

# Risk Management in Financial Innovations and Sustainable Development in Nigeria

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## Abstract

The past two decades have recorded significant improvement in the Nigerian financial markets. The banking sector migrated from arm-chair of banking to a more sophisticated and globally competitive banking practices. The capital market has also moved from the traditional trading system to automated trading system while more marketable securities that are globally competitive are now traded in the Nigeria's capital markets. The study examined the relationship between financial innovations and the sustainable economic development in Nigeria. The study examined ATM Banking, Web (Internet) Banking, POS Banking and Mobile Banking as proxies of financial innovations and the GDP as the proxy for the nation's economic growth and development. The study established that a positive and significant relationship exists between all the variables and GDP with the exception of Mobile Banking. The study also identified some risk issues that can mitigate the positive contributions of the financial innovations to the sustainability of the Nigerian economy.

**Keywords:** Economic development and growth; GDP; Financial innovation; Risk management.



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## 1. Introduction

Developments in every facet of human endeavor be it socio-economic, political, behavioral science and even religion have been an evolving process borne out of necessity or the need for improved standard of living. The necessity attributable to the human and organizational survival prompted by adaptation to changes in nature's ecosystems or new innovations (products, technology, delivery and processes) that otherwise have led to individual or group extinction or sub-optimization of capacity. On the other hand, developments could be instigated by the need to provide a more convenient, secured and cost saving methodology in conformity with the argument that there are always better ways of doing things (Fredrick Taylor cited in (Schachter, 2010) with the end results of improved standards of living.

It is obvious from the experiences of the developed economies like Great Britain, Germany, China and United States of America that one of the key ingredients to development is innovation (Crescenzi *et al.*, 2012; Griffith and Miller, 2011; Parayil and D'Costa, 2009; Rodríguez-Pose and Storper, 2012). For instance, Kardos (2012) in his study of the relationship that exists between entrepreneurship, innovation and sustainable developments in European Union Countries discovered that sustainable entrepreneurship, seen through the perspective of innovative SMEs, is part of the support system for sustainable development, as entrepreneurial enterprises are increasingly recognized as a driving force for innovation and competitiveness, as one of the keys to achieving sustainable development. In fact, Joseph Schumpeter, one of the scholarly acknowledged early contributors to entrepreneurship development posited that innovation is the key driver of economic development (Bazhal, 2016; Kaya, 2015). Though, Joseph Schumpeter's innovation theory was confined to entrepreneurship, its applicability goes beyond entrepreneurship, it encompasses every facet of human endeavors.

These days, it is much easier to associate innovation with technology, automobile and electronics. Financial innovations are real and the need for more are obvious, but unfortunately the developing economies like Nigeria have continued to provide the markets rather than being part of the inventors and innovators. From the advent of the first revolution where steam engine Crafts (2004) powers the production of goods to the second revolution of mass and efficient production (Guduru *et al.*, 2016), then the third revolution of emergence of computers (Schwab, 2016) and now to the fourth revolution of global digitization otherwise known as internet of things (French and Shim, 2016; Khalid, 2016; Schwab, 2016) that is about to debut, innovation has been the core driver of each of the revolutions. Africa and specifically, Nigeria was not part of the first revolution, it is still grasping with the second revolution as the major ingredient of stable electricity which remains an albatross that has evaded solutions from all the nation's post-independent administrations. In his study of why industrial revolution missed Africa, Nwokeabia (2002) identified a number of reasons; such as secrecy of innovative ideas by the individual innovators that make the ideas to die with them, lack of required supports for innovators to competitively develop the ideas and lack of national recognition of innovators.

The banking sector which is a major player in the money market is one of the bedrocks of economic development as it provides liquidity to the economy. The ability of the sector to attract funds and make it available to the real and productive sectors of the economy, the better for the economy and the wellbeing of its citizenry. The style of banking in Nigeria changed dramatically in the early 1990s with the entrance of the new generation banks to the sector. The newcomers changed banking from an arm-chair style of banking where the banks waited for

customers to walk-in to more aggressive marketing system where customers are enticed with different products and the introduction of technology-banking away from manual banking amongst others. Financial innovations is not limited to the banking sector as it cuts across money market and capital market as well as the formal and informal sectors of the financial markets. For instance, the Nigerian Stock Exchange in the last one decade has introduced exchanged traded funds and indexes which track underlying securities as marketable securities. The Exchange is in the process of introducing derivatives as marketable securities. There is no doubt that such types of innovations have made the sector more liquid and robust than before with evidence of branching out to other countries in the developed economies of the world. However, the innovations would not be without its risk management challenges that could threaten not only the success of the innovations but also the going concern of the entities.

The earlier the African nation and especially Nigeria come to the realization that it's socio-economic development is to a large extent a function of its innovative abilities, the better for it to achieve the desired developmental growth. Any economy that is content with providing only markets for innovative ideas without being part of the developmental hub would continue to remain at the bottom of developmental scale. This study was aimed at examining the relationship between financial innovation and economic development in Nigeria and the risk management issues associated with such innovations that could undermine their benefits to the national economic development.

## 2. Literature Review

One aspect of innovative development is financial innovation, which encompasses advancement in not just the technology of products and processes but also the transfer and minimization of risks. Innovations can be considered radical, revolutionary or incremental weighing on the impact it has on the industry (Gardner, 2009). Radical innovations are said to be the big bangs that change the whole industry either through products or processes whilst revolutionary innovations are more subtle. The latter is considered less risky but also less profitable. Incremental innovations on the other hand are well paced improvements in the existing process/product. They seem to carry the least risk of the three with positive returns and are more common than radical and revolutionary developments. According to Llewellyn (2009) and Silber (1983), financial innovations can be described by their origins and the bank's response to external economic forces.

The history of financial innovations can be traced to the late 1600s in England, following the war in 1688. It began with the establishment of the Bank of England in 1694. It has been argued that the English financial revolution was borne out of necessity as there was a demand to manage the war debts while some have argued that it was the institution's drive to supply options to a recovering economy (Eloranta and Land, 2011) Early financial innovations started with the transition from gold and silver coins to paper money as legal tender in France, as far back as the early 1700s. Fast forward to the last few decades, more positive financial innovations include ATMs, Credit/Debit Cards, Money Market Funds, Mutual Funds, Credit Scoring, Derivatives and so many more.

There are empirical studies that have examined the importance, the role and the impact of financial innovations on the economy with varying findings. For instance, Oginni *et al.* (2013) reviewed the effects of electronic payment systems popularly known as the cashless economy, on the Nigerian economy. In their findings, they concluded that of all the e-payment systems available, only the Automated Teller Machines have contributed positively to economic growth, while others had negative effects on the economy. Some of the challenges of financial innovations in a country like Nigeria include poor infrastructure, inadequate power supply, poor regulation as well as socio-cultural support and the basic requirements to run an efficient and effective system (Echekoba, 2012).

Similarly, Odior and Banuso (2012) identified that although the drive for cashless economy is beneficial to the economy, it comes with a higher operating cost (infrastructure) and an even higher risk of increased cybercrime. It appears that Nigerians are aware of the cashless policy and have fully embraced it. However, Akhalumeh and Ohiokha (2012) agreed with Odior and Banuso (2012), that cybercrime and illiteracy are major challenges of implementing financial innovation to the benefits of the investors and the economy. Looking at other developing countries in Africa, Sanderson (2014) in his discussion about the key drivers of financial innovation mentioned that technological advancement in Zimbabwe had increased the available credit for borrowers and created cheaper ways for the financial institutions to raise capital. The duo of (Sibindi and Bimha, 2014) carried out a study on the Zimbabwean economy attempting to understand the relationship between economic growth and the banking industry and concluded that there exists a long run relationship between both as economic growth demands the development. They went on to confirm the relationship as a "demand following" finance-growth.

The former president and CEO of the Federal Reserve Bank of Cleveland, Sandra Pianalto, acknowledged the advantages of financial innovations in shaping the mortgage market of Cleveland, Ohio, USA through the provision of better and cheaper access to finance as well as more payment options. She however highlighted that these innovations have made the market and its products more complex for the average resident to understand.

Over the years, several arguments have ensued about innovations in the financial industry but more importantly the pros and cons of financial innovations. Researchers such as Elliott (2010) have identified that the measurement of the effects of financial innovation is difficult, however it is said to have aided the global financial crisis which some countries are still recovering from. In addition to the financial crisis, Johnson S. and And Kwak (2012) found that banks took larger risks leading to increase in fiscal deficit as well as job losses. According to Block (2002) financial innovation is dependent on the capital, knowledge and labor that is available in an enabling environment within an economy. Michalopoulos *et al.* (2014) further concluded that an economy will remain stagnant if there was no financial innovation in the form of instruments, technology, services and accessibility. Levine (1997) referred

to Schumpeter (1912) who argued that the role of financial institutions was more of identifying and funding viable innovations thereby sidelining the seemingly risky and unviable projects as they consider.

According to Abel (2010) the financial instruments came at a cost to Zimbabweans when the global financial crises hit and many home owners lost their homes due to the inability to refinance their mortgages as home prices continued to nose dive. He went on to suggest that the systematic risks inherent in these innovations were often underestimated by investors who in turn do not take adequate steps to minimize or avoid the risks.

Financial innovation, like all innovations, carry a certain level of risk varying from very low risk to extremely high risk. Reviewing financial innovations and the banking industry, Becalli and Poli (2015) argued that innovations have expanded the sector's ability to spread and diversify risk. He went on to cite Rajan (2006) who also posits that the ability of economies to bear more risk has created a wider access to finance for the citizens and also broadened the range of financial transactions available to the economy.

Becalli and Poli (2015) identified possible risks known as "Tail risks" which the banks knowingly or unknowingly take on as they embrace financial innovations that are incentive coated.

They went on to point out that some of these risks are recognized but neglected, which makes the industry vulnerable and negatively affected, should they crystalize. Similarly, Johnson and Kwak (2009) argued that the financial developments may be effective for the allocation of resources but not necessarily adding any value to the economy. They went on to say innovations could be deliberately deceptive to lure the user, citing the example of the Dutch and UK market for life insurance products where multiple products are presented as options but with little or no actual variation in the characteristics or benefits. This they argued would only confuse the investors, reduce transparency and indirectly worsen their capital allocation. In line with the tail risks mentioned above and similar to that of Zimbabwe, the US market also experienced a boom in its property markets as homeowners were enticed by the various options of mortgages. Unfortunately, as the risks materialized and the market began to crash, majority of them became losers. Arnaboldi and Rossignoli (2013), described the effects of financial innovations very aptly by calling it "a double-edged sword".

Akinwunmi *et al.* (2016) examined the effect of financial incentives on financial innovation adoption in the Nigerian banking sector. They discovered that financial incentives in form of attractive interest rates were effective for financial innovation adoption by increasing the bank's number of customer and deposit base. At the 2016 Bankers' Committee retreat, the Governor of the Central Bank of Nigeria, Godwin Emiefele challenged banks to come up with financial innovations to address some of the challenges of the sector to aid the Nigerian economic growth. According to Idun and Aboagye (2014) banks can play the role of innovators through the creation of new or improved products that ultimately reduce the effect of macroeconomic variables on the customers and the economy at large. Unfortunately most of the financial technologies adopted by the Nigerian banks are foreign innovations tailored to meet the needs of each institution. Although not foreign funded, Beck *et al.* (2014)'s posited that external funding of financial innovations might increase volatility in the economy which might also be applicable to these foreign designed and priced innovations which usually remain serviced by foreign counterparts. Michalopoulos *et al.* (2014)'s model postulated that there is significant correlation between the financial and technology industry which reflects in financial development and economic growth.

In Ghana, Idun and Aboagye (2014) found an adverse relation between financial innovations and economic growth in the long term whilst they had a positive relationship in the short term. Their study also considered the competition between the banks. On the contrary, a study on Kenya showed a significantly positive relationship between both variables as e-payments played a very vital role in their economic growth (Mwinzi, 2014).

Therefore this study would identify some key risks and mitigants of the financial innovations and also its impact on the Nigerian economy in addition to examining the relationship between some specific financial innovation products and the economic development and growth of Nigeria.

### 3. Data and Research Methodology

The study examined the relationship between the financial innovations represented by some financial market products (ATM Banking, Web Banking, Point of Sales Services and Mobile Banking) and the economic growth and development as represented by the nation's Gross Domestic Product (GDP). The study gather a 10 year period data covering 2006 to 2016 from the Central Bank of Nigeria (2016) to ascertain the relationship between financial innovations and the Nigerian economic growth and development. The electronic payments, otherwise known as financial innovations accounted for 3.5 percent, 3.1 percent, 3.7 percent and 3.8 percent of the 2011, 2013, 2015 and 2016 GDP growth in Nigeria respectively (Agbaje and Ayanbadejo, 2017).

The study tested one hypothesis that:

$H_0$  = There is no positive correlation between financial innovations and the Nigerian economic growth and development.

$H_1$  = There is positive correlation between financial innovations and the Nigerian economic growth and development.

The data was analysed using a multiple linear regression model adapted from Muiruri and Ngari (2014) who studied the effects of financial innovations on the financial performance of commercial banks in Kenya. The model was adapted to study the effects of financial innovations on the national economic development and growth. The model is stated as follows:

$$Y_{1t-n} = \beta_{0t-n} + \beta_1 X_{1t-n} + \beta_2 X_{2t-n} + \beta_3 X_{3t-n} + \beta_4 X_{4t-n} + \epsilon_{t-n} \quad \text{eqn. (1)}$$

Where:

$Y_{t-n}$  = National economic growth with GDP as proxy  
 $\beta_0$  = Constant Co-efficient

$\beta_1, \beta_2, \beta_3$  and  $\beta_4$  = Co-efficient of ATM Banking, WEB (Internet) Banking, POS Banking and Mobile Banking respectively

$N$  = Years of data coverage, in this case 10 years.

$\epsilon_{t-n}$  = Error term

The equation (1) above can be rewritten as:

$$Y_{1t-n} = \sum \beta_{0t-n} + \beta_1 X_{1t-n} + \epsilon_{t-n} \quad \text{eqn. (2)}$$

### 4. Results and Findings

The empirical analysis shows that the adjusted R-Square which explains the extent to which the independent variables account for the changes and behavior of the dependent variable (GDP) is 0.9937. It can therefore be explained that 99.37 percent of the changes in variable GDP is accounted for by independent variables (ATM Banking, Internet Banking, POS Banking and Mobile Banking). In other words, the adjusted R2 shows that all the explanatory variables represent or jointly determine the effect on Economic Growth or variations at 99% and the others one percent is captured by omitted variables. This indicates the importance of the variables used.

The adjusted R-Square of 0.9937 and F-Test 356.32 is > than 2,528<sub>tab</sub> are found to be significant at 0.05 level of significance, suggesting that suggesting that the proxies adopted to represent financial innovations in the model, collectively and significantly impact on the on the Nigeria’s economic growth and development as proxy by GDP. The *p-value* < 0.05. Therefore, the hypothesis that the there is no positive correlation between financial innovations and the Nigerian economic growth and development is rejected.

All the coefficients of the model are positive except for the MOBILE which shows positive or direct relationships between all the explanatory variables and the independent variable while the MOBILE shows inverse relationship. For instance, the coefficient of ATM,  $\beta_1=20.25$ , indicates that a unit increase in the level of ATM will have a positive impact on GDP to the tune of 20.25 and likewise for the coefficients of WEB and POS which would equally increase the contributions to GDP by  $\beta_2 = 67.91$  and  $\beta_3 = 39.04$  respectively. All these are in line with the a priori expectation. However, the contribution of MOBILE is inversely related to the GDP as shown by  $a_4 = -88.66$  though there are divergent views for this in the literature but the traditional International Financial Statistics (IFS) (2008) definition, mobile phone penetration has a negative correlation with traditional financial intermediary dynamics of depth, activity, and size. However, when a previously missing informal-financial sector component is integrated into the definition, mobile phone penetration has a positive correlation with informal financial development. Also, according to Harald and Koutroumpis (2011), impact is smaller for countries with a low mobile penetration, usually low income countries. While in low income countries the mobile telecommunications contribution to annual GDP growth is 0.11%, for high income countries this is 0.20%. The increasing returns from mobile adoption are also emerging when assessing the impact on productivity growth.

The study identified some specific and prevalent risks associated with the examined financial innovations namely, ATM Banking, WEB (Internet) Banking, POS Banking and Mobile Banking as well as the implications they pose on the financial system.

Financial Innovation	Risk Types	Implications
ATM Banking Service	<ul style="list-style-type: none"> <li>• Card theft</li> <li>• Skimming devices</li> <li>• Pin Fraud</li> </ul>	<ul style="list-style-type: none"> <li>• Financial loss</li> <li>• Loss of financial data</li> </ul>
WEB/ Internet Banking	<ul style="list-style-type: none"> <li>• Hackers</li> <li>• Phishing</li> <li>• Secure Login</li> <li>• Suspicious email</li> <li>• Username and Password</li> </ul>	<ul style="list-style-type: none"> <li>• Financial loss</li> <li>• Loss of financial data</li> <li>•</li> </ul>
POS Banking	<ul style="list-style-type: none"> <li>• Connection reliability.</li> <li>• Security risks</li> </ul>	
Mobile Banking	<ul style="list-style-type: none"> <li>• Identity theft:</li> <li>• Impersonation of provider status:</li> <li>• Inability to transact</li> <li>• Transaction delayed by Network</li> <li>• Delays in balance updates by the service:</li> </ul>	Reputational

## 5. Conclusion

Financial innovations are essential for economic growth and development. This study established that a positive and significant relationship exist with most of the financial innovation products and the GDP with the exception of Mobile Banking that showed a negative but significant relationship with the GDP. It was also observed that in spite of the positive and significant relationship which implies that the independent variables contributes positively and significantly to the economic growth and development, they are not without some risks that could make them rather a liability rather than asset to the financial system and inadvertently to the nation's economy.

This study recommends policy makers to encourage home grown financial innovations that can impact positively on the domestic economy and that can also be exported to other economies. The policy makers should also ensure that implementable policies are put in place to address some of the risks that could arise from external threats while operators deploying the financial innovation products ensure that they have in place very sound and regularly updated risk management frameworks, required hardware and software and personnel that could forestall any internal and external threats.

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## Appendix

### Multiple Linear Regression - Estimated Regression Equation

$$GDP[t] = + 28125 + 20.25ATM[t] + 67.9125WEB[t] + 39.0403POS[t] - 88.6645MOB[t] + e[t]$$

### Multiple Linear Regression - Ordinary Least Squares

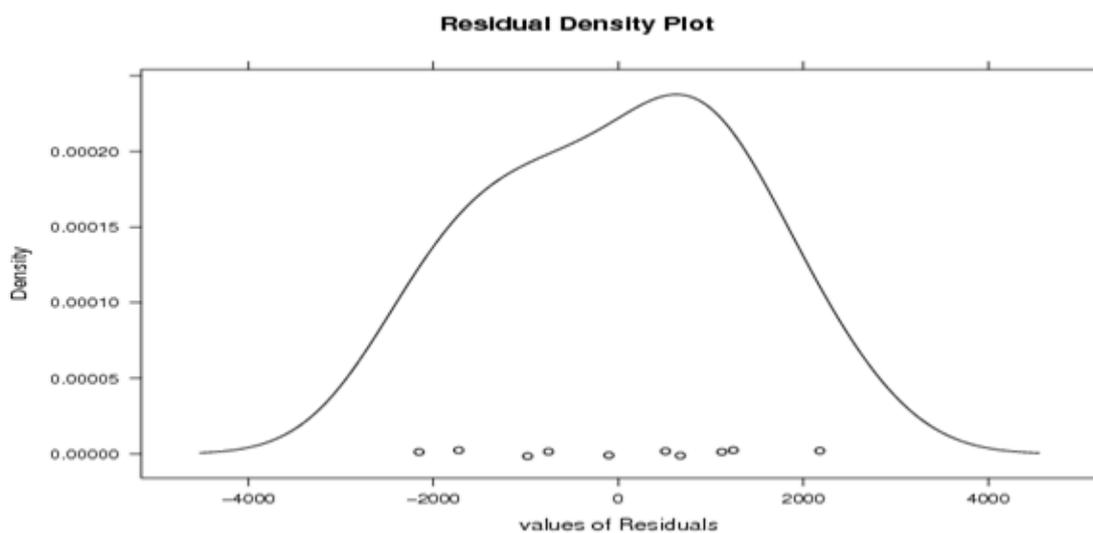
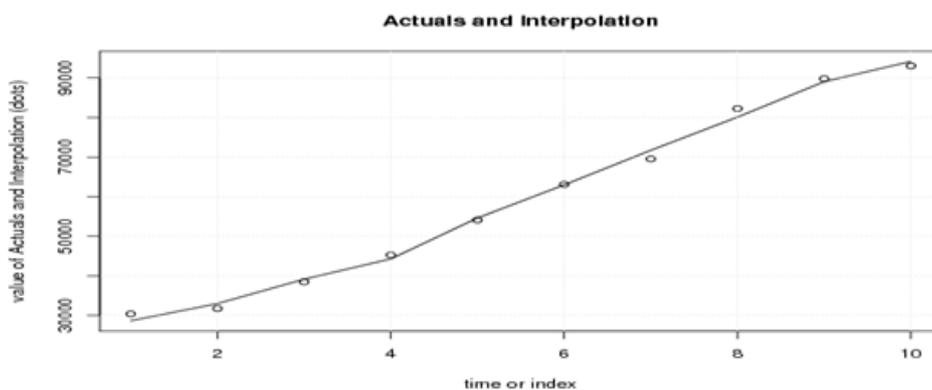
Variable	Parameter	S.D.	T-STAT H0: parameter = 0	2-tail p-value	1-tail p-value
(Intercept)	+2.812e+04	1565	+1.7970e+01	9.803e-06	4.902e-06
ATM	+20.25	1.044	+1.9400e+01	6.717e-06	3.358e-06
WEB	+67.91	21.72	+3.1270e+00	0.02604	0.01302
POS	+39.04	58.23	+6.7040e-01	0.5323	0.2662
MOB	-88.66	55.8	-1.5890e+00	0.1729	0.08645

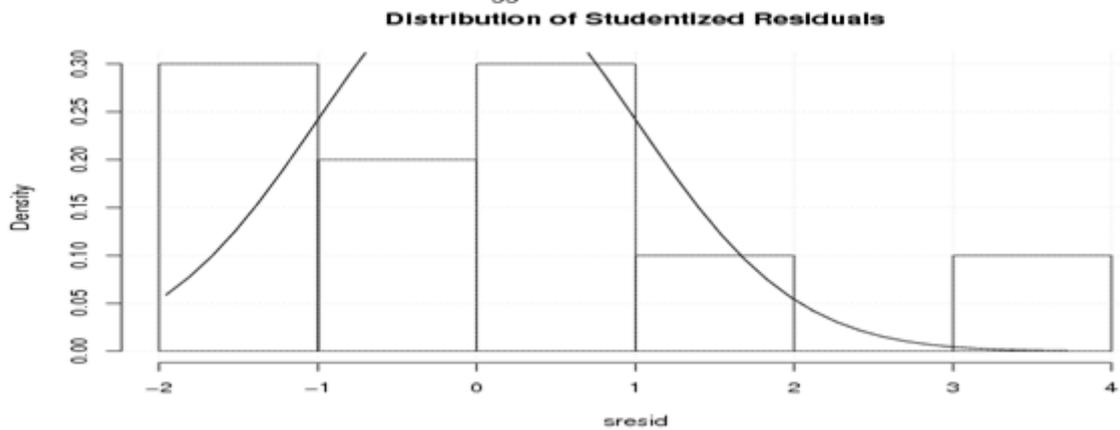
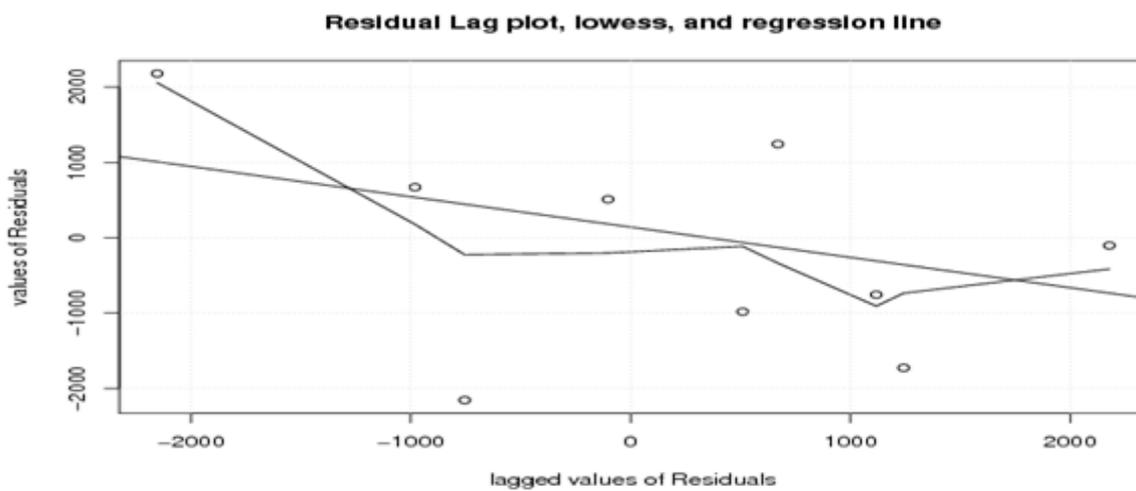
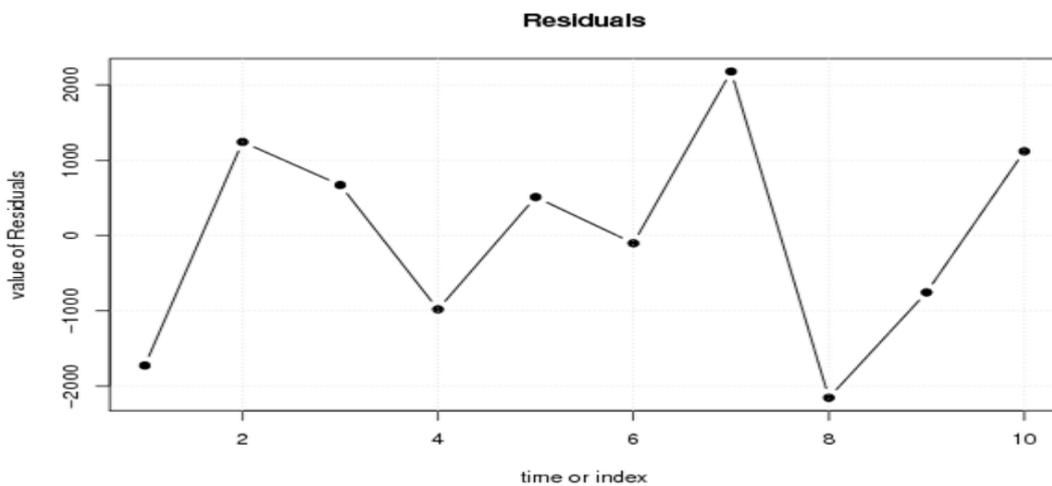
### Multiple Linear Regression - Regression Statistics

Multiple R	0.9983
R-squared	0.9965
Adjusted R-squared	0.9937
F-TEST (value)	356.3
F-TEST (DF numerator)	4
F-TEST (DF denominator)	5
p-value	2.523e-06

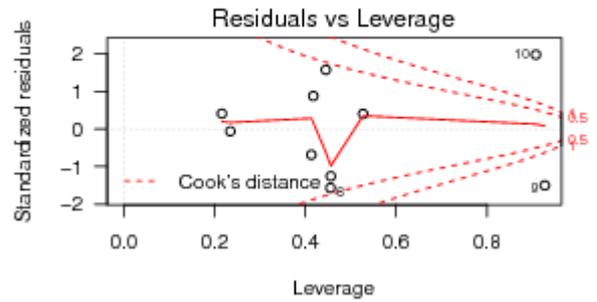
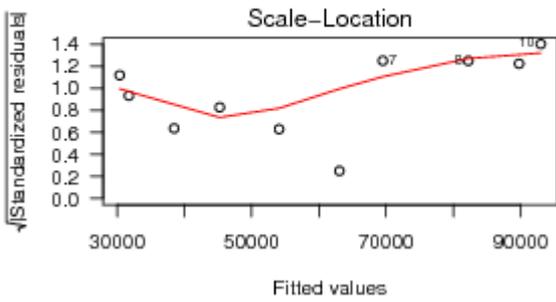
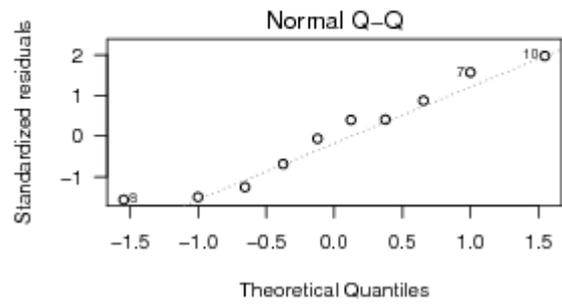
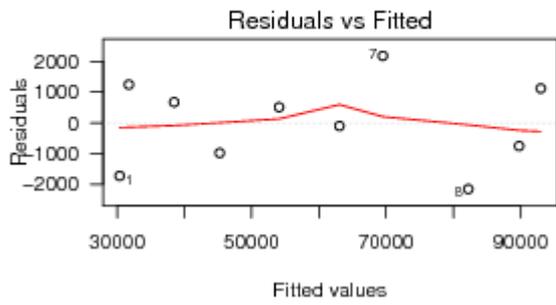
### Multiple Linear Regression - Residual Statistics

Residual Standard Deviation	1866
Sum Squared Residuals	1.741e+07





### Residual Diagnostics



### Residual Partial Autocorrelation Function

