negative and insignificant relationship between financial performance (ROA) and percentage of state ownership of the companies. Since level of government ownership keeps increasing before privatization that resulted to continuous reduction in financial performance of the companies which triggered public calls for privatization of the companies.

After privatization, it was observed that there was positive and significant relationship between financial performance (ROA) and percentage of state ownership of the companies, this means that as level of government ownership keeps reducing after privatization, there was increase in financial performance of the companies which resulted to increase public calls for privatization of other government-owned establishments

These results concurred with work of Makoha (2015) who conducted empirical studies to examine the pre-and post-privatization impacts on financial and operating performance for 208 firms privatized in Pakistan during the period 1990-2007, He noticed that privatization has led to improvements in return on sales though with the marginal effect of profitability factor like ROE and ROA. Thus, from these scholars' views, it could be deduced that privatization can improve the financial of public enterprises;

The results also aligned that empirical work of Pham and Nguyen (2019) who studied the differences in enterprises' financial performance before and after privatization in order to find out the influence of privatization on the state enterprises' performance. His finding revealed that the proportion of state ownership, economic growth, operating period, enterprise's size, and business risk have a positive influence on the financial performance of research firms.

Operational Performance; The results in table 7 revealed that percentage of state ownership affects operational performance (sales efficiency) negatively both before and after privatization for company A but the effects is significant only after privatization. Since level of government ownership keep increasing before privatization, that resulted to continual reduction in operation performance which must have led to public calls for privatization, thus after privatization, subsequent and gradual reduction in level of government ownership resulted to significant increase in operational performance of this firm.

For company B, it is a different case as shown in table 8, because the results revealed that increase or decrease in level of government ownership will results to increase or decrease in operational performance of the company. Which imply that privatization will have negative effects on operational performance for company B. These results obtained for Company A aligned with empirical work Ntiri (2016) on the privatization impact on the financial and operational performance of privatized state-owned enterprises in Ghana. The results obtained from the study show that, on average, there are significant improvements in operational performance in two Ghanaian firms while result of company B agreed with empirical work of Al-Tan (2015) who researched on the impact of privatization on the financial and operational performance of Jordanian Cement Factories. His study revealed the privatization did not significantly affect Jordanian Cement Factories' operating performance,

Waste Elimination: The results in table 7 and table 8 revealed that increase or decrease in level of government ownership increases or reduces level of waste in the companies both before and after privatization. This means that increase in level of government ownership of the company as observed before privatization will increase waste level of the companies while reducing the level of government ownership, as noticed during and after privatization, will reduce waste level of the companies. This suggest that privatization of the companies will help to reduce wasteful behaviour of the companies.

These results concurred with empirical studies of Nwali et al (2019) on the impact of privatization on the elimination of waste in which they found that privatization eliminated some characterize public enterprises waste in Nigeria such as over bloated budgets, over staffing, low employee output, and resource mismanagement. They also found that privatization was able to eliminate layers of bureaucracy that often result to waste of time in production or service delivery and also Nwangi (2014) studies on the effect of privatization on wastage minimization in which they found that wastages associated with corrupt leadership and management of public enterprises were significantly reduced by privatization.

Power Generation and distribution: The results in able 7 and table 8 also revealed that before privation level of government ownership affected power collection efficiency significantly and positively for company A and negatively but significantly for company B which means that increase in level of government ownership as noticed before privatization increase power collection for company A and reduce power collection efficiency for company B

The results also showed that after privatization, reduced level of government ownership usually observed during this period significantly increases power collection efficiency. This suggested that privatization of the companies increased their power collections efficiency

These results disagree with empirical work of Subair and Oke (2018) who investigated the impact of privatization on power generation and distribution in Nigeria through a comparative analysis. They found that privatization repositioned the power sector for a more effective performance noting that significant increase in power generation and distribution has been recorded since the full privatization of the power sector.

The results equally disagree with empirical work of Aminu and Perterside (2014) who examined the impact of privatization on electric power generation and distribution in Nigeria through a comparative study. The results from their investigation revealed that privatization has not brought about any significant increase in power generation and distribution. They further noted that Nigeria through its privatization of the power sector has succeeded in entrusting the collective wealth of the people in the hands of few elites, and that retrenchment of workers and high electricity tariff were the major consequences of taxation.

3.4 Pre and Post Diagnostic Tests Results

This present the results of pre and post diagnostic tests which were carried out to ascertain the condition of the data and appropriateness of the model used in regression analysis. These results are presented in table 9 and 10 for company A and B respectively.

Table 9

Diagnostic Test Results of Regression Models for Company A

Model	Diagnostic Test	Test type	P-value	T-stats	F-state	R-square	Remark
ROA/PSO MODEL	Linearity Test	Scattered Chart					Inverse relations
		Ramsey RESET Test		0.0607	0.0707		Linear Relationship
	Auto-Correlation Test	Breusch-Godfrey Serial Correlation LM Test			0.0623	0.0532	No auto-correlation
	Normality Test	Histogram Normality test	0.7080				Normally Distributed
	Heteroskedasticity Test	Breusch-Pagan-Godfrey test			0.5726	0.5612	Homoskedastic
	Stability Test	Cusom stability test					Stable
DTA/PSO MODEL	Linearity Test	Scattered Chart					Direct Relation
		Ramsey RESET Test		0.0598	0.0610		Linear Relationship
	Auto-Correlation Test	Breusch-Godfrey Serial Correlation LM Test			0.0591	0.0608	No serial-correlations
	Normality Test	Histogram Normality test	0.1069				Normally distributed
	Heteroskedasticity Test	Breusch-Pagan-Godfrey test			0.2002	0.1004	Homoskedastic
	Stability Test	CusUm stability test					Unstable
CE/PSO MODEL	Linearity Test	Scattered Chart					Inverse relations
		Ramsey RESET Test		0.0530	0.0620		Linear Relationship
	Auto-Correlation Test	Breusch-Godfrey Serial Correlation LM Test			0.0598	0.0612	No serial-correlations
	Normality Test	Histogram Normality test	0.2412				Normally distributed
	Heteroskedasticity Test	Breusch-Pagan-Godfrey test			0.3221	0.3100	Homoskedastic
	Stability Test	Cusom stability test					Unstable
SELEFF/PSO MODEL	Linearity Test	Scattered Chart					Inverse relations
		Ramsey RESET Test		0.0510	0.0760		Linear Relationship
	Auto-Correlation Test	Breusch-Godfrey Serial Correlation LM Test			0.1200	0.0970	No serial-correlations
	Normality Test	Histogram Normality test	0.02664				Normally distributed
	Heteroskedasticity Test	Breusch-Pagan-Godfrey test			0.1697	0.1616	Homoskedastic
	Stability Test	Cusom stability test					Unstable

Table 10

Diagnostic Test Results of Regression Models for Company B

Model	Diagnostic Test	Test type	P-value	T-stats	F-state	R-square	Remark
ROA/PSO MODEL	Linearity Test	Scattered Chart					Inverse relations
		Ramsey RESET Test		0.5163	0.7173		Linear Relationship
	Auto-Correlation Test	Breusch-Godfrey Serial Correlation LM Test			0.5610	0.5122	No serial-correlations
	Normality Test	Histogram Normality test	0.4977				Normally Distributed
	Heteroskedasticity Test	Breusch-Pagan-Godfrey test			0.1139	0.1089	Homoskedastic
	Stability Test	Cusom stability test					Stable
DTA/PSO MODEL	Linearity Test	Scattered Chart					Direct Relation
		Ramsey RESET Test		0.0598	0.0610		Linear Relationship
	Auto-Correlation Test	Breusch-Godfrey Serial Correlation LM Test			0.3103	0.2407	No serial-correlations
	Normality Test	Histogram Normality test	0.2241				Normally distributed
	Heteroskedasticity Test	Breusch-Pagan-Godfrey test			0.0765	0.0973	Homoskedastic
	Stability Test	CusUm stability test					Stable
CE/PSO MODEL	Linearity Test	Scattered Chart					Inverse relations
		Ramsey RESET Test		0.3115	0.3115		Linear Relationship
	Auto-Correlation Test	Breusch-Godfrey Serial Correlation LM Test			0.0793	0.0730	No serial-correlations
	Normality Test	Histogram Normality test	0.3403				Normally distributed
	Heteroskedasticity Test	Breusch-Pagan-Godfrey test			0.0718	0.0690	Homoskedastic
	Stability Test	Cusom stability test					Stable
SELEFF/PSO MODEL	Linearity Test	Scattered Chart					Inverse relations
		Ramsey RESET Test		0.0610	0.0561		Linear Relationship
	Auto-Correlation Test	Breusch-Godfrey Serial Correlation LM Test			0.0561	0.0612	No serial-correlations
	Normality Test	Histogram Normality test	0.0114				Not Normally distributed
	Heteroskedasticity Test	Breusch-Pagan-Godfrey test			0.1948	0.1861	Homoskedastic
	Stability Test	Cusom stability test					Unstable

Table 9 and 10 are table of diagnostic test for the regression analysis on company A and B. the diagnostic test analysis that were conducted are linearity test, Auto-correlation test, Normality test, Heteroscedasticity Test and stability test.

The results reviewed that all the four regression models developed for company a are linear but only DTA/PSO model showed direct relationship between the variables while the other three (ROA/PSO, CE/PSO AND SELEFF/PSO) showed inverse relationship between the variables. For Auto-Correlation Test, the results revealed that there is no problem of serial correlation between the variables in the four models. For Normality test, the results revealed that the data used for all the four models are normality distributed for company A while data for SELEFF/PSO model is not normally distributed for company B.

For Heteroskedasticity Test, the results revealed that there is no problem of Heteroskedasticity in the models which means that the models are Homoskedastic while for the stability test, the results revealed that that all the models are unstable except for ROA.PSO model which means the only ROA/PSO model is suitable for use in predicting further value of the variable for both companies.

CONCLUSIONS AND PROPOSALS

Based on the theoretical analysis and the empirical analysis, the author made the following conclusions that:

From the theoretical analysis, could be concluded that the position of scholars is mixed. Some authors like Miguel (2016) and Ntiri (2016), agreed that privatization increases performance of the firms and while some researcher Subair and Oke (2018) disagreed with the fact that privatization increases performance of the firms.

Hence, this study is intended to come out with its position on how privatization has impacted on the effectiveness state-owned enterprises in terms of financial performance, operational performance, organizational efficiency, waste elimination and power generation and distribution.

The study examined the performance of two privatized enterprises in competitive sectors in Nigeria by comparing the pre and post-privatization performance. The indicators used are financial performance, operating performance, waste elimination and power generation and distribution.

In comparison with the previous studies, the current research is carried out using the latest sample of two (2) enterprises privatized in 2008 -2018. The applied methodologies include the Wilcoxon signed test and OLS regression. Independent variables used in the model are based on the study overview and comparison of results of financial performance before and after privatization, in which some factors have different usage measures, such as percentage calculated by state ownership from 0% to 100% and operational performance calculated sales and income efficiency. However, the research model also considers the impact of the waste elimination and power generation and distributions on the financial performance of enterprises.

Using the Wilcoxon test to compare financial performance between two periods, before and after privatization, the results showed that privatization of state-owned of the two power Distribution Company in Nigeria helped to improve their financial and organizational performance, eliminate waste and also improve their power generation and distribution. However, these improvements are mostly insignificant probably because the privatization program is still in its early stage and all the strategic procedures and technique deployed to create significant effects are not fully implemented.

Regression model by OLS method shows that the results differ in terms of ROA, SELEFF, DTA and CE.

The results of the regression analysis revealed that for company A privatization increases their financial performance, increased their operational performance, reduced their wasteful nature and also increased their power collection efficiency. And for company B, privatization increased their financial performance, reduce their operational performance, reduce their wasteful nature and finally increase their power collection efficiency. In generally, we can conclude that privatization improved the overall performance of the two companies.

Proposals

Based on these conclusions above the author recommends that:

I. The financial manager of these power distribution of the two sampled companies should improve on their revenue maximization programs and plans. This would be achieved by bringing in some programs and procedures that will help them generate revenue.

II. The operational managers of these two sampled company should improve on their operation effectiveness by ensuring that their administrative and technical units are effective and functional. This could be achieving by ensuring that their administrative and technical unit personals are well trained and well-informed. This move would ensure that all their administrative and technical unit generate high volume of sales and income which would increase the volume of sales and income per employees and by extension increase their operational efficiency. III. The management and human resource unit of the two companies should avoid unnecessary debt and employing redundant workers. This could be achieved by using retained earnings as source of fund for expansion or other purposes instead of using debt with massive interest rate and also ensuring that they employ when it is absolutely necessary. These moves would ensure that these source of waste are eliminated.

IV. The management of these sampled companies should improve power distribution efficiency by ensuring that all transformers and other power distribution gadgets are in good working condition at all times. This could be achieved by improving their maintenance and repair culture and by training their technical personal to ensure that they can handle all issues regarding distribution of power to customers. These moves would ensure reduced power distribution loss and increase power collection efficiency.

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LIST OF ABBREVIATIONS

APC	Absolute Performance Change
ATC& CL	Average Technical Commercial & Collection Losses
CE	Collection Efficiency
DTA	Debt to Asset
DTE	Debt to Equity
NE	Number of Employees
NIEFF	Net-Income Efficiency
PHCN	Power Holding Company of Nigeria
PSO	Percentage of State-Ownership
ROA	Return on Asset
ROE	Return on Equity
ROS	Return on Sales
RPC	Relative Performance Change
SELEFF	Sales Efficiency

SUMMARY

Clara Chiemeka Dimudu

THE IMPACT OF PRIVATIZATION ON THE EFFICIENCY OF STATE-OWNED ENTERPRISES

Final Master Thesis

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Finance and Banking

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110 pages, 50 figures, 51 tables, 51 references

Thesis description: State-owned enterprises in Nigeria have witnessed an unprecedented transformation in the last two decades as many of these enterprises had become privatized during the period. One of the major public enterprises that were privatised is the Power Holding Company of Nigeria (PHCN), the sole electricity generation and distribution company in Nigeria. Public policy thrust towards privatization was informed by some claims and assumptions that privatization enhances performance efficiency of public enterprises. Hence, this study, examines the impact of privatization on the performance of state-owned enterprises.

Aim and objectives: The aim of the thesis is to investigate the impact of privatization on performance of state-owned enterprises. The objectives of the thesis are to analyse the effect of privatization on financial and operational performance of state owned enterprises; identify if privatization had eliminated wastage that characterizes state owned enterprises; and to identify the effect of privatization on power generation and distribution capacity of successor companies of PHCN.

Methodology and Results: The research applied comparative analysis methods using descriptive statistical tools such as mean, skew-ness, Kurtosis and Wilcoxon Signed Ranks Tests and Ordinary Least Square regression analysis tools. The study comparatively analysed data that were collected from annual reports of selected two SOEs that covers the period five years before and five years after privatization. Results were presented using descriptive statistics that involve mean, absolute performance change (APC), Relative Performance Change (RPC) and Wilcoxon rank factor. The

regression and post regression analysis test results were also presented. Through the results of these analyses, the impacts of privatization on the performance of state-owned enterprises were identified.

Conclusions. Findings from the study show that Privatization positively improved their financial performance but the improvement is only slightly significant or noticeable with respect to their sales but not significant with respect to their assets and shareholders' equity. The study also found that privatization positively impacted on their Operational performance and this impact is slightly significant or noticeable with respect to their sales and income. It was also discovered that privatization negatively impacted on their waste which is positive improvement on waste elimination but this impact is not significant or noticeable with respect to their debt as compare to the company assets and equity but significant or noticeable with respect to reducing waste due to excess number of employees. Privatization negatively impacted on power distribution loss which is positive improvement on power distribution and positively impacted on power collection efficiency, but these improvements are not significant or noticeable.

At the end of the study, practical recommendations are given as well as the implications and limitations of the research.

ANNEXES

Annex 1: Lists of companies involved in the study

Company A	Enugu Power Distribution Company
Company B	EKO power Generation Company

Annex 2: results of factor analysis of factors used in the study

Table 9

Wilcoxon rank test results for company A

Variables	Proxies	Z-statistics	Wilcoxon test coefficient	Interpretation
Financial Performance	ROS	-2.023	0.043	The difference between ROS before and after privatization is significant
	ROA	-0.944	0.345	The difference between ROA before and after privatization is not significant
	ROE	-0.944	0.345	The difference between ROE before and after privatization is not significant
Operational performance	SELEFF	-1.753	0.045	The difference between SELEFF before and after privatization is significant
	INEFF	-2.023	0.043	The difference between INEFF before and after privatization is significant
Waste elimination	DTA	-1.483	0.138	The difference between DTA before and after privatization is not significant
	DTE	-1.753	0.080	The difference between DTE before and after privatization is not significant
	NE	-2.023	0.043	The difference between SE before and after privatization is significant
Power generation and Distribution	ATC&C losses %	-1.841	0.066	The difference between ATC&C before and after privatization is not significant
	CE	-1.841	0.066	The difference between CE before and after privatization is not significant

Source: Researcher's analysis using SPSS

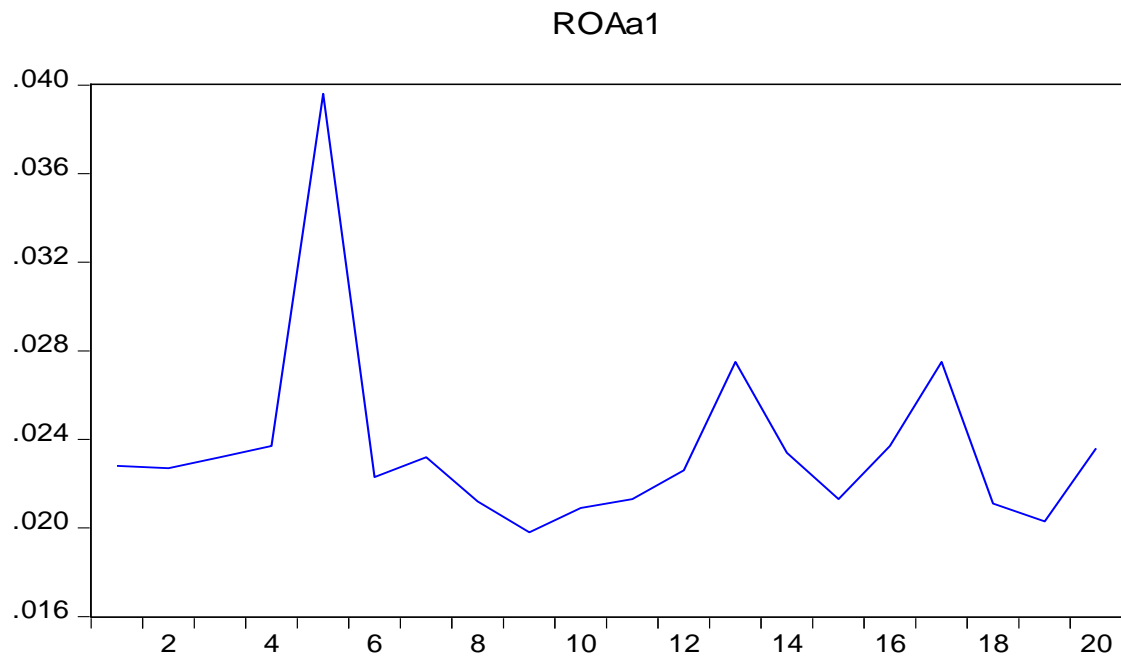
Table10

Wilcoxon rank test results for company B

Variables	Proxies	Z-statistics	Wilcoxon test coefficient	Interpretation
Financial Performance	ROS	-2.023	0.080	The difference between ROS before and after privatization is not significant
	ROA	-0.944	0.345	The difference between ROA before and after privatization is not significant
	ROE	-0.944	0.345	The difference between ROE before and after privatization is not significant
Operational performance	SELEFF	-2.023	0.043	The difference between SELEFF before and after privatization is significant
	INEFF	-2.023	0.080	The difference between INEFF before and after privatization is not significant
Waste elimination	DTA	-1.483	0.043	The difference between DTA before and after privatization is significant
	DTE	-1.753	0.138	The difference between DTE before and after privatization is not significant
	NE	-2.023	0.686	The difference between SE before and after privatization is not significant
Power generation and Distribution	ATC&C Losses (%)	-1.841	0.066	The difference between ATC&C before and after privatization is not significant
	CE	-1.841	0.066	The difference between CE before and after privatization is not significant

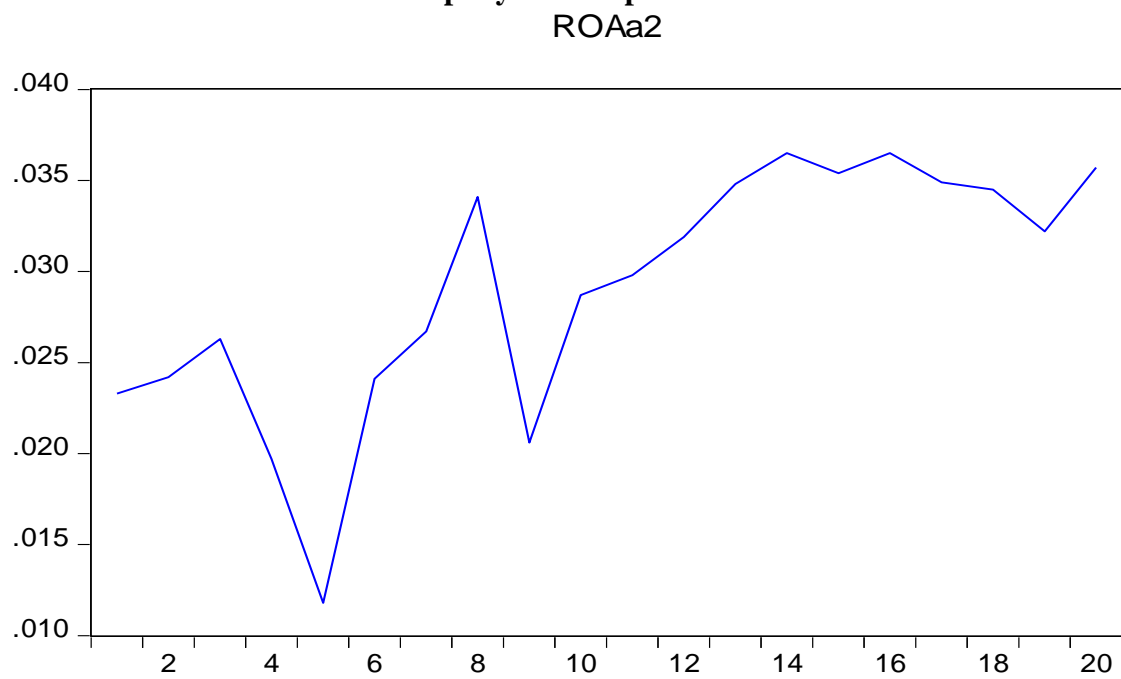
Source: Researcher's analysis using SPSS

Figure 7
Return on asset for company A before privatization



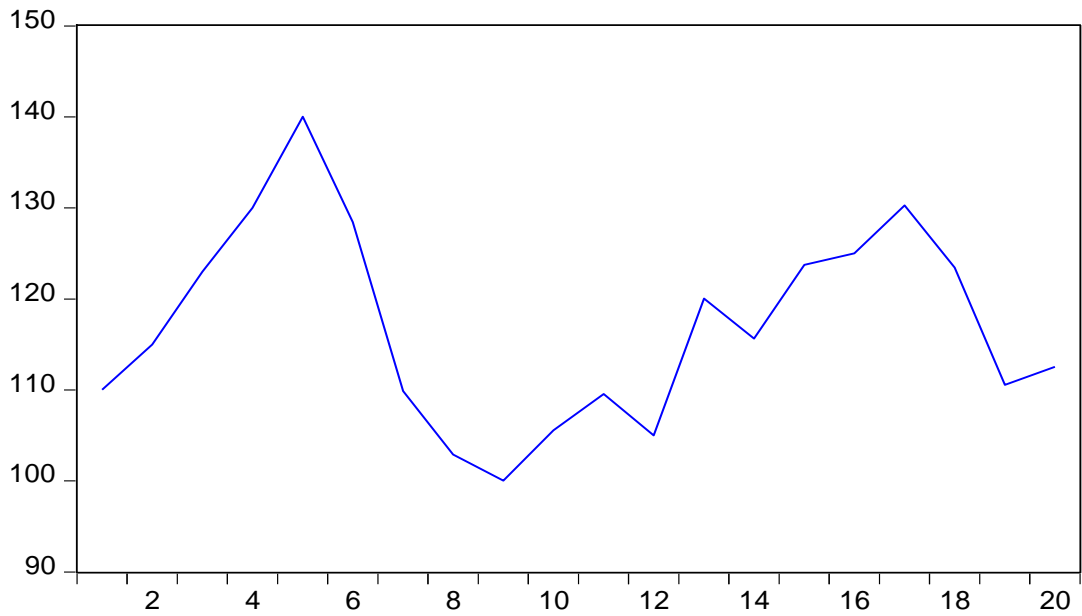
Source: Stat. (E-view version 10)

Figure 8
Return on asset for Company A after privatization



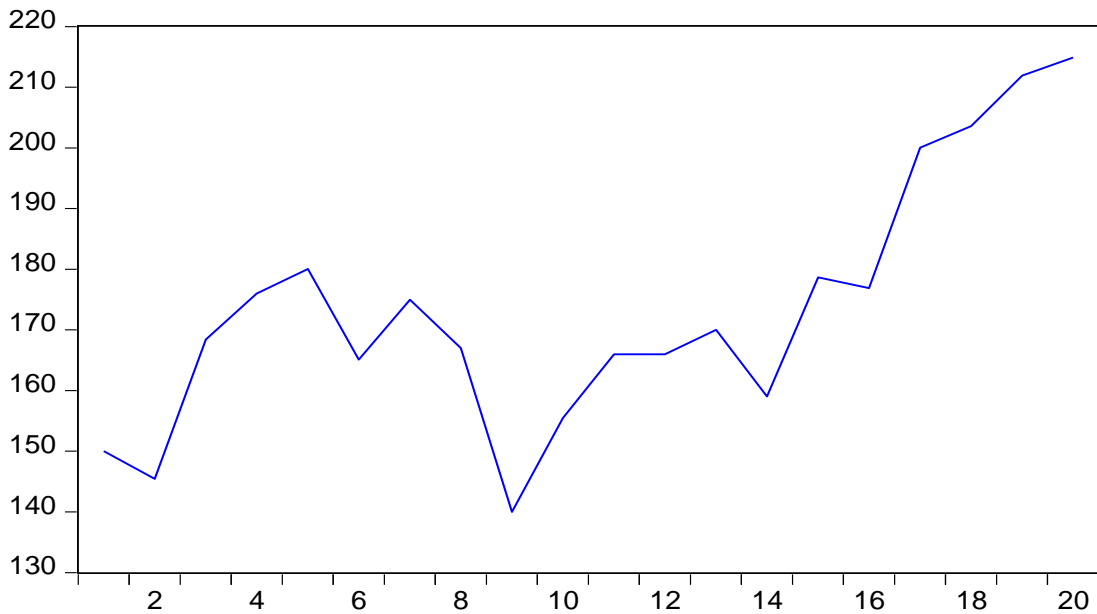
Source: Stat. (E-view version 10)

Figure 9
Sales Efficiency for Company A before privatization
 SELEFFa1



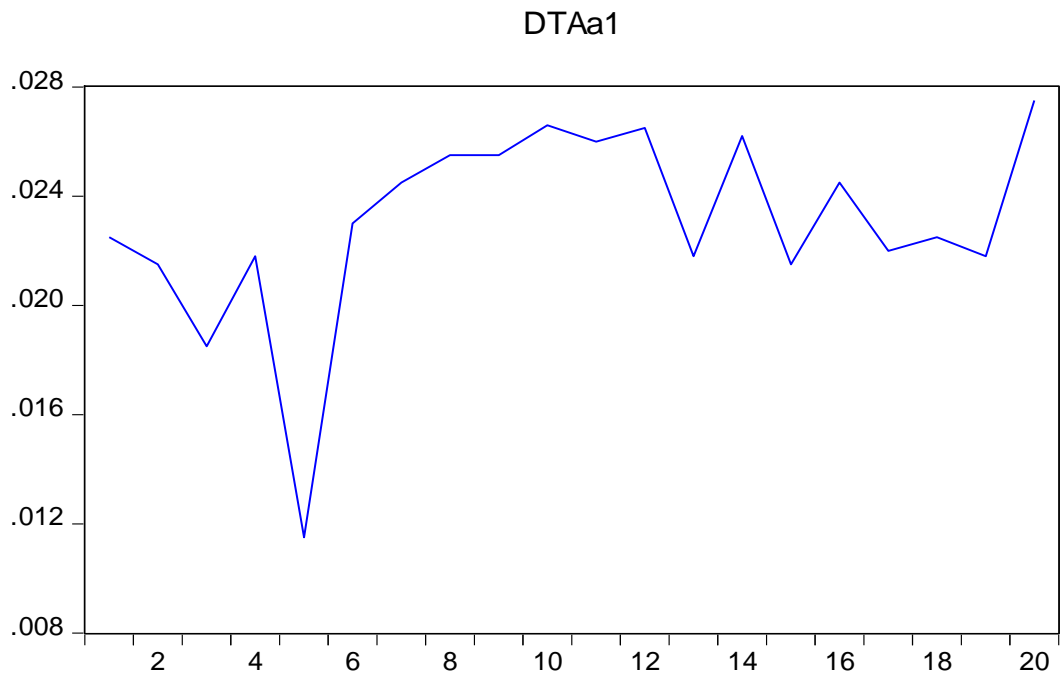
Source: Stat. (E-view version 10)

Figure 10
Sales Efficiency for Company A after privatization
 SELEFFa2



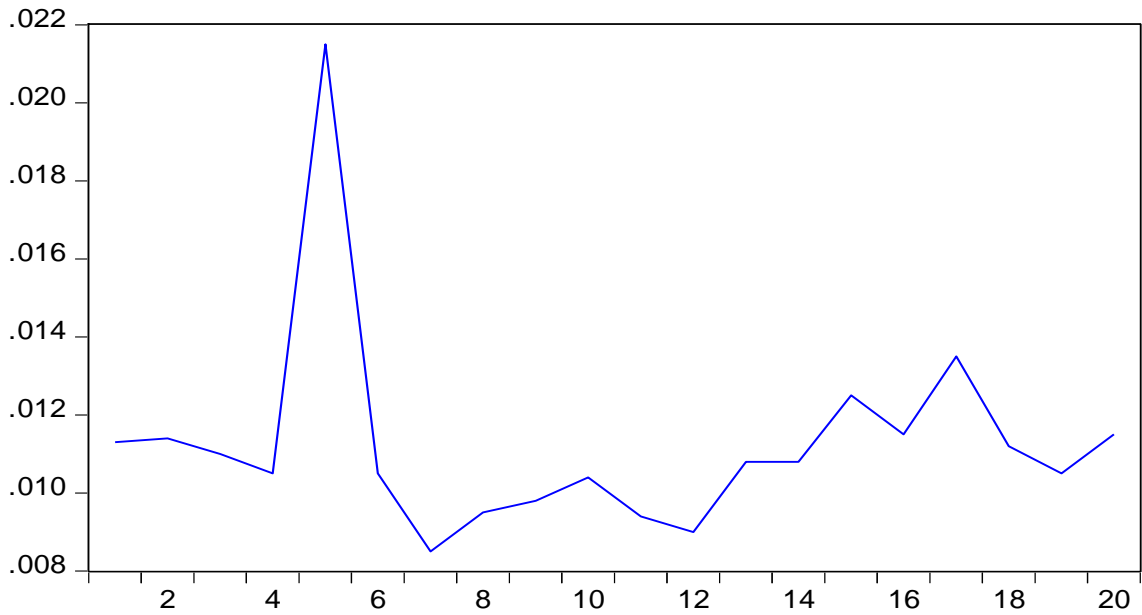
Source: Stat. (E-view version 10)

Figure 11
Debt to asset for Company A before privatization



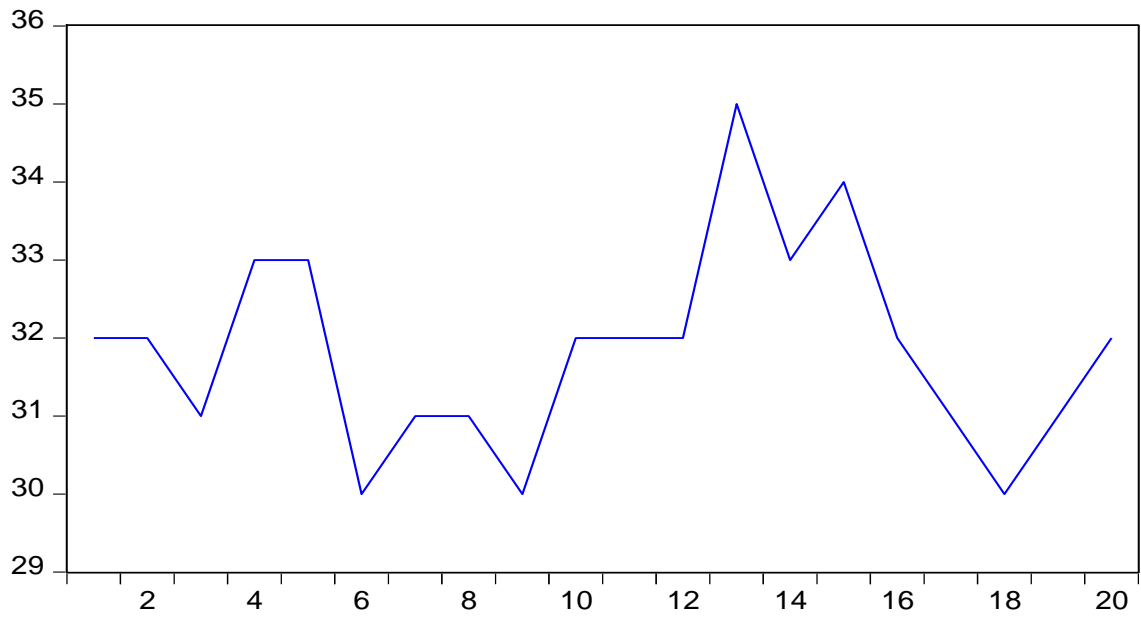
Source: Stat. (E-view version 10)

Figure 12
Debt to asset for Company A after privatization
 DTA a2



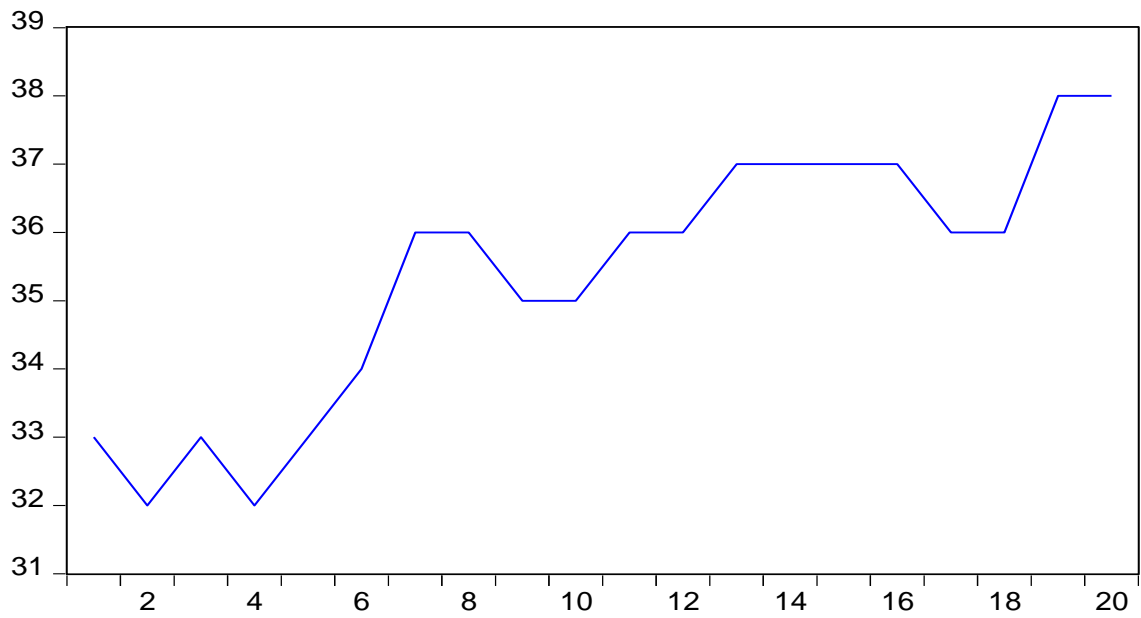
Source: Stat. (E-view version 10)

Figure 13
Collection Efficiency for Company A before privatization
CE a1



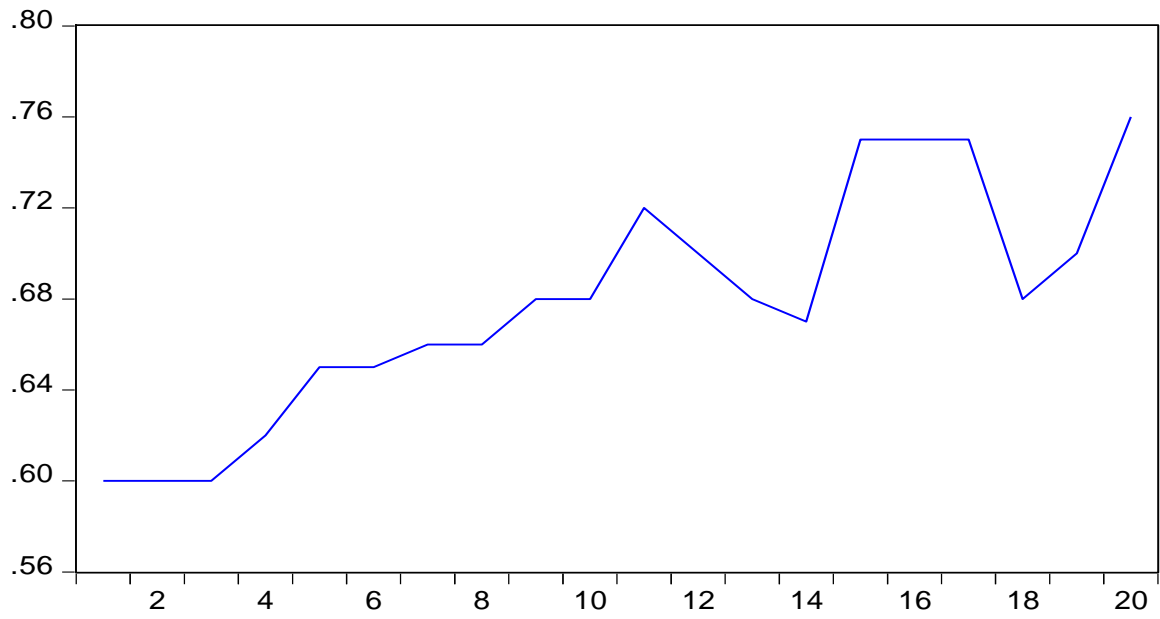
Source: Stat. (E-view version 10)

Figure 14
Collection Efficiency for company A after privatization
CE a2



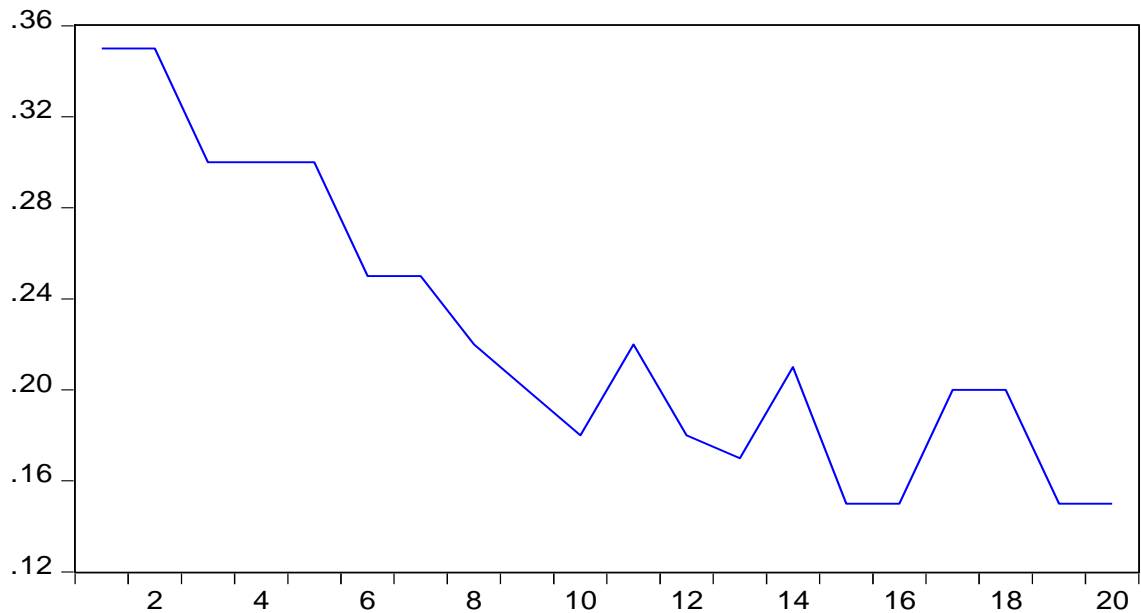
Source: Stat. (E-view version 10)

Figure 15
Percentage of State ownership (PSO) before Privatization
 PSOa1



Source: Stat. (E-view version 10)

Figure 16
Percentage of State ownership (PSO) after Privatization
 POSa2



Source: Stat. (E-view version 10)

Table 11**Return on Assets (ROA) and Percentage of State ownership (PSO) before privatization**

Dependent Variable: ROAA1
 Method: Least Squares
 Date: 08/27/21 Time: 00:32
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.027474	0.013447	2.043153	0.0560
PSO A1	-0.005736	0.019781	-0.289977	0.7751
R-squared	0.004650	Mean dependent var		0.023585
Adjusted R-squared	-0.050647	S.D. dependent var		0.004268
S.E. of regression	0.004375	Akaike info criterion		-7.931167
Sum squared resid	0.000345	Schwarz criterion		-7.831594
Log likelihood	81.31167	Hannan-Quinn criter.		-7.911729
F-statistic	0.084087	Durbin-Watson stat		2.005320
Prob(F-statistic)	0.775148			

Table12**Return on Assets (ROA) and Percentage of State ownership (PSO) after privatization**

Dependent Variable: ROAA2
 Method: Least Squares
 Date: 08/27/21 Time: 00:41
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.045989	0.003976	11.56537	0.0000
PSO A2	-0.075466	0.017076	-4.419509	0.0003
R-squared	0.520410	Mean dependent var		0.029085
Adjusted R-squared	0.493766	S.D. dependent var		0.006834
S.E. of regression	0.004862	Akaike info criterion		-7.720000
Sum squared resid	0.000426	Schwarz criterion		-7.620427
Log likelihood	79.20000	Hannan-Quinn criter.		-7.700562
F-statistic	19.53206	Durbin-Watson stat		1.446899
Prob(F-statistic)	0.000331			

Table 13
Sales Efficiency (SELEFF) and Percentage of State ownership (PSO) before privatization

Dependent Variable: SELEFFA1
Method: Least Squares
Date: 08/27/21 Time: 00:52
Sample: 1 20
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	119.7993	33.86569	3.537484	0.0024
PSOA1	-4.083810	49.81703	-0.081976	0.9356
R-squared	0.000373	Mean dependent var		117.0305
Adjusted R-squared	-0.055162	S.D. dependent var		10.72659
S.E. of regression	11.01846	Akaike info criterion		7.731661
Sum squared resid	2185.318	Schwarz criterion		7.831235
Log likelihood	-75.31661	Hannan-Quinn criter.		7.751099
F-statistic	0.006720	Durbin-Watson stat		0.643798
Prob(F-statistic)	0.935570			

Sources: Stat. (E-view version 10)

Table 14
Sales Efficiency (SELEFF) and Percentage of State ownership (PSO) after privatization

Dependent Variable: SELEFFA2
Method: Least Squares
Date: 08/27/21 Time: 12:01
Sample: 1 20
Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	206.3286	15.42046	13.38018	0.0000
POSA2	-146.6857	66.21823	-2.215187	0.0399
R-squared	0.214216	Mean dependent var		173.4710
Adjusted R-squared	0.170561	S.D. dependent var		20.70343
S.E. of regression	18.85534	Akaike info criterion		8.806109
Sum squared resid	6399.432	Schwarz criterion		8.905682
Log likelihood	-86.06109	Hannan-Quinn criter.		8.825547
F-statistic	4.907052	Durbin-Watson stat		0.554867
Prob(F-statistic)	0.039882			

Sources: Stat. (E-view version 10)

Table 15**Debt to Asset ratio (DTA) and Percentage of State ownership (PSO) before privatization**

Dependent Variable: DTAA1

Method: Least Squares

Date: 08/27/21 Time: 00:57

Sample: 1 20

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005273	0.010518	0.501341	0.6222
PSO A1	0.026235	0.015472	1.695673	0.1072
R-squared	0.137737	Mean dependent var		0.023060
Adjusted R-squared	0.089834	S.D. dependent var		0.003587
S.E. of regression	0.003422	Akaike info criterion		-8.422558
Sum squared resid	0.000211	Schwarz criterion		-8.322985
Log likelihood	86.22558	Hannan-Quinn criter.		-8.403121
F-statistic	2.875305	Durbin-Watson stat		1.922817
Prob(F-statistic)	0.107175			

Sources: Stat. (E-view version 10)

Table 16**Debt to Asset ratio (DTA) and Percentage of State ownership (PSO) after privatization**

Dependent Variable: DTA_A2

Method: Least Squares

Date: 08/27/21 Time: 01:00

Sample: 1 20

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.009248	0.002193	4.217022	0.0005
PSO A2	0.008962	0.009417	0.951650	0.3539
R-squared	0.047903	Mean dependent var		0.011255
Adjusted R-squared	-0.004991	S.D. dependent var		0.002675
S.E. of regression	0.002681	Akaike info criterion		-8.910318
Sum squared resid	0.000129	Schwarz criterion		-8.810745
Log likelihood	91.10318	Hannan-Quinn criter.		-8.890880
F-statistic	0.905638	Durbin-Watson stat		2.004108
Prob(F-statistic)	0.353879			

Table 17
Collection Efficiency (CE) and Percentage of State ownership (PSO) before privatization

Dependent Variable: CE_A1
 Method: Least Squares
 Date: 08/27/21 Time: 01:03
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.13144	4.113117	7.325694	0.0000
PSO A1	2.534751	6.050469	0.418935	0.6802
R-squared	0.009656	Mean dependent var		31.85000
Adjusted R-squared	-0.045363	S.D. dependent var		1.308877
S.E. of regression	1.338235	Akaike info criterion		3.515219
Sum squared resid	32.23569	Schwarz criterion		3.614792
Log likelihood	-33.15219	Hannan-Quinn criter.		3.534657
F-statistic	0.175506	Durbin-Watson stat		1.272212
Prob(F-statistic)	0.680221			

Sources: Stat. (E-view version 10)

Table 18
Collection Efficiency (CE) and Percentage of State ownership (PSO) before privatization

Dependent Variable: CE_A2
 Method: Least Squares
 Date: 08/27/21 Time: 01:04
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	41.25666	0.672552	61.34341	0.0000
PSO A2	-26.36902	2.888061	-9.130353	0.0000
R-squared	0.822421	Mean dependent var		35.35000
Adjusted R-squared	0.812556	S.D. dependent var		1.899446
S.E. of regression	0.822362	Akaike info criterion		2.541368
Sum squared resid	12.17304	Schwarz criterion		2.640942
Log likelihood	-23.41368	Hannan-Quinn criter.		2.560806
F-statistic	83.36335	Durbin-Watson stat		1.683882
Prob(F-statistic)	0.000000			

Source: Stat. (E-view version 10)

Figure17

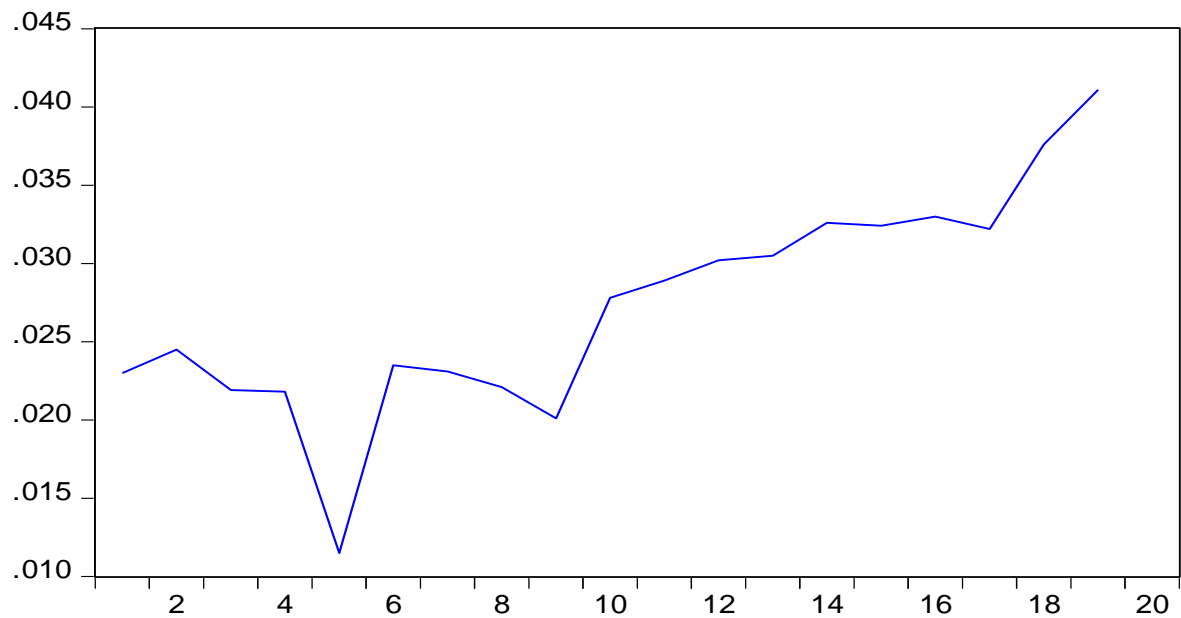
Return on asset for company B before privatization
ROAb1



Source: Stat. (E-view version 10)

Figure18

Return on Asset for company B" after privatization
ROAb2

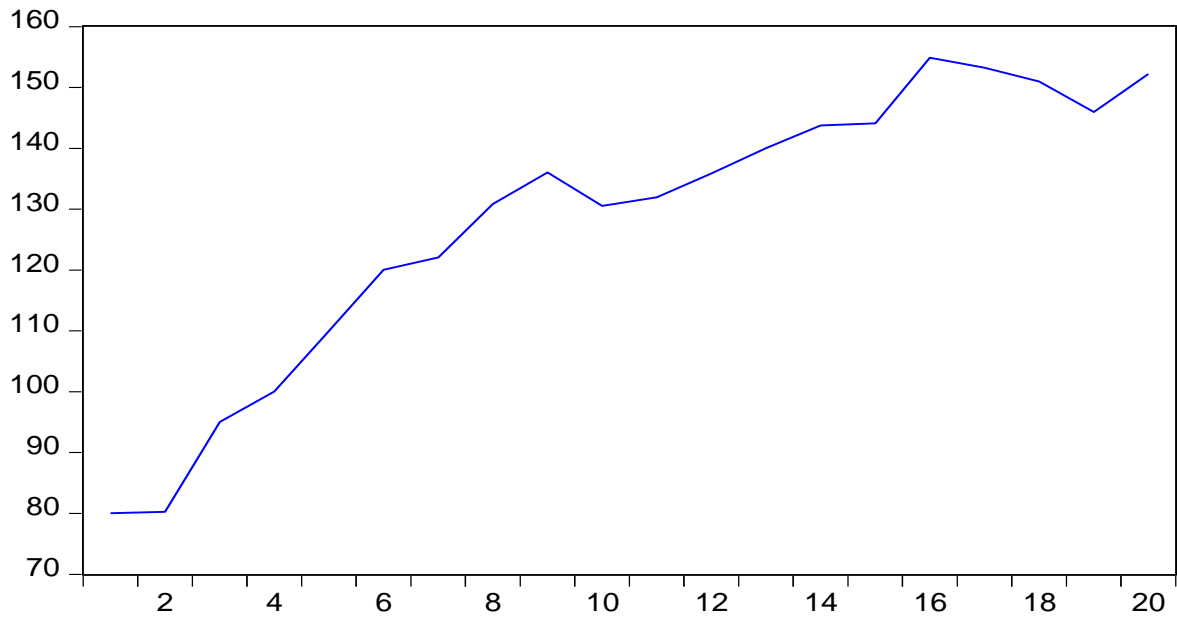


Source: Stat. (E-view version 10)

Figure19

Sales Efficiency for Company B before privatization

SELEFFb1

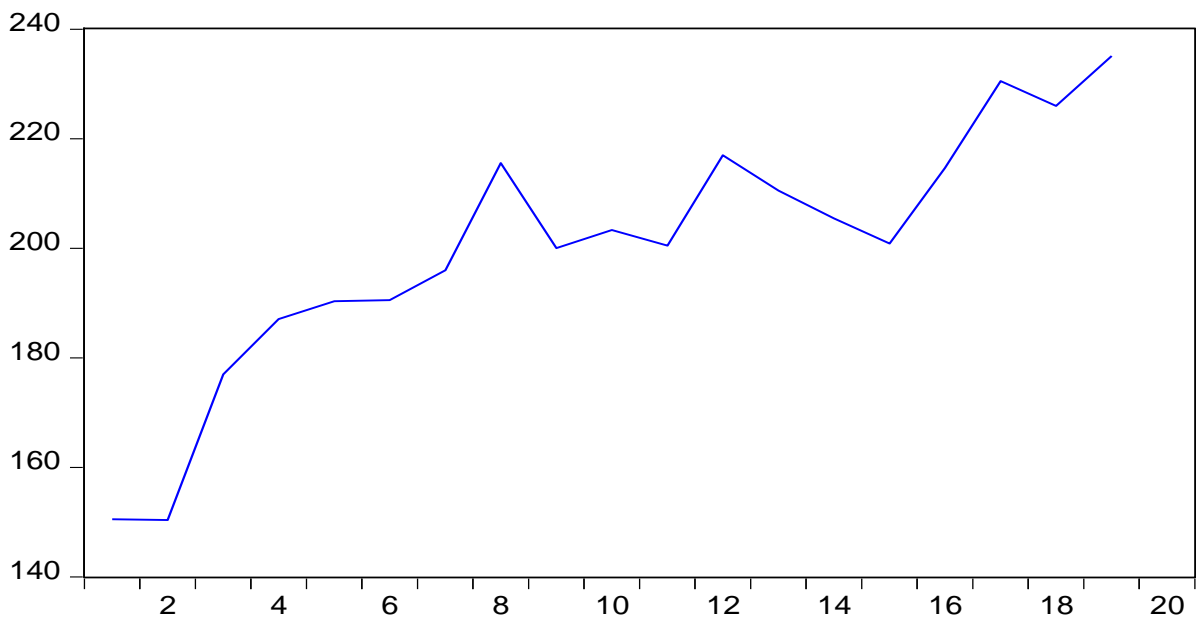


Source: Stat. (E-view version 10)

Figure20

Sales Efficiency for Company B after privatization

SELEFFb2

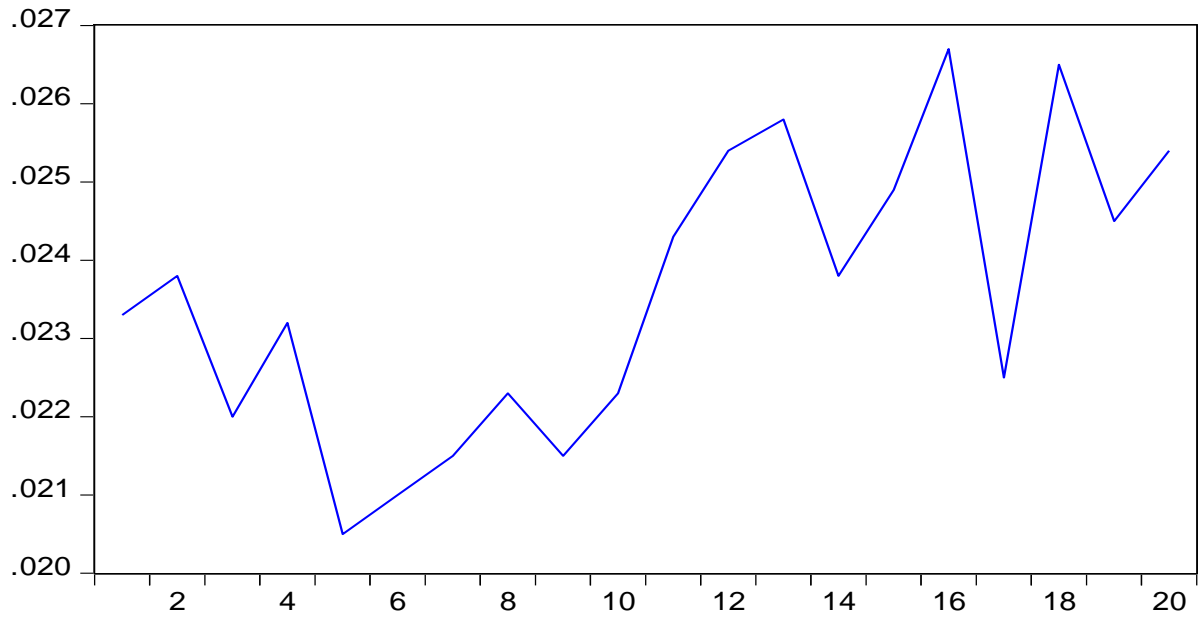


Source: Stat. (E-view version 10)

Figure 21

Debt to asset for Company B before privatization

DTAb1

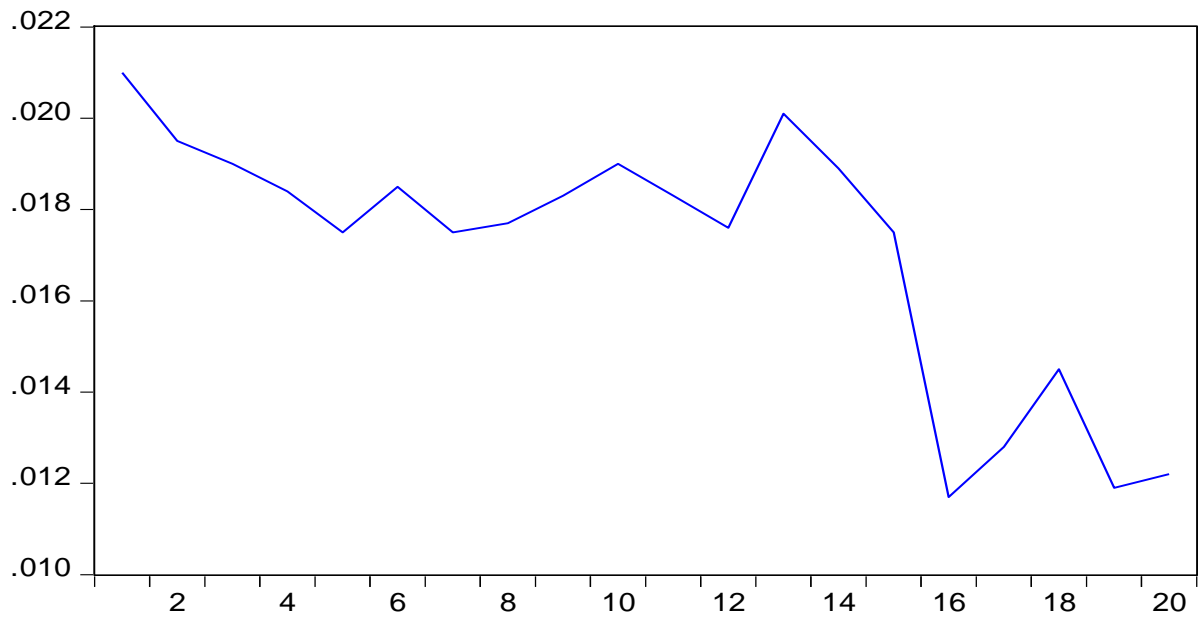


Source: Stat. (E-view version 10)

Figure 22

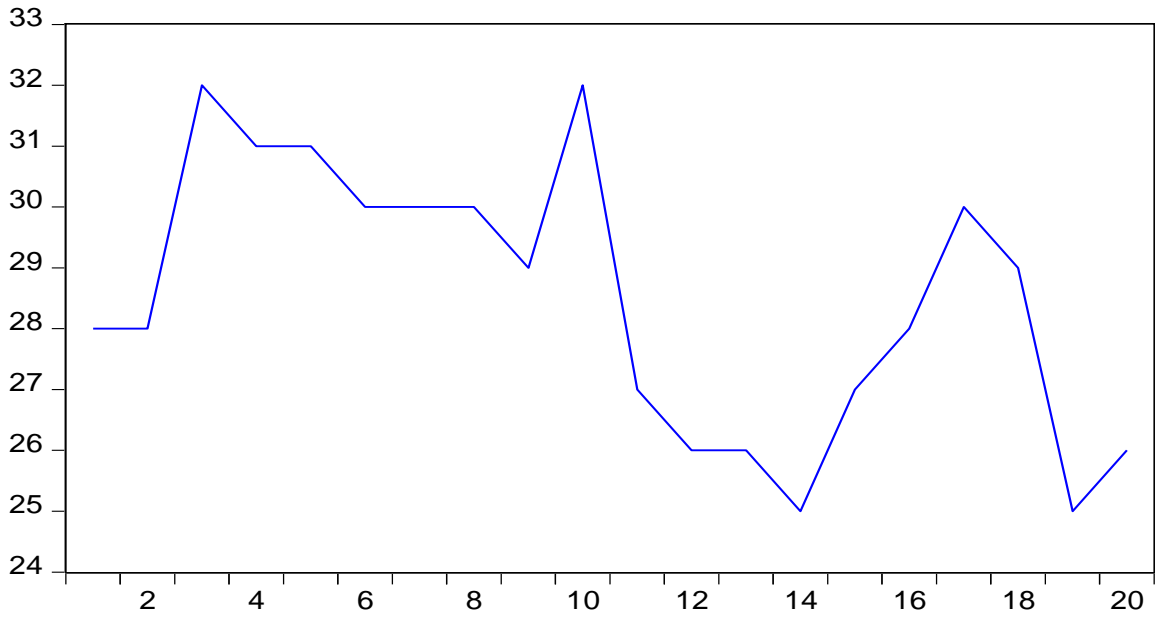
Debt to asset for Company B after privatization

DTAb2



Source: Stat. (E-view version 10)

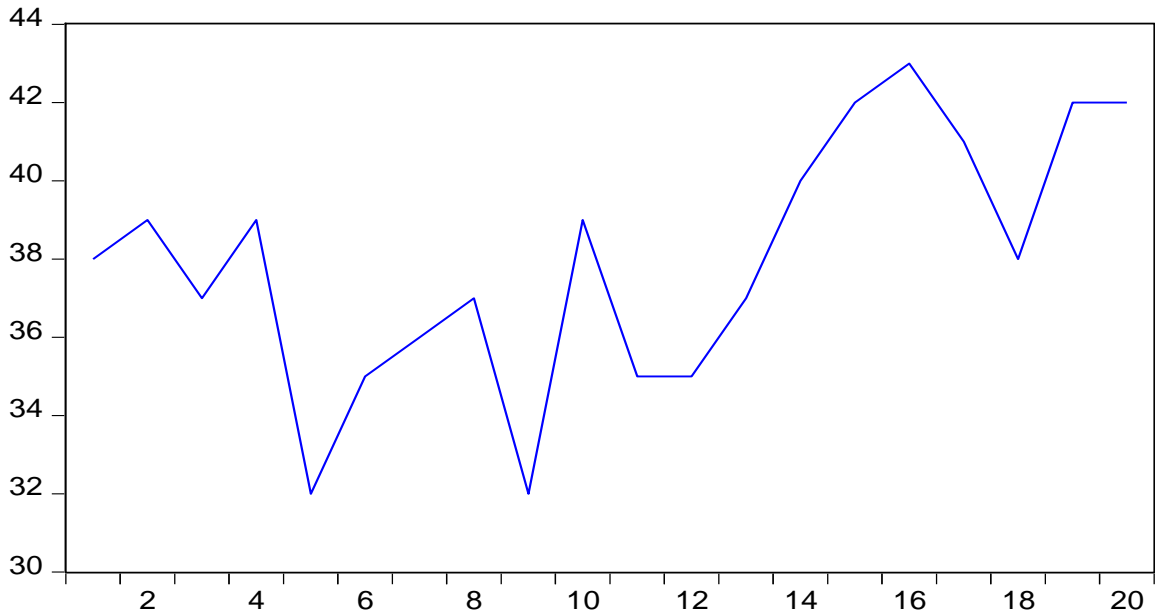
Figure 23
Collection Efficiency for Company B before privatization
 CE b1



Source: Stat. (E-view version 10)

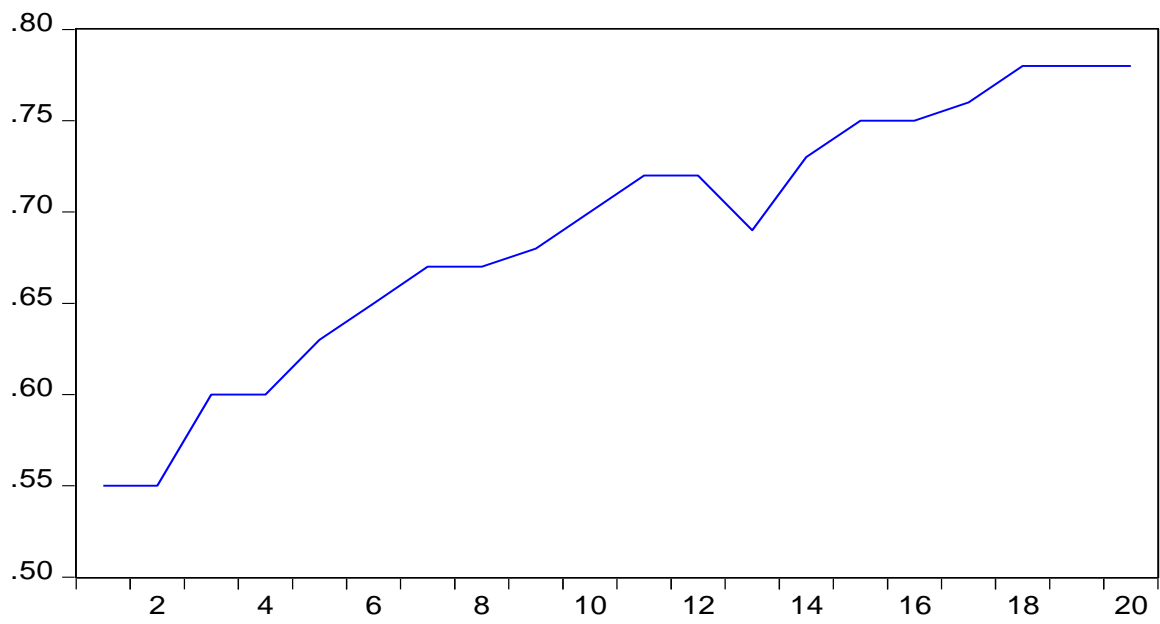
Figure 24

Collection Efficiency for Company B after privatization
 CE b2



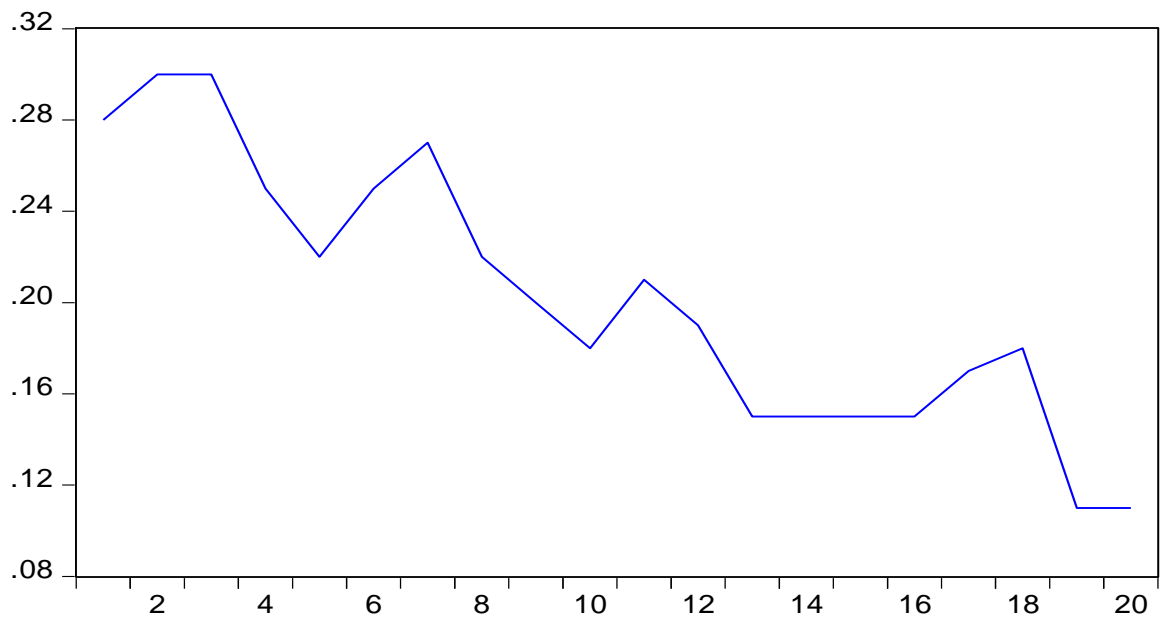
Source: Stat. (E-view version 10)

Figure 25
Percentage of State ownership (PSO) before Privatization
 PSOb1



Source: Stat. (E-view version 10)

Figure 26
Percentage of State ownership (PSO) after Privatization
 PSOb2



Source: Stat. (E-view version 10)

Table 19**Return on Assets (ROA) and Percentage of State ownership (PSO) before**

Dependent Variable: ROAB1
 Method: Least Squares
 Date: 08/27/21 Time: 09:01
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.034902	0.009936	3.512595	0.0025
PSOB1	-0.019633	0.014366	-1.366647	0.1886
R-squared	0.094008	Mean dependent var		0.021395
Adjusted R-squared	0.043675	S.D. dependent var		0.004676
S.E. of regression	0.004573	Akaike info criterion		-7.842778
Sum squared resid	0.000376	Schwarz criterion		-7.743204
Log likelihood	80.42778	Hannan-Quinn criter.		-7.823340
F-statistic	1.867723	Durbin-Watson stat		1.230129
Prob(F-statistic)	0.188565			

Source: Stat. (E-view version 10)

Table 20**Return on Assets (ROA) and Percentage of State ownership (PSO) after privatization**

Dependent Variable: ROAB2
 Method: Least Squares
 Date: 08/27/21 Time: 09:04
 Sample (adjusted): 1 19
 Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.045357	0.004612	9.835317	0.0000
PSOB2	-0.087525	0.021562	-4.059196	0.0008
R-squared	0.492190	Mean dependent var		0.027253
Adjusted R-squared	0.462319	S.D. dependent var		0.006972
S.E. of regression	0.005112	Akaike info criterion		-7.615098
Sum squared resid	0.000444	Schwarz criterion		-7.515684
Log likelihood	74.34343	Hannan-Quinn criter.		-7.598273
F-statistic	16.47707	Durbin-Watson stat		1.293933
Prob(F-statistic)	0.000816			

Table 21**Sales Efficiency (SELEFF) and Percentage of State ownership (PSO) before privatization**

Dependent Variable: SELEFFB1

Method: Least Squares

Date: 08/27/21 Time: 09:06

Sample: 1 20

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-85.90769	13.51136	-6.358183	0.0000
PSOB1	310.7636	19.53435	15.90857	0.0000
R-squared	0.933600	Mean dependent var		127.8977
Adjusted R-squared	0.929911	S.D. dependent var		23.48662
S.E. of regression	6.217940	Akaike info criterion		6.587394
Sum squared resid	695.9299	Schwarz criterion		6.686967
Log likelihood	-63.87394	Hannan-Quinn criter.		6.606832
F-statistic	253.0827	Durbin-Watson stat		1.264471
Prob(F-statistic)	0.000000			

Source: Stat. (E-view version 10)**Table 22****Sales Efficiency (SELEFF) and Percentage of State ownership (PSO) after privatization**

Dependent Variable: SELEFFB2

Method: Least Squares

Date: 08/27/21 Time: 09:07

Sample (adjusted): 1 19

Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.917103	21.53259	-0.042591	0.9665
PSOB1	294.1963	31.35623	9.382387	0.0000
R-squared	0.838140	Mean dependent var		200.0654
Adjusted R-squared	0.828619	S.D. dependent var		23.02520
S.E. of regression	9.532012	Akaike info criterion		7.446489
Sum squared resid	1544.607	Schwarz criterion		7.545904
Log likelihood	-68.74165	Hannan-Quinn criter.		7.463314
F-statistic	88.02918	Durbin-Watson stat		1.510846
Prob(F-statistic)	0.000000			

Source: Stat. (E-view version 10)

Table 23**Debt to Asset (DTA) and Percentage of State ownership (PSO) before privatization**

Dependent Variable: DTAB1
 Method: Least Squares
 Date: 08/27/21 Time: 09:09
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.014513	0.003528	4.113626	0.0007
PSOB1	0.013150	0.005101	2.578230	0.0189
R-squared	0.269696	Mean dependent var		0.023560
Adjusted R-squared	0.229124	S.D. dependent var		0.001849
S.E. of regression	0.001624	Akaike info criterion		-9.913765
Sum squared resid	4.74E-05	Schwarz criterion		-9.814192
Log likelihood	101.1377	Hannan-Quinn criter.		-9.894328
F-statistic	6.647272	Durbin-Watson stat		1.516038
Prob(F-statistic)	0.018946			

Source: Stat. (E-view version 10)

Table 24**Debt to Asset (DTA) and Percentage of State ownership (PSO) after privatization**

Dependent Variable: DTAB2
 Method: Least Squares
 Date: 08/27/21 Time: 11:26
 Sample: 1 20
 Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.010909	0.001864	5.852321	0.0000
PSOB2	0.030623	0.008880	3.448398	0.0029
R-squared	0.397821	Mean dependent var		0.017095
Adjusted R-squared	0.364367	S.D. dependent var		0.002842
S.E. of regression	0.002266	Akaike info criterion		-9.246804
Sum squared resid	9.24E-05	Schwarz criterion		-9.147231
Log likelihood	94.46804	Hannan-Quinn criter.		-9.227366
F-statistic	11.89145	Durbin-Watson stat		0.761550
Prob(F-statistic)	0.002867			

Table 25**Collection Efficiency (CE) and Percentage of State ownership (PSO) before privatization**

Dependent Variable: CE_B1

Method: Least Squares

Date: 08/27/21 Time: 11:39

Sample: 1 20

Included observations: 20

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	38.07442	4.446708	8.562383	0.0000
PSOB1	-13.91630	6.428927	-2.164639	0.0441
R-squared	0.206547	Mean dependent var		28.50000
Adjusted R-squared	0.162467	S.D. dependent var		2.236068
S.E. of regression	2.046379	Akaike info criterion		4.364660
Sum squared resid	75.37801	Schwarz criterion		4.464234
Log likelihood	-41.64660	Hannan-Quinn criter.		4.384098
F-statistic	4.685661	Durbin-Watson stat		1.157690
Prob(F-statistic)	0.044101			

Source: Stat. (E-view version 10)**Table 26****Collection Efficiency (CE) and Percentage of State ownership (PSO) after privatization**

Dependent Variable: CE_B2

Method: Least Squares

Date: 08/27/21 Time: 11:40

Sample: 1 20

Included observations: 20

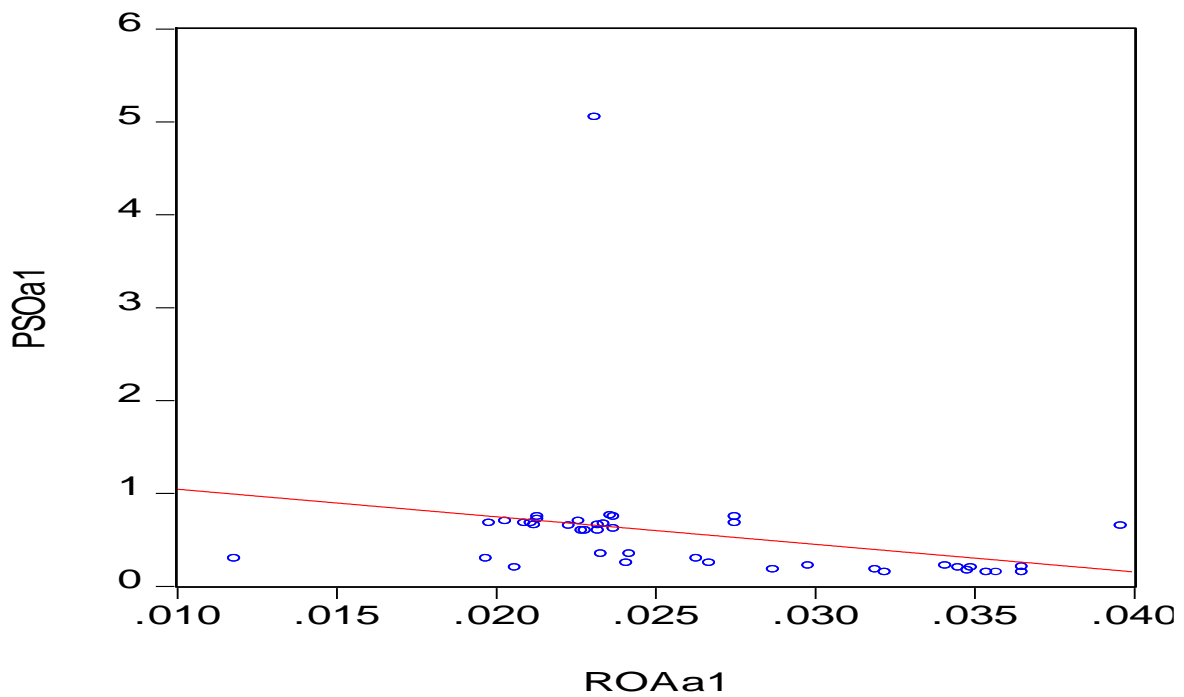
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	43.24816	2.375713	18.20429	0.0000
PSOB2	-26.22850	11.31805	-2.317404	0.0325
R-squared	0.229794	Mean dependent var		37.95000
Adjusted R-squared	0.187004	S.D. dependent var		3.203206
S.E. of regression	2.888211	Akaike info criterion		5.053791
Sum squared resid	150.1517	Schwarz criterion		5.153364
Log likelihood	-48.53791	Hannan-Quinn criter.		5.073229
F-statistic	5.370362	Durbin-Watson stat		1.308714
Prob(F-statistic)	0.032463			

Source: Stat. (E-view version 10)

FOR COMPOANY A

Figure 27

Linearity of Return on asset and PSO for company A



Source: Stat. (E-view version 10)

Table 27

Ramsey Test on Return on asset for company A

Ramsey RESET Test
 Equation: UNTITLED
 Specification: ROAA1 C PSOA1
 Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	3.670214	44	0.0607
F-statistic	13.47047	(1, 43)	0.0707
Likelihood ratio	12.44031	1	0.0504

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000381	1	0.000381
Restricted SSR	0.001454	44	3.73E-05
Unrestricted SSR	0.001073	44	2.82E-05

LR test summary:

	Value
Restricted LogL	151.8883
Unrestricted LogL	158.1084

Source: Stat. (E-view version 10)

Table 28

Unrestricted Test Equation:
 Dependent Variable: ROAA1
 Method: Least Squares
 Date: 11/02/21 Time: 20:24
 Sample: 2008Q1 2018Q1
 Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.526384	0.150886	-3.488612	0.0012
PSOA1	0.064930	0.018273	3.553396	0.0010
FITTED^2	746.1671	203.3034	3.670214	0.0007
R-squared	0.305755	Mean dependent var		0.026256
Adjusted R-squared	0.269215	S.D. dependent var		0.006217
S.E. of regression	0.005315	Akaike info criterion		-7.566264
Sum squared resid	0.001073	Schwarz criterion		-7.440880
Log likelihood	158.1084	Hannan-Quinn criter.		-7.520606
F-statistic	8.367845	Durbin-Watson stat		1.230977
Prob(F-statistic)	0.000974			

Source: Stat. (E-view version 10)

The T-stats and F-stats are greater than 0.05 meaning that the model well specified and the relationship between ROA and PSO is linear

Table 29

Auto-correlation test on Return on asset for company A

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	7.177603	Prob. F(2,37)	0.0623
Obs*R-squared	11.46064	Prob. Chi-Square(2)	0.0532

Test Equation:
 Dependent Variable: RESID
 Method: Least Squares
 Date: 11/02/21 Time: 20:27
 Sample: 2008Q1 2018Q1
 Included observations: 41
 Presample missing value lagged residuals set to zero.

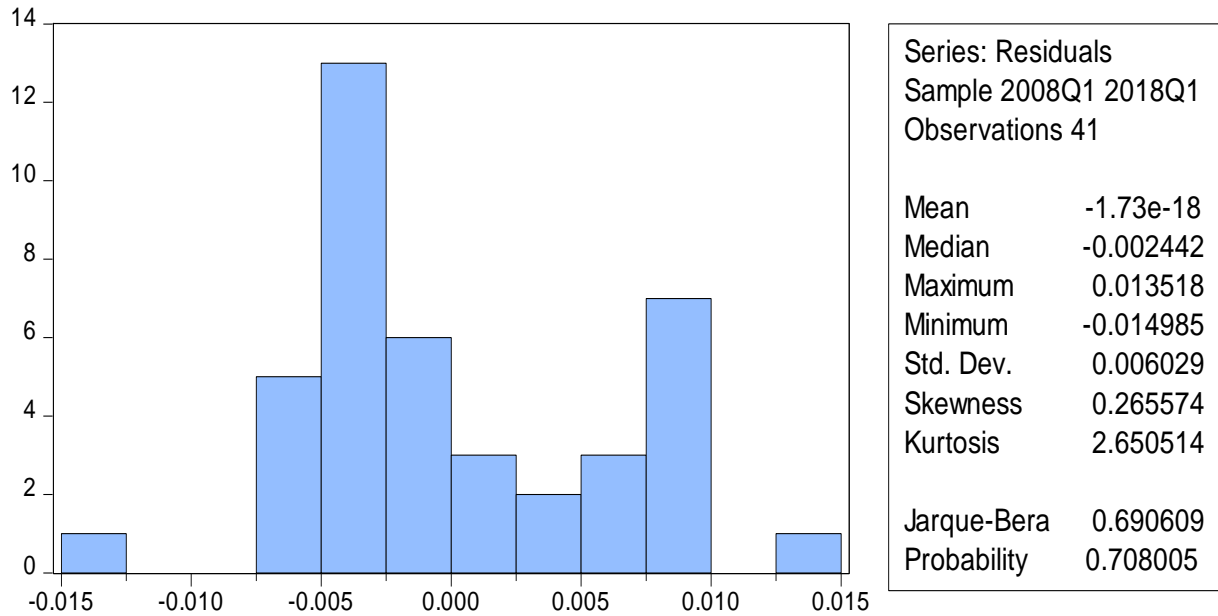
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000445	0.001049	-0.423925	0.6741
PSOA1	0.001078	0.001158	0.931255	0.3578
RESID(-1)	0.424660	0.163033	2.604757	0.0132
RESID(-2)	0.219282	0.167553	1.308731	0.1987
R-squared	0.279528	Mean dependent var		-1.73E-18
Adjusted R-squared	0.221111	S.D. dependent var		0.006029
S.E. of regression	0.005321	Akaike info criterion		-7.541909
Sum squared resid	0.001048	Schwarz criterion		-7.374732
Log likelihood	158.6091	Hannan-Quinn criter.		-7.481032
F-statistic	4.785069	Durbin-Watson stat		1.937042
Prob(F-statistic)	0.006459			

The f stats are more than 0.05 meaning that there is no problem of auto correlation between ROA and PSO in the model

Source: Stat. (E-view version 10)

Figure 28

Normality test on Return on asset for company A



The probability value is greater 0.05 which means that there is no evidence of non-normality in the model thus confirming that the model is normally distributed

Source: Stat. (E-view version 10)

Table 30

Heteroskedasticity test on Return on asset for company A

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.323834	Prob. F(1,39)	0.5726
Obs*R-squared	0.337637	Prob. Chi-Square(1)	0.5612
Scaled explained SS	0.252116	Prob. Chi-Square(1)	0.6156

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/02/21 Time: 20:28

Sample: 2008Q1 2018Q1

Included observations: 41

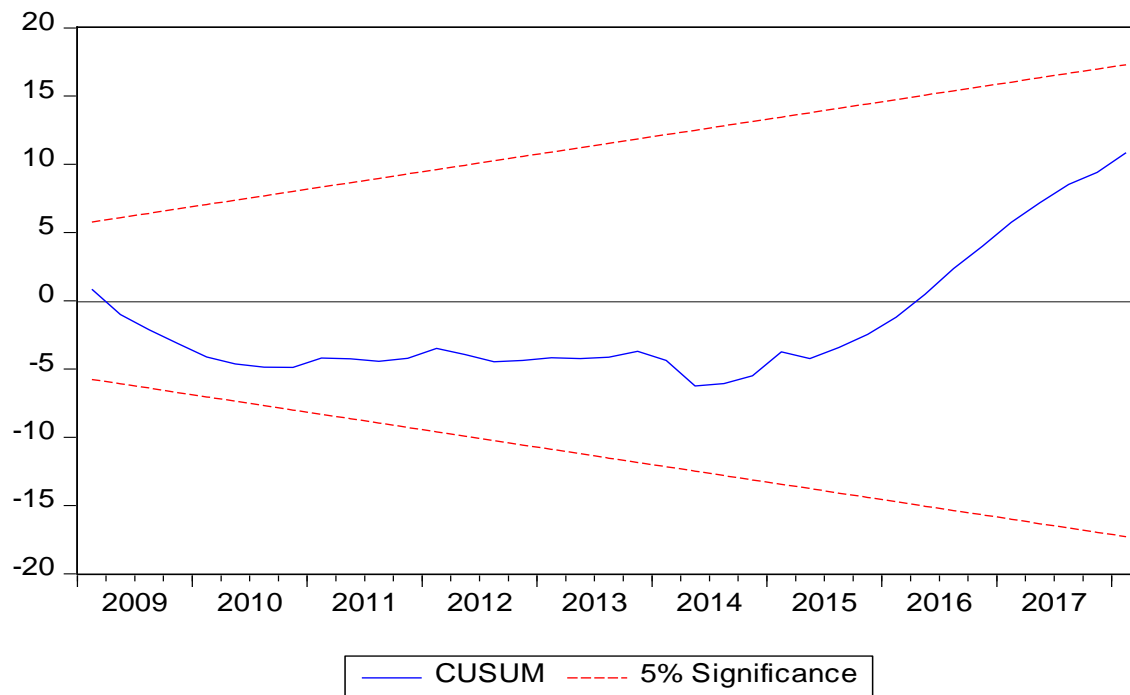
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.86E-05	9.10E-06	4.238767	0.0001
PSOA1	-5.54E-06	9.74E-06	-0.569064	0.5726

R-squared	0.008235	Mean dependent var	3.55E-05
Adjusted R-squared	-0.017195	S.D. dependent var	4.61E-05
S.E. of regression	4.65E-05	Akaike info criterion	-17.06586
Sum squared resid	8.44E-08	Schwarz criterion	-16.98228
Log likelihood	351.8502	Hannan-Quinn criter.	-17.03543
F-statistic	0.323834	Durbin-Watson stat	1.886155
Prob(F-statistic)	0.572576		

Source: Stat. (E-view version 10)

Figure 29

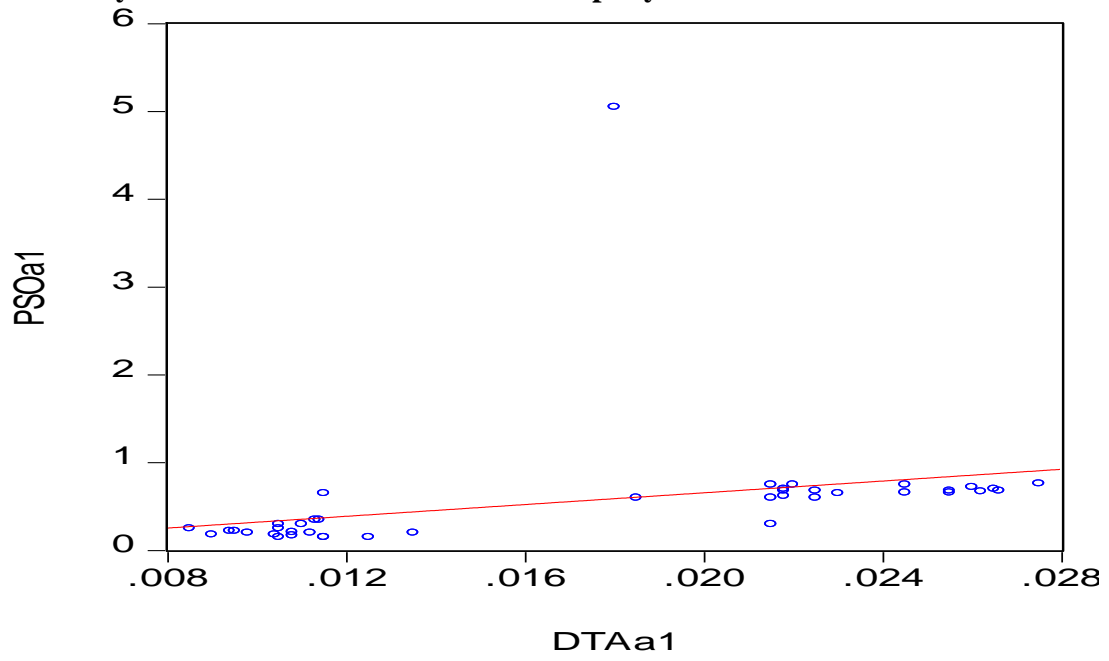
Stability test on return on asset for company A



Source: Stat. (E-view version 10)

Figure 30

Linearity of Debt to asset and PSO for company A



Source: Stat. (E-view version 10)

Table 31

Ramsey RESET Test on Return on asset and PSO for company A

Equation: UNTITLED

Specification: ROAA1 C PSOA1

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	3.670214	44	0.0598
F-statistic	13.47047	(1, 43)	0.0610
Likelihood ratio	12.44031	1	0.0512

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.000381	1	0.000381
Restricted SSR	0.001454	39	3.73E-05
Unrestricted SSR	0.001073	38	2.82E-05

LR test summary:

	Value
Restricted LogL	151.8883
Unrestricted LogL	158.1084

Unrestricted Test Equation:

Dependent Variable: ROAA1

Method: Least Squares

Date: 11/02/21 Time: 20:24

Sample: 2008Q1 2018Q1

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.526384	0.150886	-3.488612	0.0012
PSOA1	0.064930	0.018273	3.553396	0.0010
FITTED^2	746.1671	203.3034	3.670214	0.0007

R-squared	0.305755	Mean dependent var	0.026256
Adjusted R-squared	0.269215	S.D. dependent var	0.006217
S.E. of regression	0.005315	Akaike info criterion	-7.566264
Sum squared resid	0.001073	Schwarz criterion	-7.440880
Log likelihood	158.1084	Hannan-Quinn criter.	-7.520606
F-statistic	8.367845	Durbin-Watson stat	1.230977
Prob(F-statistic)	0.000974		

The T-stats and F-stats are greater than 0.05 meaning that the model well specified and the relationship between ROA and PSO is linear

Source: Stat. (E-view version 10)

Table 32

Auto-correlation test on Return on asset for company A

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	7.177603	Prob. F(2,37)	0.0591
Obs*R-squared	11.46064	Prob. Chi-Square(2)	0.0608

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/02/21 Time: 20:27

Sample: 2008Q1 2018Q1

Included observations: 41

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000445	0.001049	-0.423925	0.6741
PSOA1	0.001078	0.001158	0.931255	0.3578
RESID(-1)	0.424660	0.163033	2.604757	0.0132
RESID(-2)	0.219282	0.167553	1.308731	0.1987

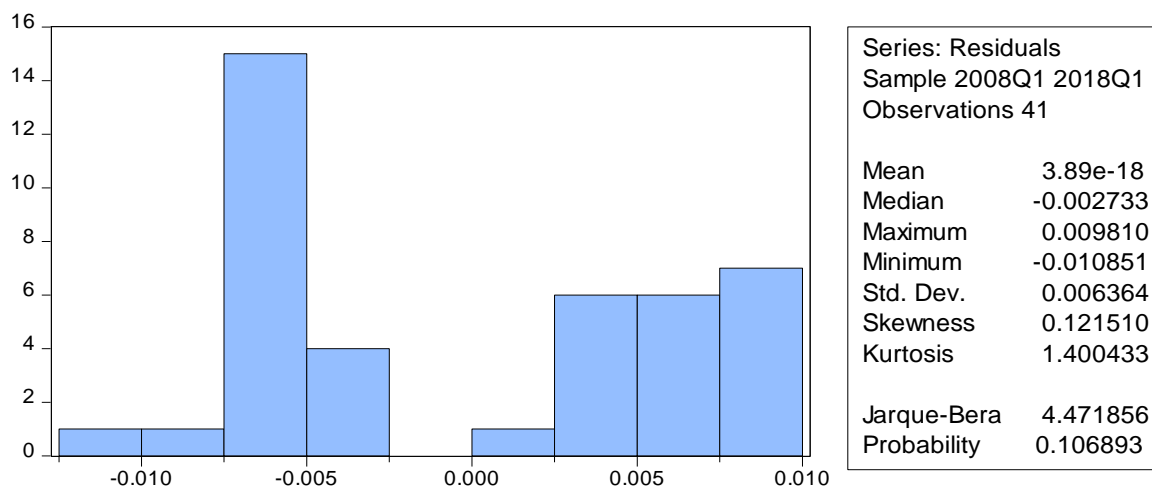
R-squared	0.279528	Mean dependent var	-1.73E-18
Adjusted R-squared	0.221111	S.D. dependent var	0.006029
S.E. of regression	0.005321	Akaike info criterion	-7.541909
Sum squared resid	0.001048	Schwarz criterion	-7.374732
Log likelihood	158.6091	Hannan-Quinn criter.	-7.481032
F-statistic	4.785069	Durbin-Watson stat	1.937042
Prob(F-statistic)	0.006459		

The f-stats are more than 0.05 meaning that there is no problem of auto correlation between ROA and PSO in the model

Source: Stat. (E-view version 10)

Figure 31

Normality test on Return on asset for company A



The probability value is greater 0.05 which means that there is no evidence of non-normality in the model thus confirming that the model data are normally distributed

Source: Stat. (E-view version 10)

Table 33

Heteroskedasticity test on Return on asset for company B

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	17.04764	Prob. F(1,39)	0.2002
Obs*R-squared	12.47070	Prob. Chi-Square(1)	0.1004
Scaled explained SS	2.259190	Prob. Chi-Square(1)	0.1328

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/02/21 Time: 20:35

Sample: 2008Q1 2018Q1

Included observations: 41

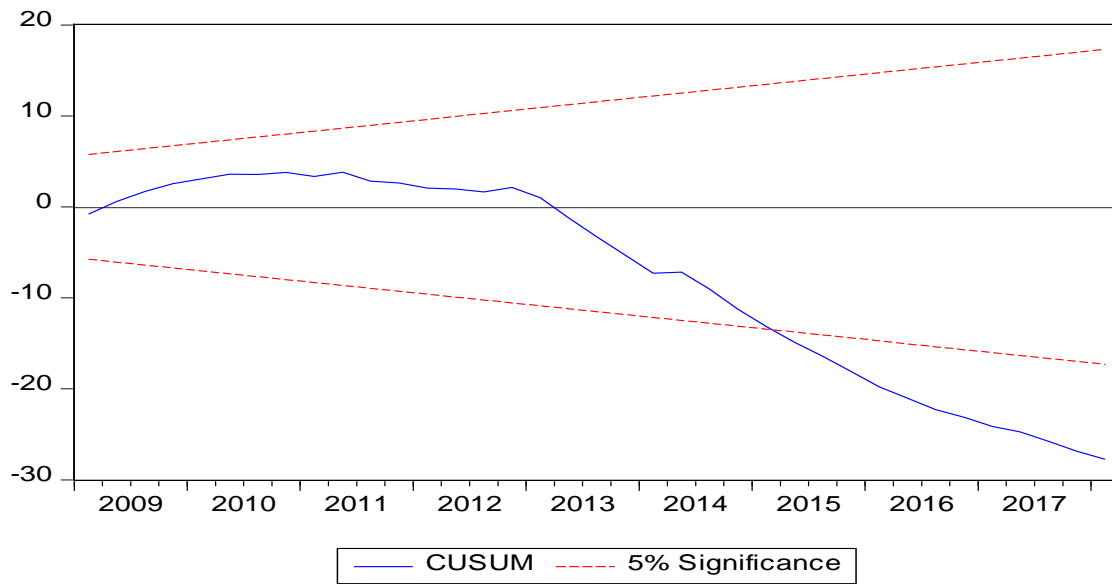
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.91E-05	4.18E-06	6.955567	0.0000
PSOA1	1.85E-05	4.48E-06	4.128879	0.0002

R-squared	0.304163	Mean dependent var	3.95E-05
Adjusted R-squared	0.286321	S.D. dependent var	2.53E-05
S.E. of regression	2.14E-05	Akaike info criterion	-18.62002
Sum squared resid	1.78E-08	Schwarz criterion	-18.53643
Log likelihood	383.7105	Hannan-Quinn criter.	-18.58958
F-statistic	17.04764	Durbin-Watson stat	1.539217
Prob(F-statistic)	0.000186		

Source: Stat. (E-view version 10)

Figure 32

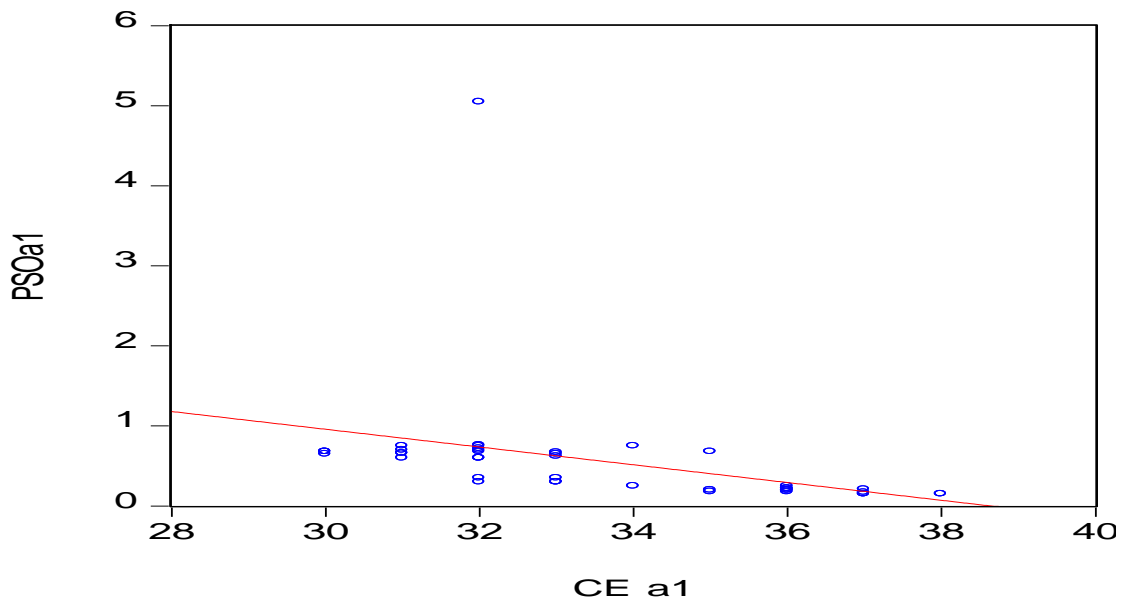
Stability Test on Return on asset for company A



Source: Stat. (E-view version 10)

Figure 33

Linearity test on Collection Efficiency and PSO for company A



Source: Stat. (E-view version 10)

Table 34

Ramsey RESET Test on Collection Efficiency and PSO for company A

Equation: UNTITLED

Specification: CE_A1 C PSOA1

Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	7.958695	44	0.0530
F-statistic	63.34082	(1, 43)	0.0620
Likelihood ratio	40.21703	1	0.0561

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	124.0897	1	124.0897
Restricted SSR	198.5347	44	5.090632
Unrestricted SSR	74.44500	43	1.959079

LR test summary:

	Value
Restricted LogL	-90.51301
Unrestricted LogL	-70.40449

Unrestricted Test Equation:

Dependent Variable: CE_A1

Method: Least Squares

Date: 11/02/21 Time: 20:38

Sample: 2008Q1 2018Q1

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1628.265	208.8842	-7.795057	0.0000
PSOA1	97.32166	12.36989	7.867628	0.0000
FITTED^2	1.425910	0.179164	7.958695	0.0000

R-squared	0.670739	Mean dependent var	33.56098
Adjusted R-squared	0.653410	S.D. dependent var	2.377486
S.E. of regression	1.399671	Akaike info criterion	3.580707
Sum squared resid	74.44500	Schwarz criterion	3.706090
Log likelihood	-70.40449	Hannan-Quinn criter.	3.626365
F-statistic	38.70507	Durbin-Watson stat	0.858743
Prob(F-statistic)	0.000000		

The T-stats and F-stats are greater than 0.05 meaning that the model well specified and the relationship between ROA and PSE is linear

Table 35

Auto-correlation test on Collection Efficiency for company A

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	30.77871	Prob. F(2,37)	0.0598
Obs*R-squared	25.60796	Prob. Chi-Square(2)	0.0512

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/02/21 Time: 20:40

Sample: 2008Q1 2018Q1

Included observations: 41

Presample missing value lagged residuals set to zero.

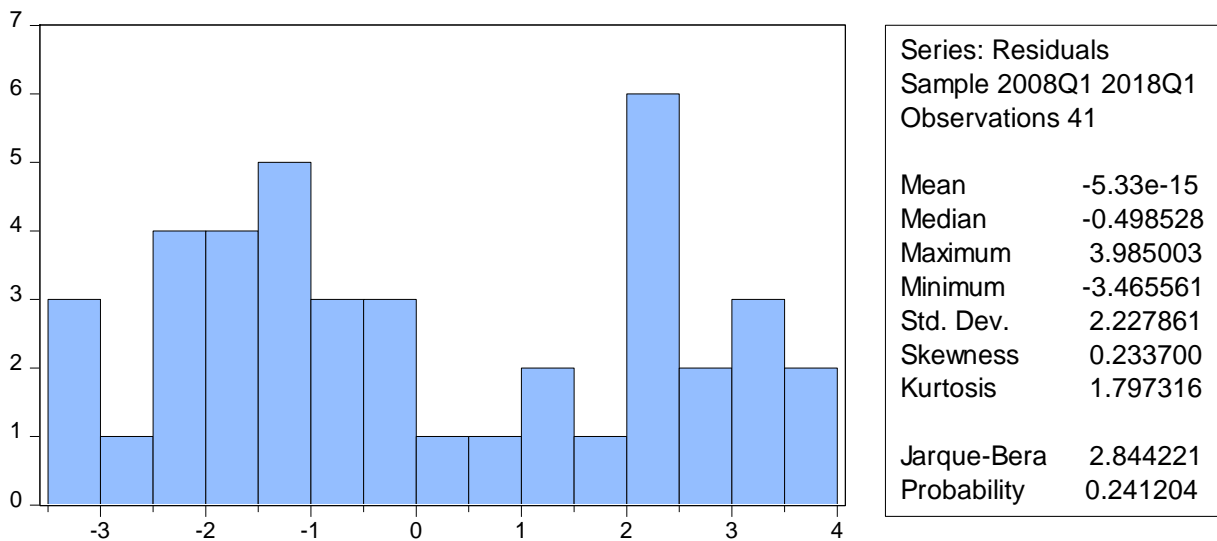
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.372410	0.281922	-1.320969	0.1946
PSOA1	0.865492	0.321145	2.695016	0.0105
RESID(-1)	0.702003	0.150006	4.679846	0.0000
RESID(-2)	0.240638	0.161233	1.492487	0.1440

R-squared	0.624584	Mean dependent var	-5.33E-15
Adjusted R-squared	0.594145	S.D. dependent var	2.227861
S.E. of regression	1.419298	Akaike info criterion	3.630669
Sum squared resid	74.53303	Schwarz criterion	3.797847
Log likelihood	-70.42872	Hannan-Quinn criter.	3.691546
F-statistic	20.51914	Durbin-Watson stat	1.670505
Prob(F-statistic)	0.000000		

Source: Stat. (E-view version 10)

Figure 34

Normality test on Collection Efficiency for company A



The probability value is greater 0.05 which means that there is no evidence of non-normality in the model thus confirming that the model data are normally distributed

Table 36

Heteroskedasticity test on Collection Efficiency for company A

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.005732	Prob. F(1,39)	0.3221
Obs*R-squared	1.030728	Prob. Chi-Square(1)	0.3100
Scaled explained SS	0.371797	Prob. Chi-Square(1)	0.5420

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/02/21 Time: 20:41

Sample: 2008Q1 2018Q1

Included observations: 41

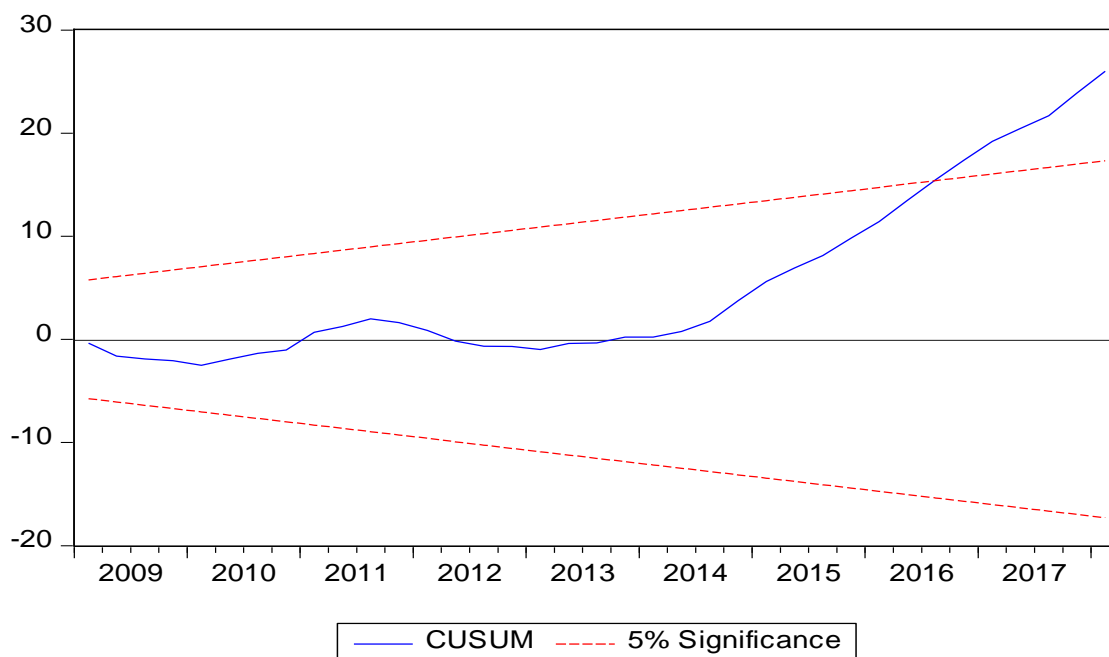
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.324864	0.856471	5.049634	0.0000
PSOA1	0.918806	0.916184	1.002862	0.3221

R-squared	0.025140	Mean dependent var	4.842309
Adjusted R-squared	0.000143	S.D. dependent var	4.377536
S.E. of regression	4.377222	Akaike info criterion	5.838256
Sum squared resid	747.2429	Schwarz criterion	5.921845
Log likelihood	-117.6843	Hannan-Quinn criter.	5.868695
F-statistic	1.005732	Durbin-Watson stat	1.064429
Prob(F-statistic)	0.322109		

The values of F-stats and observed f-stats are greater than 0.05 which means that there is no evidence of Heteroskedasticity. Thus the model is homosadastic

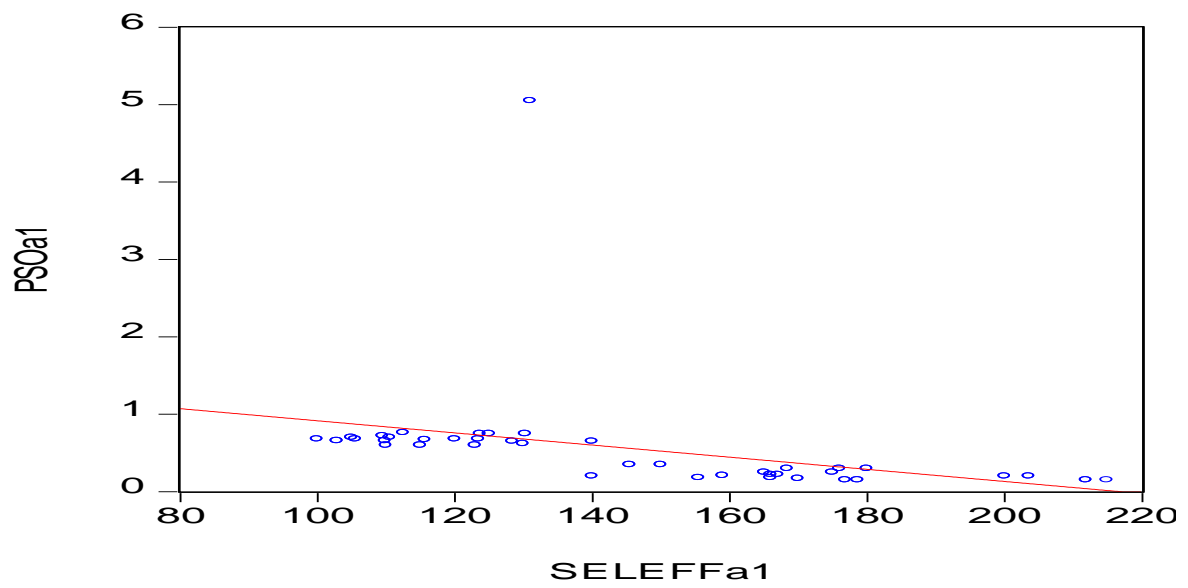
Figure 35

Stability test on Collection Efficiency for company A



Source: Stat. (E-view version 10)

Figure 36 Linearity test on Sales Efficiency and PSO for company A



Source: Stat. (E-view version 10)

Table 37**Ramsey Test on Sales Efficiency and PSO for company A**

Ramsey RESET Test

Equation: UNTITLED

Specification: SELEFFA1 C PSOA1

Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	10.86179	40	0.0510
F-statistic	117.9785	(1, 40)	0.0760
Likelihood ratio	57.89740	1	0.0620

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	28399.48	1	28399.48
Restricted SSR	37546.75	40	962.7371
Unrestricted SSR	9147.266	40	240.7175

LR test summary:

	Value
Restricted LogL	-197.9818
Unrestricted LogL	-169.0331

Unrestricted Test Equation:

Dependent Variable: SELEFFA1

Method: Least Squares

Date: 11/02/21 Time: 20:43

Sample: 2008Q1 2018Q1

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2676.994	260.5728	-10.27350	0.0000
PSOA1	401.8744	38.47638	10.44470	0.0000
FITTED^2	0.122926	0.011317	10.86179	0.0000

R-squared	0.784179	Mean dependent var	144.9032
Adjusted R-squared	0.772820	S.D. dependent var	32.55133
S.E. of regression	15.51507	Akaike info criterion	8.391857
Sum squared resid	9147.266	Schwarz criterion	8.517240
Log likelihood	-169.0331	Hannan-Quinn criter.	8.437514
F-statistic	69.03591	Durbin-Watson stat	0.595330
Prob(F-statistic)	0.000000		

The T-stats and F-stats are greater than 0.05 meaning that the model well specified and the relationship between ROA and PSE is linear

Source: Stat. (E-view version 10)

Table 38

Auto-correlation teston Sales efficiency for company A

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	66.91417	Prob. F(2,37)	0.1200
Obs*R-squared	32.11974	Prob. Chi-Square(2)	0.0970

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/02/21 Time: 20:45

Sample: 2008Q1 2018Q1

Included observations: 41

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.278783	2.969050	-2.451553	0.0191
PSOA1	16.84119	3.441068	4.894176	0.0000
RESID(-1)	0.789592	0.127883	6.174351	0.0000
RESID(-2)	0.319420	0.136791	2.335100	0.0251

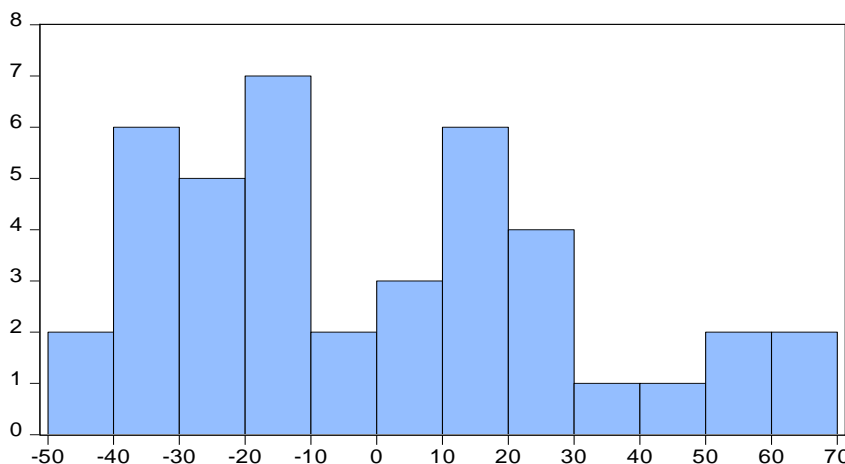
R-squared	0.783408	Mean dependent var	-2.04E-14
Adjusted R-squared	0.765847	S.D. dependent var	30.63770
S.E. of regression	14.82539	Akaike info criterion	8.323028
Sum squared resid	8132.314	Schwarz criterion	8.490206
Log likelihood	-166.6221	Hannan-Quinn criter.	8.383905
F-statistic	44.60944	Durbin-Watson stat	1.435135
Prob(F-statistic)	0.000000		

The f stats are more than 0.05 meaning that the there is no problem of auto correlation between ROA and PSO in the model

Source: Stat. (E-view version 10)

Table37

Normality test on Sales Efficiency and PSO for company A



Series: Residuals	
Sample 2008Q1 2018Q1	
Observations 41	
Mean	-2.04e-14
Median	-3.629219
Maximum	63.98241
Minimum	-43.17252
Std. Dev.	30.63770
Skewness	0.451427
Kurtosis	2.143601
Jarque-Bera	2.645463
Probability	0.266407

Source: Stat. (E-view version 10)

The probability value is greater 0.05 which means that there is no evidence of non-normality in the model thus confirming that the model data are normally distributed

Table 39

Heteroskedasticity test on Sales Efficiency for company A

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.957573	Prob. F(1,39)	0.1697
Obs*R-squared	1.959601	Prob. Chi-Square(1)	0.1616
Scaled explained SS	1.013850	Prob. Chi-Square(1)	0.3140

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/02/21 Time: 20:46

Sample: 2008Q1 2018Q1

Included observations: 41

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	754.1771	191.7187	3.933770	0.0003
PSOA1	286.9417	205.0854	1.399133	0.1697

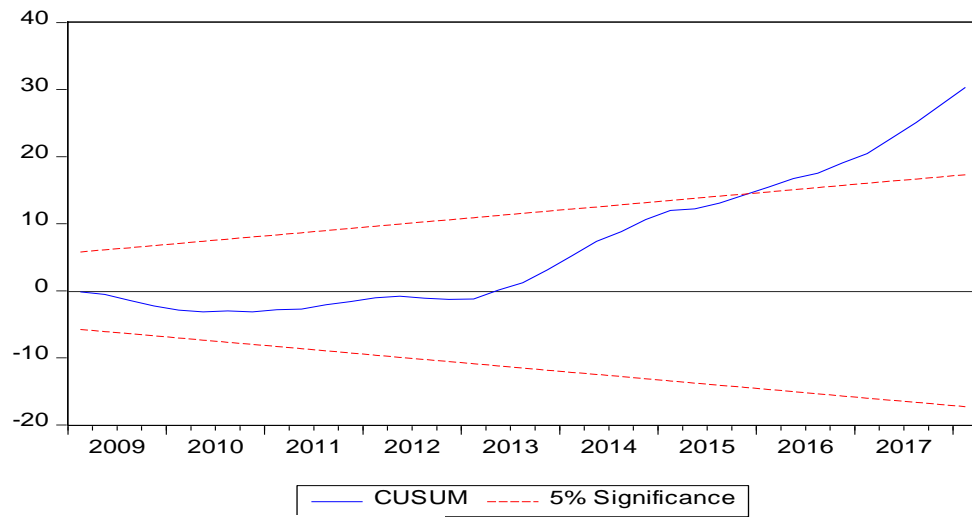
R-squared	0.047795	Mean dependent var	915.7743
Adjusted R-squared	0.023380	S.D. dependent var	991.4883
S.E. of regression	979.8294	Akaike info criterion	16.66018
Sum squared resid	37442564	Schwarz criterion	16.74377
Log likelihood	-339.5338	Hannan-Quinn criter.	16.69062
F-statistic	1.957573	Durbin-Watson stat	0.312028
Prob(F-statistic)	0.169676		

Source: Stat. (E-view version 10)

The values of F-stats and observed f-stats are greater than 0.05 which means that there is no evidence of Heteroskedasticity. Thus the model is homosadastic

Figure 38

Stability test on Sales Efficiency for company A

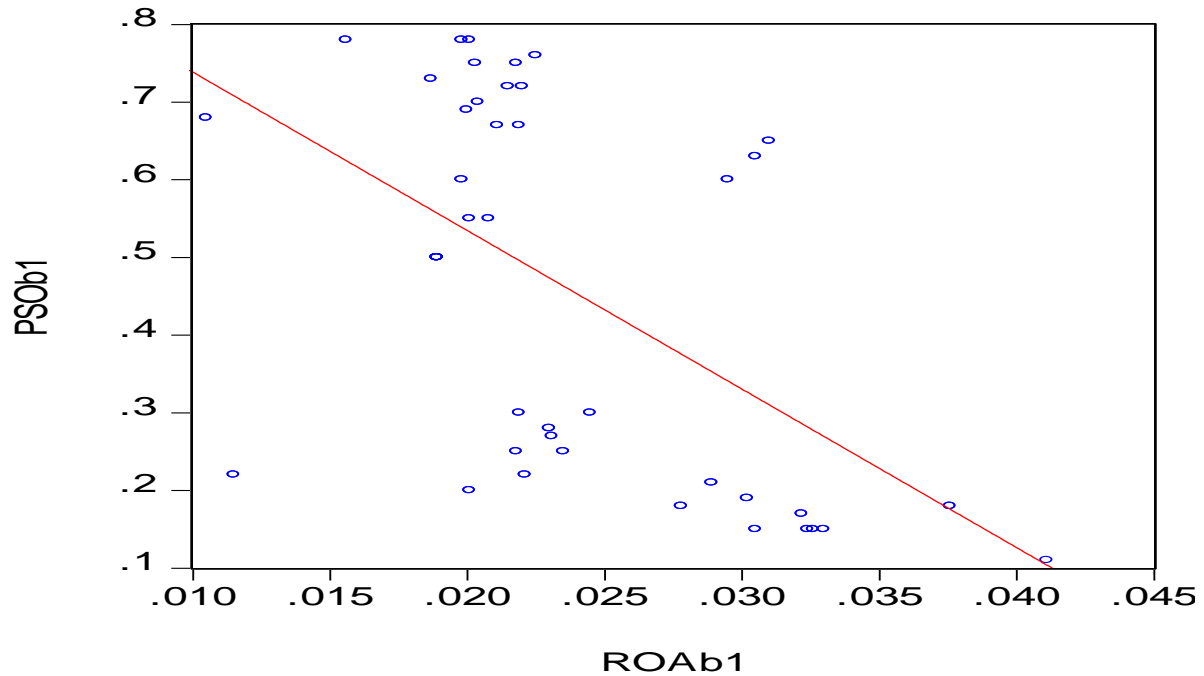


Source: Stat. (E-view version 10)

FOR COMPOANY B

Figure39

Linearity test on ROA and PSO for company B



Source: Stat. (E-view version 10)

Table40

Ramsey RESET Test on Return on asset for company B

Equation: UNTITLED

Specification: ROAB1 C PSOB1

Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	2.533061	40	0.5153
F-statistic	6.416400	(1, 40)	0.7173
Likelihood ratio	6.397256	1	0.5114

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	0.000168	1	0.000168
Restricted SSR	0.001215	41	2.96E-05
Unrestricted SSR	0.001047	40	2.62E-05

LR test summary:

	Value
Restricted LogL	164.1885
Unrestricted LogL	167.3872

Unrestricted Test Equation:
Dependent Variable: ROAB1

Method: Least Squares
 Date: 11/02/21 Time: 19:42
 Sample: 2008Q1 2018Q3
 Included observations: 43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.224771	0.100759	-2.230775	0.0314
PSOB1	0.183720	0.078349	2.344890	0.0241
FITTED^2	285.3757	112.6604	2.533061	0.0153
R-squared	0.394429	Mean dependent var		0.023751
Adjusted R-squared	0.364150	S.D. dependent var		0.006415
S.E. of regression	0.005115	Akaike info criterion		-7.645915
Sum squared resid	0.001047	Schwarz criterion		-7.523040
Log likelihood	167.3872	Hannan-Quinn criter.		-7.600603
F-statistic	13.02668	Durbin-Watson stat		0.889974
Prob(F-statistic)	0.000044			

The T-stats and F-stats are greater than 0.05 meaning that the model well specified and the relationship between ROA and PSE is linear

Table 41

Auto-correlation test on PSO for company B

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	13.34535	Prob. F(2,39)	0.5610
Obs*R-squared	17.47127	Prob. Chi-Square(2)	0.5122

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/02/21 Time: 19:45

Sample: 2008Q1 2018Q3

Included observations: 43

Presample missing value lagged residuals set to zero.

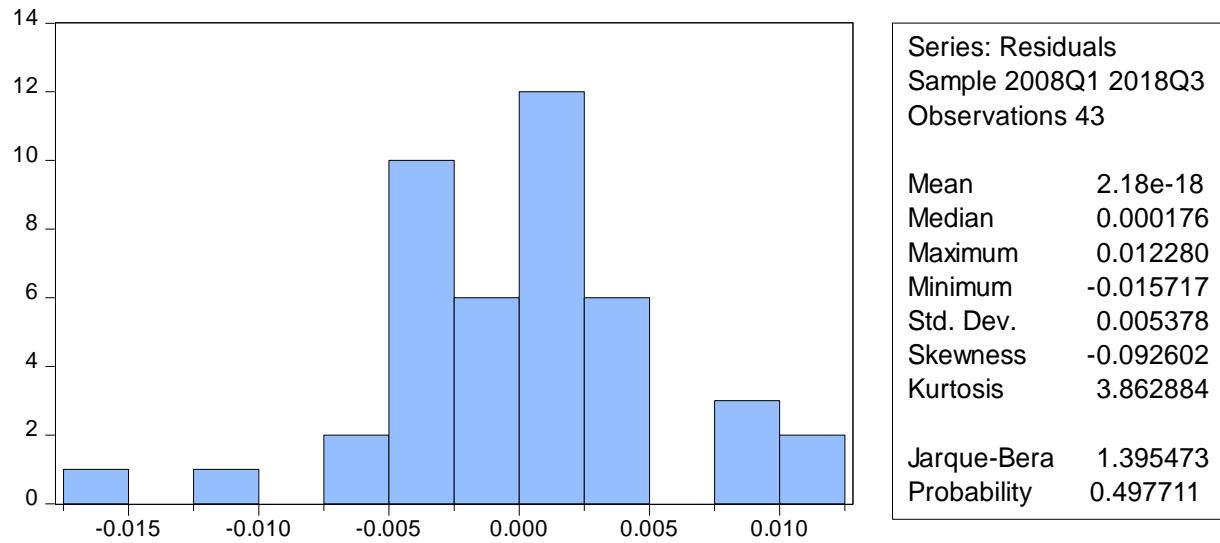
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001158	0.001464	0.791557	0.4334
PSOB1	-0.002009	0.002821	-0.711961	0.4807
RESID(-1)	0.614325	0.162211	3.787201	0.0005
RESID(-2)	0.123290	0.173139	0.712089	0.4806
R-squared	0.406309	Mean dependent var		2.18E-18
Adjusted R-squared	0.360640	S.D. dependent var		0.005378
S.E. of regression	0.004300	Akaike info criterion		-7.972025
Sum squared resid	0.000721	Schwarz criterion		-7.808193
Log likelihood	175.3985	Hannan-Quinn criter.		-7.911609
F-statistic	8.896898	Durbin-Watson stat		1.941418
Prob(F-statistic)	0.000129			

Source: Stat. (E-view version 10)

The f stats are more than 0.05 meaning that there is no problem of auto correlation between ROA and PSO in the model

Figure 40

Normality test



Source: Stat. (E-view version 10)

The probability value is greater 0.05 which means that there is no evidence of non-normality in the model thus confirming that the model data are normally distributed

Table 42

Heteroskedasticity test on PSO for company B

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.609386	Prob. F(1,41)	0.1139
Obs*R-squared	2.572923	Prob. Chi-Square(1)	0.1087
Scaled explained SS	3.348353	Prob. Chi-Square(1)	0.0673

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/02/21 Time: 19:47

Sample: 2008Q1 2018Q3

Included observations: 43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.08E-05	1.57E-05	3.229930	0.0024
PSOB1	-4.93E-05	3.05E-05	-1.615359	0.1139

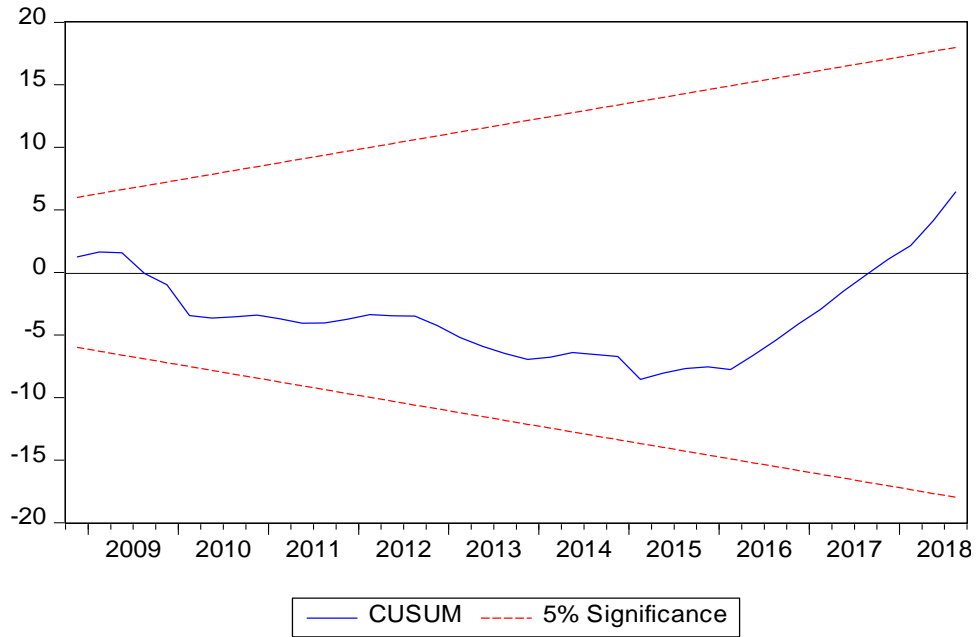
R-squared	0.059835	Mean dependent var	2.82E-05
Adjusted R-squared	0.036905	S.D. dependent var	4.84E-05
S.E. of regression	4.75E-05	Akaike info criterion	-17.02808
Sum squared resid	9.23E-08	Schwarz criterion	-16.94616
Log likelihood	368.1037	Hannan-Quinn criter.	-16.99787
F-statistic	2.609386	Durbin-Watson stat	1.644608
Prob(F-statistic)	0.113903		

Source: Stat. (E-view version 10)

The values of F-stats and observed f-stats are greater than 0.05 which means that there is no evidence of Heteroskedasticity. Thus the model is homosadastic

Figure 41

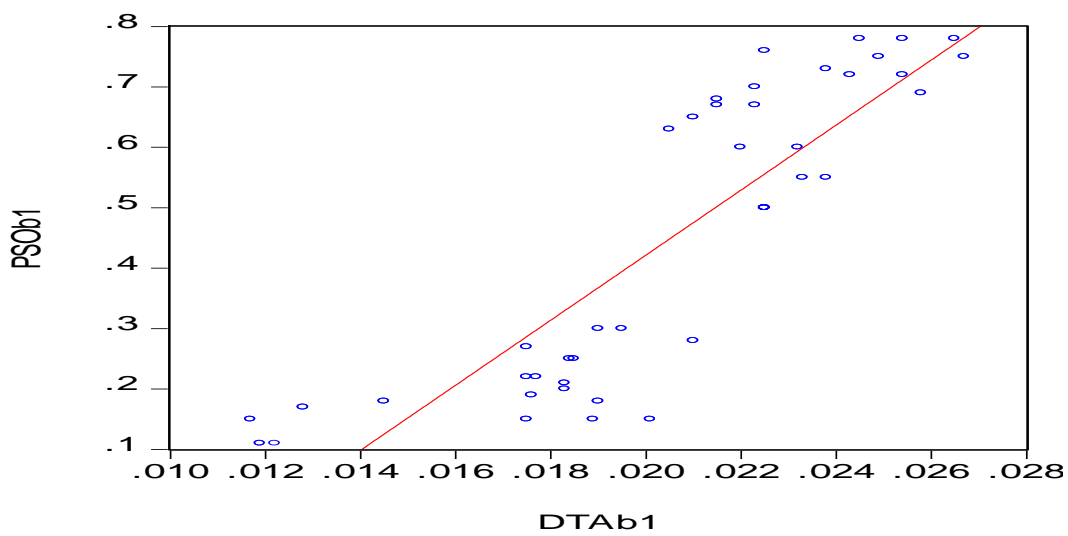
STABILITY TEST



Source: Stat. (E-view version 10)

Figure 42

LINEARITY test on Debt to asset and PSO for company B



Source: Stat. (E-view version 10)

Table 43

Ramsey RESET Test on Debt to asset and PSO for company B

Equation: UNTITLED

Specification: DTAB1 C PSOB1

Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	1.928302	41	0.0608
F-statistic	3.718348	(1, 41)	0.0534
Likelihood ratio	3.819720	1	0.0507

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	1.38E-05	1	1.38E-05
Restricted SSR	0.000166	42	3.96E-06
Unrestricted SSR	0.000152	41	3.72E-06

LR test summary:

	Value
Restricted LogL	212.2695
Unrestricted LogL	214.1794

Unrestricted Test Equation:

Dependent Variable: DTAB1

Method: Least Squares

Date: 11/02/21 Time: 19:52

Sample: 2008Q1 2018Q4

Included observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.029748	0.008040	3.700160	0.0006
PSOB1	0.063453	0.025750	2.464196	0.0180
FITTED^2	-87.37396	45.31135	-1.928302	0.0608
R-squared	0.766857	Mean dependent var		0.020525
Adjusted R-squared	0.755484	S.D. dependent var		0.003899
S.E. of regression	0.001928	Akaike info criterion		-9.599062
Sum squared resid	0.000152	Schwarz criterion		-9.477413
Log likelihood	214.1794	Hannan-Quinn criter.		-9.553949
F-statistic	67.42879	Durbin-Watson stat		0.912284
Prob(F-statistic)	0.000000			

Source: Stat. (E-view version 10)

The T-stats and F-stats are greater than 0.05 meaning that the model well specified and the relationship between ROA and PSE is linear

Table 44

Auto-correlation test on Debt to asset for company B

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	10.00375	Prob. F(2,40)	0.3103
Obs*R-squared	14.67034	Prob. Chi-Square(2)	0.2407

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/02/21 Time: 19:53

Sample: 2008Q1 2018Q4

Included observations: 44

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000289	0.000542	-0.534157	0.5962
PSOB1	0.000492	0.001057	0.465605	0.6440
RESID(-1)	0.522063	0.157680	3.310899	0.0020
RESID(-2)	0.145970	0.168277	0.867444	0.3909

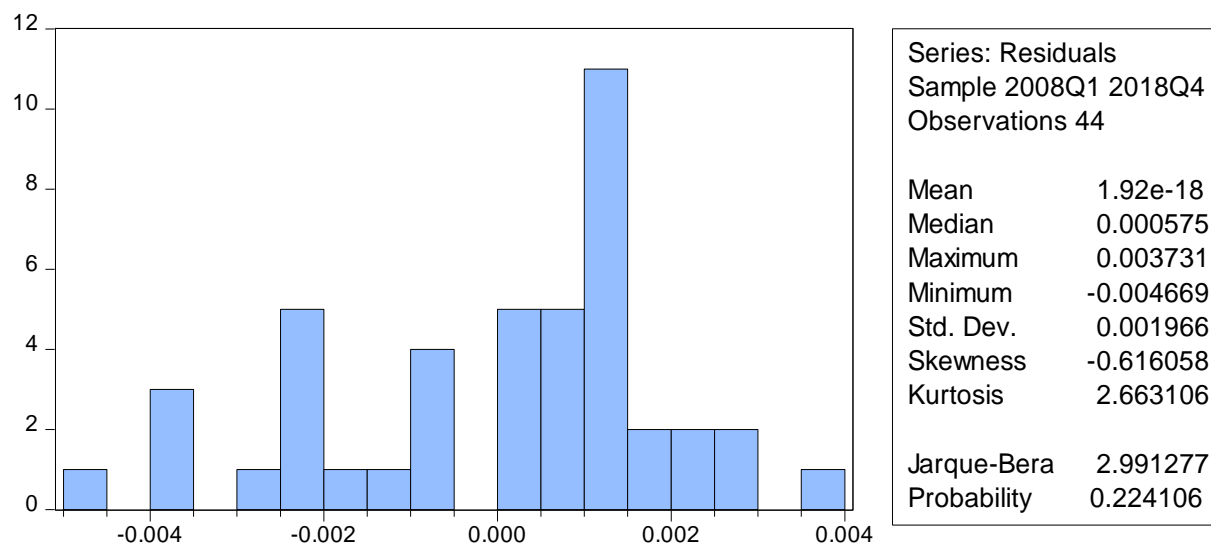
R-squared	0.333417	Mean dependent var	1.92E-18
Adjusted R-squared	0.283423	S.D. dependent var	0.001966
S.E. of regression	0.001664	Akaike info criterion	-9.872386
Sum squared resid	0.000111	Schwarz criterion	-9.710187
Log likelihood	221.1925	Hannan-Quinn criter.	-9.812235
F-statistic	6.669169	Durbin-Watson stat	1.982887
Prob(F-statistic)	0.000931		

The f stats are more than 0.05 meaning that there is no problem of auto correlation between ROA and PSO in the model

Source: Stat. (E-view version 10)

Figure 43

Normality test on Debt to asset for company B



Source: Stat. (E-view version 10)The probability value is greater than 0.0 5 which means that there is no evidence of non-normality in the model thus confirming that the model data are normally distributed

Table 45

Heteroskedasticity test on Debt to asset for company B

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	8.199846	Prob. F(1,42)	0.0765
Obs*R-squared	7.187138	Prob. Chi-Square(1)	0.0973
Scaled explained SS	5.445518	Prob. Chi-Square(1)	0.0616

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/02/21 Time: 19:54

Sample: 2008Q1 2018Q4

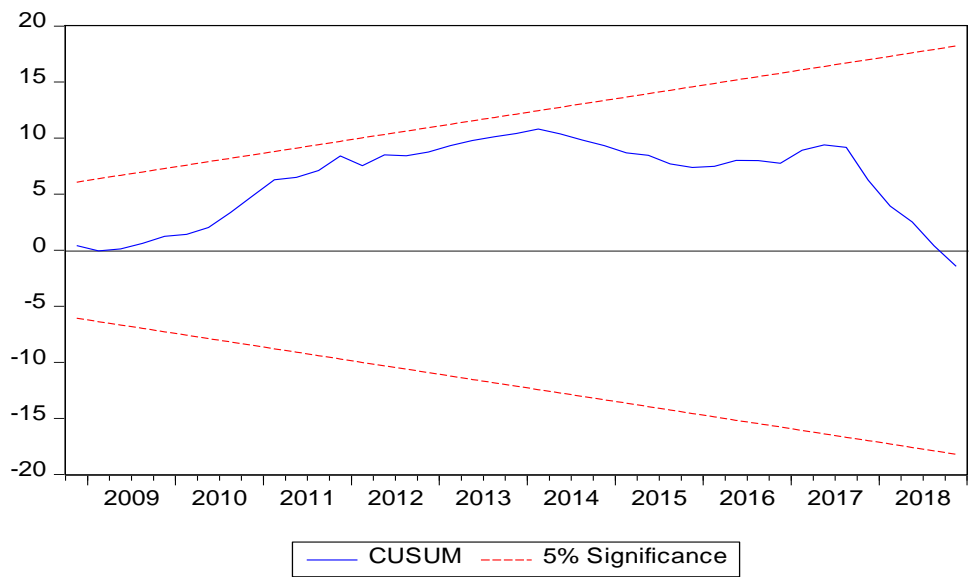
Included observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.47E-06	1.46E-06	5.113510	0.0000
PSOB1	-8.20E-06	2.86E-06	-2.863537	0.0065

R-squared	0.163344	Mean dependent var	3.78E-06
Adjusted R-squared	0.143424	S.D. dependent var	4.93E-06
S.E. of regression	4.56E-06	Akaike info criterion	-21.71385
Sum squared resid	8.74E-10	Schwarz criterion	-21.63275
Log likelihood	479.7047	Hannan-Quinn criter.	-21.68378
F-statistic	8.199846	Durbin-Watson stat	1.294067

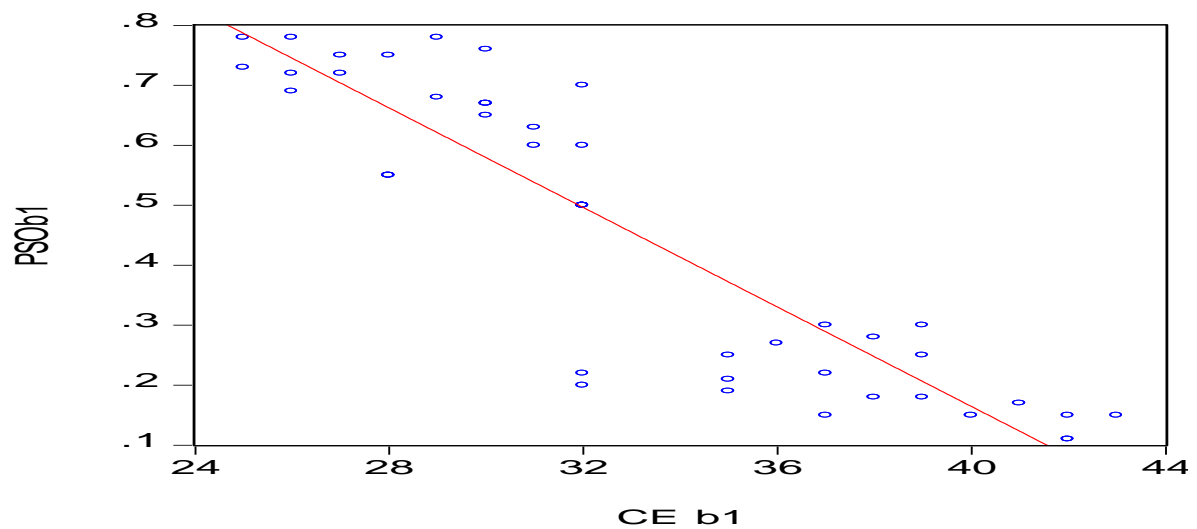
The values of F-stats and observed f-stats are greater than 0.05 which means that there is no evidence of Heteroskedasticity. Thus the model is homosadastic

Figure 44
Stability test on Debt to asset for company B



Source: Stat. (E-view version 10)

Figure 45
Linearity test on Collection Efficiency and PSO for company B



Source: Stat. (E-view version 10)

Table 46**Ramsey RESET Test on Collection Efficiency for company B**

Equation: UNTITLED

Specification: CE_B1 C PSOB1

Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	1.024660	41	0.3115
F-statistic	1.049929	(1, 41)	0.3115
Likelihood ratio	1.112568	1	0.2915

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	5.785434	1	5.785434
Restricted SSR	231.7081	42	5.516861
Unrestricted SSR	225.9227	41	5.510310

LR test summary:

	Value
Restricted LogL	-98.98165
Unrestricted LogL	-98.42537

Unrestricted Test Equation:

Dependent Variable: CE_B1

Method: Least Squares

Date: 11/02/21 Time: 20:02

Sample: 2008Q1 2018Q4

Included observations: 44

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.044614	47.72201	-0.147618	0.8834
PSOB1	17.67133	36.21896	0.487903	0.6282
FITTED^2	0.028800	0.028107	1.024660	0.3115
R-squared	0.809898	Mean dependent var		33.11364
Adjusted R-squared	0.800625	S.D. dependent var		5.257181
S.E. of regression	2.347405	Akaike info criterion		4.610244
Sum squared resid	225.9227	Schwarz criterion		4.731893
Log likelihood	-98.42537	Hannan-Quinn criter.		4.655357
F-statistic	87.33711	Durbin-Watson stat		1.278730
Prob(F-statistic)	0.000000			

Source: Stat. (E-view version 10)

The T-stats and F-stats are greater than 0.05 meaning that the model well specified and the relationship between ROA and PSE is linear

Table 47

Auto-correlation test on Collection Efficiency for company B

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.701419	Prob. F(2,40)	0.0793
Obs*R-squared	5.235903	Prob. Chi-Square(2)	0.0730

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/02/21 Time: 20:00

Sample: 2008Q1 2018Q4

Included observations: 44

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.093650	0.727007	0.128815	0.8981
PSOB1	-0.166778	1.423620	-0.117151	0.9073
RESID(-1)	0.347798	0.159010	2.187278	0.0346
RESID(-2)	0.005024	0.161453	0.031118	0.9753

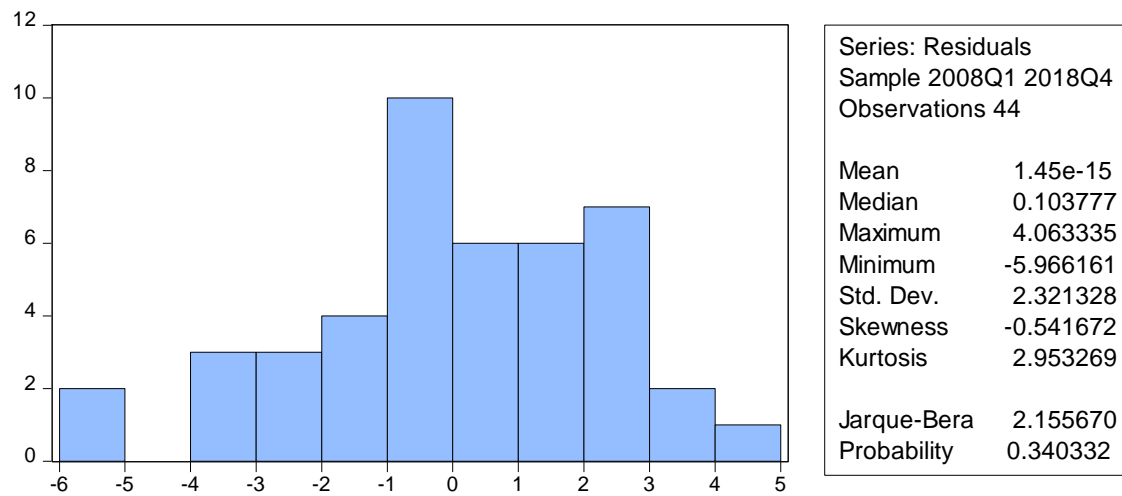
R-squared	0.118998	Mean dependent var	1.45E-15
Adjusted R-squared	0.052923	S.D. dependent var	2.321328
S.E. of regression	2.259067	Akaike info criterion	4.554289
Sum squared resid	204.1354	Schwarz criterion	4.716488
Log likelihood	-96.19436	Hannan-Quinn criter.	4.614440
F-statistic	1.800946	Durbin-Watson stat	1.939976
Prob(F-statistic)	0.162533		

Source: Stat. (E-view version 10)

The f stats are more than 0.05 meaning that there is no problem of auto correlation between ROA and PSO in the model

Figure 46

Normality test on Collection Efficiency for company B



Source: Stat. (E-view version 10)

The probability value is greater than 0.05 which means that there is no evidence of non-normality in the model thus confirming that the model data are normally distributed

Table 48

Heteroskedasticity test on Collection Efficiency for company B

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	3.412174	Prob. F(1,42)	0.0718
Obs*R-squared	3.306066	Prob. Chi-Square(1)	0.0690
Scaled explained SS	2.941960	Prob. Chi-Square(1)	0.0863

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 11/02/21 Time: 20:01

Sample: 2008Q1 2018Q4

Included observations: 44

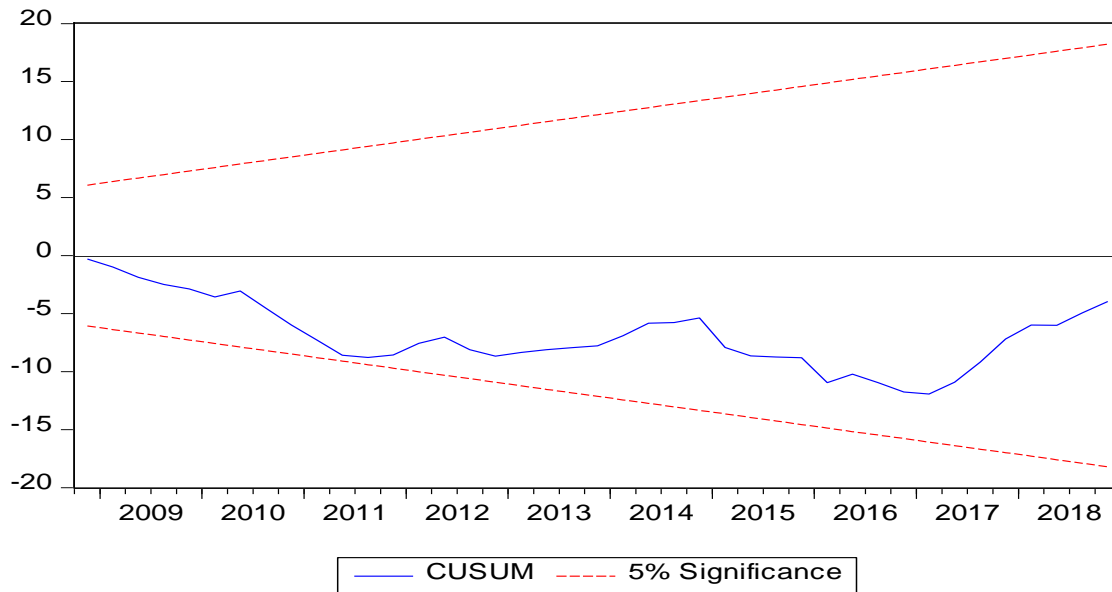
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.045054	2.319045	3.900335	0.0003
PSOB1	-8.397689	4.546155	-1.847207	0.0718

R-squared	0.075138	Mean dependent var	5.266094
Adjusted R-squared	0.053117	S.D. dependent var	7.444949
S.E. of regression	7.244523	Akaike info criterion	6.842758
Sum squared resid	2204.291	Schwarz criterion	6.923857
Log likelihood	-148.5407	Hannan-Quinn criter.	6.872833
F-statistic	3.412174	Durbin-Watson stat	2.275172
Prob(F-statistic)	0.071770		

The values of F-stats and observed f-stats are greater than 0.05 which means that there is no evidence of Heteroskedasticity. Thus the model is homosadastic

Figure 47

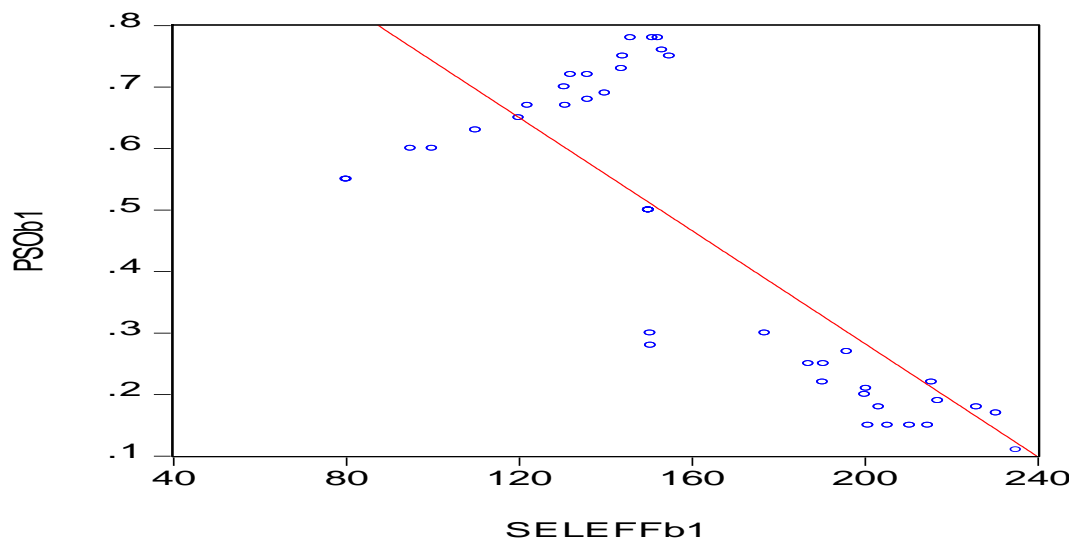
Stability test on Collection Efficiency for company B



Source: Stat. (E-view version 10)

Figure 48

Linearity test on Sales Efficiency and PSO for company B



Source: Stat. (E-view version 10)

Table 49**Ramsey RESET Test on Sales Efficiency for company B**

Equation: UNTITLED

Specification: SELEFFB1 C PSOB1

Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	7.070090	40	0.0610
F-statistic	49.98618	(1, 40)	0.0561
Likelihood ratio	34.86340	1	0.0501

F-test summary:

	Sum of Sq.	Df	Mean Squares
Test SSR	14976.83	1	14976.83
Restricted SSR	26961.61	41	657.6003
Unrestricted SSR	11984.78	40	299.6195

LR test summary:

	Value
Restricted LogL	-199.4952
Unrestricted LogL	-182.0635

Unrestricted Test Equation:

Dependent Variable: SELEFFB1

Method: Least Squares

Date: 11/02/21 Time: 20:08

Sample: 2008Q1 2018Q3

Included observations: 43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1254.291	209.1514	-5.997052	0.0000
PSOB1	1239.009	194.7239	6.362899	0.0000
FITTED^2	0.031175	0.004409	7.070090	0.0000
R-squared	0.832115	Mean dependent var		161.8436
Adjusted R-squared	0.823720	S.D. dependent var		41.22721
S.E. of regression	17.30952	Akaike info criterion		8.607604
Sum squared resid	11984.78	Schwarz criterion		8.730479
Log likelihood	-182.0635	Hannan-Quinn criter.		8.652917
F-statistic	99.12889	Durbin-Watson stat		2.611417
Prob(F-statistic)	0.000000			

Source: Stat. (E-view version 10)

The T-stats and F-stats are greater than 0.05 meaning that the model well specified and the relationship between ROA and PSE is linear

Table 50

Auto-correlation test on Sales Efficiency for company B

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	35.18927	Prob. F(2,39)	0.0561
Obs*R-squared	27.66793	Prob. Chi-Square(2)	0.0512

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 11/02/21 Time: 20:05

Sample: 2008Q1 2018Q3

Included observations: 43

Presample missing value lagged residuals set to zero.

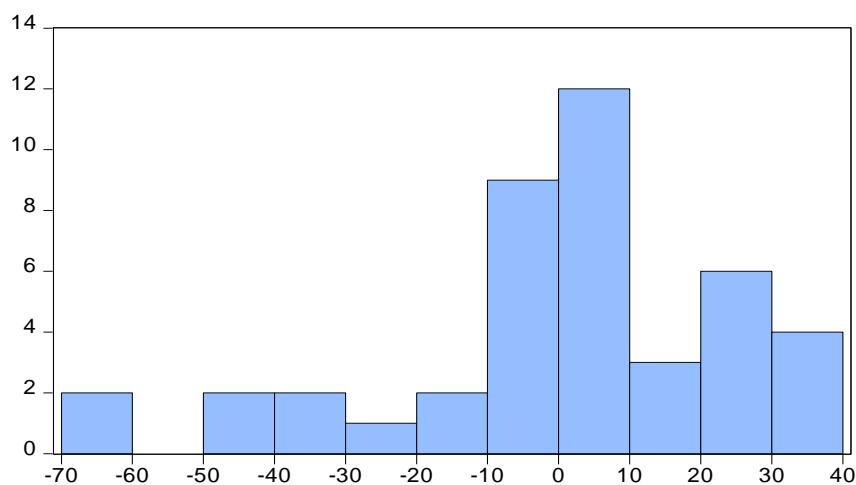
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.484889	5.204350	-0.093170	0.9262
PSOB1	1.891879	10.09924	0.187329	0.8524
RESID(-1)	0.922193	0.158527	5.817277	0.0000
RESID(-2)	-0.146170	0.160921	-0.908334	0.3693

R-squared	0.643440	Mean dependent var	-1.04E-14
Adjusted R-squared	0.616012	S.D. dependent var	25.33660
S.E. of regression	15.70026	Akaike info criterion	8.433640
Sum squared resid	9613.428	Schwarz criterion	8.597472
Log likelihood	-177.3233	Hannan-Quinn criter.	8.494056
F-statistic	23.45952	Durbin-Watson stat	1.577377
Prob(F-statistic)	0.000000		

The f stats are more than 0.05 meaning that there is no problem of auto correlation between ROA and PSO in the model

Figure 49

Normality test on Sales Efficiency for company B



Source: Stat. (E-view version 10)

The probability value is less than 0.05 which means that there is evidence of non-normality in the model thus confirming that the model data are not normally distributed

Table 51

Heteroskedasticity test on Sales Efficiency for company B

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.737570	Prob. F(1,41)	0.1948
Obs*R-squared	1.748240	Prob. Chi-Square(1)	0.1861
Scaled explained SS	2.289523	Prob. Chi-Square(1)	0.1302

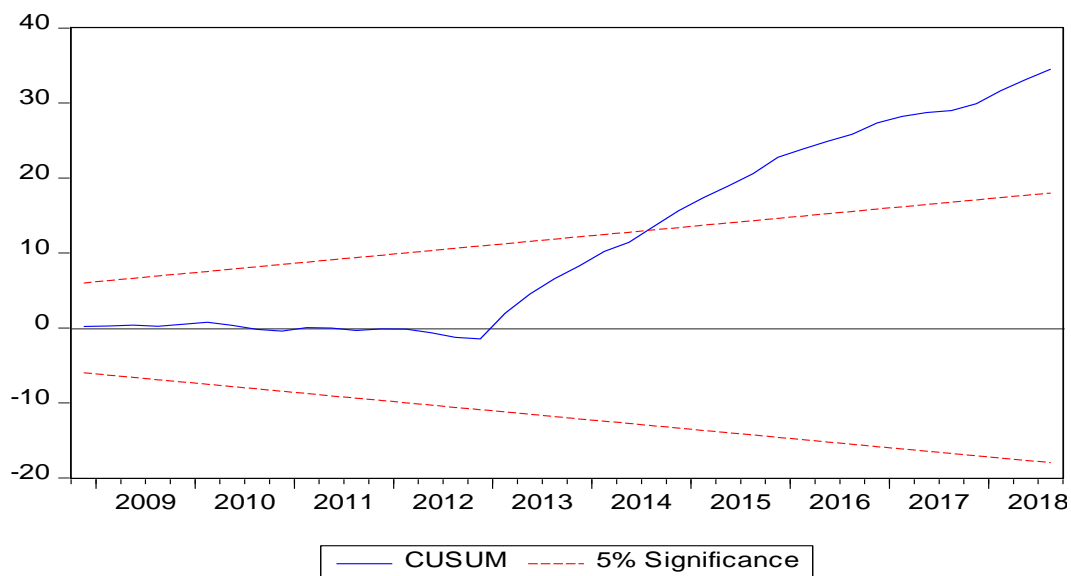
Test Equation:
 Dependent Variable: RESID^2
 Method: Least Squares
 Date: 11/02/21 Time: 20:06
 Sample: 2008Q1 2018Q3
 Included observations: 43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	212.9007	353.8330	0.601698	0.5507
PSOB1	904.3615	686.0739	1.318169	0.1948

R-squared	0.040657	Mean dependent var	627.0142
Adjusted R-squared	0.017258	S.D. dependent var	1076.858
S.E. of regression	1067.526	Akaike info criterion	16.82947
Sum squared resid	46724042	Schwarz criterion	16.91139
Log likelihood	-359.8336	Hannan-Quinn criter.	16.85968
F-statistic	1.737570	Durbin-Watson stat	1.597209
Prob(F-statistic)	0.194764		

Figure 50

Stability test on Sales Efficiency for company B



Source: Stat. (E-view version 10)