A STRUCTURAL MODELING OF ECONOMIC IMPLICATIONS OF BANKRUPTCY IN POST COVID-19 ERA: EVIDENCE FROM NIGERIA

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Abstract

The outbreak of Covid-19 pandemic presents more devastating economic and financial consequences such as bankruptcy to performance of companies with potential effects on the economy. This study, therefore, employs Structural Equation Modeling (SEM) to analyse economic implications of bankruptcy in post Covid-19 period using weighted survey data with a view to understand structural analysis of bankruptcy and guide policy reforms on it. Maximum likelihood estimation method was used to analyse perceptions and opinions of 291 experts on bankruptcy consisting of Credit / Loan Officers in Banks, Official Receivers, Economics and Finance Lecturers, and Debt Management Officials which represent the unit of analysis. Stratified sampling technique was adopted to randomly select the respondents and sample weight was applied to avoid under-representation. The findings reveal that there are devastating economic implications of bankruptcy if occurs in Nigeria in post Covid-19 regime. Measurement model estimation results indicate significant economic implications such as loss of income due to loss of formal employment, reduction in energy consumption, fall in industrial / manufacturing production, fall in small and medium scale enterprises output and finished products, a decline in research and development programmes and reduction in delivery networks across the country. However, puzzling findings through structural model estimation at aggregate data level indicate that bankruptcy in Nigeria will likely cause significant increase in GDP and spur innovation and capital investment but will significantly reduce aggregate supply in the economy. The study renders policy advice that government should adopt bankruptcy reforms that ensure significant reduction in interest rates and increased costs of filing for bankruptcy.

Keywords: Covid-19, Bankruptcy, Economy; Reform, Structural Equation Modeling, Measurement Model, Structural Model

Introduction

The incidence of current global disease outbreak, Covid-19, presents more devastating potential economic and financial damages to firm value dipping firms into financial distress. Bankruptcy puts affected firms, corporations and economy at vulnerable situation and ultimate effect is worsened socio-economic conditions of the citizens. A firm in financial distress will have insufficient cash to pay interest and principal as at when due. A debt holder being aware that a company might not be able to pay their interest and principal might likely to hire lawyers to defend it against lawsuits. The bankruptcy costs include direct cost (legal, administrative and accounting costs), indirect costs and shortfall in liquidated values of assets from economic values. The higher the debt employs by a firm in its capital structure, the higher the bankruptcy costs associated with bankruptcy. These costs represent a drain in the system to investors. Thus, in a bankruptcy situation, investors (both debt and equity investors) may receive less than they should receive because of bankruptcy costs.

Even before the outbreak of Covid-19, evidence has suggested high estimated direct costs of bankruptcy as percentage of firms' value (Olowe, 2011; Altman, 1984; Weiss, 1990). Apart from legal and administrative fees, a firm in bankruptcy will also incur some indirect costs such as suppliers providing goods and services might reduce the generosity of their credit terms, or even stop supplying altogether, customers seek more stable supplies, key employees will resign and change jobs. Despite all these, number of companies falling into bankruptcy in Nigeria is increasing at alarming rate. For instance, between 2002 and 2020 close to 114 companies had been de-listed (Nigeria Stock Exchange, 2020) with majority no longer in operations mostly on account of regulatory issues bordering on bankruptcy. In lieu of the above, the current study raised

important questions that what are the likely significant economic implications of bankruptcy for a developing economy in post Covid-19 regime? Therefore, the researchers poise to empirically evaluate possible implications of bankruptcy on Nigerian firms' value in the post Covid-19 era using Structural Equation Modeling (SEM, henceforth).

The use of structural modeling is informed by the potential ability of the technique to understand and evaluate impact of a phenomenon (Kaboski and Townsend, 2011), implications of bankruptcy in this context. This study contributes to existing literature through better understanding of tested structural implications of bankruptcy via quantitative interpretation of primary data and again provides framework within which bankruptcy implications can be assessed in econometric analysis.

This study is motivated by the need to inform policy decisions of relevant stakeholders that handle economic affairs of developing economies (Nigeria, in focus) and corporations in order to prevent the economy from entering into new stage of recession in post Covid-19 period. The research study starts with the introduction section followed by review of past works in this field. The next section is centered on methodology after which the study data analyses were presented and the last section contains conclusion and recommendations.

Literature Review

Financial distress, an indication of bankruptcy, occurs where a firm fails to meet its obligations to one or more debtors due to insufficient funds represented by less total assets compared to total liabilities. Oftentimes, signs of financial distress can be reflected through continuous fall in sales level volume likely caused by declining consumer demand, high production costs, unhealthy or strong competition from competitors, poor debt collection strategies and high reliance on receivables from debtors. Within the context of this study, signaling theory provides framework through which potential financial distress within an organisation or bankruptcy among many companies in the economy can early be detected. However, this depends on how management, regulators and policy makers can perceive financial distress signals on time and respond accordingly. Thus, acting promptly to avoid possible incidence of bankruptcy (financial distress) effectively underpins the reliability and importance of signaling theory.

Empirical literature such as Ani and Ugwunta (2012); Alifiah (2014); Celli (2015); Bal (2015) and Darmawan and Supriyanto (2018) provide evidence that financial distress can be predicted using different test. However, prediction of possible bankruptcy without taking cognizance of such implications put the health of the economies at risk. In fact, this researcher can argue that prediction of financial distress of companies may not accurately be determined due to disparities in prediction tools and data employed. For instance, in Nigeria, reliable and efficient data on financial ratios of companies are rarely available or non-comparable. Therefore, misleading conclusion can be made from analysis of such data at comparable level. Even Darmawan and Supriyanto (2018) observe that some financial ratios have positive effect on financial distress. As a result, there exist mixed results about prediction of corporate failures through financial distress. In other words, what is noteworthy is arriving at possible implications of bankruptcy events to guide policy makers in fine-tuning policy reforms that discourage persistence bankruptcy of companies particularly in developing counties like Nigeria.

However, the current study recognizes the relevance of prior empirical studies that delved on the consequences of bankruptcy to economic situation of county or countries where there is potential incidence of financial distress such as Grybinenko (2017) and Gross, Kluender, Liu, Notowidgdo and Wang (2019). As much as evidence from Grybinenko (2017) provide information on socio-economic consequences of bankruptcy in Ukraine as GDP reduction, fall in industrial and other products, reduction of market goods and services, inverse multiplier effect and decline in innovation and capital-intensive businesses. Gross, et al. (2019) provide empirical insight on consequences of bankruptcy reforms in United States tagged Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA, henceforth) such as decrease in credit card interest rate. The work of Gross *et al* (2019) underscores the need to always analyze implications of bankruptcy from time to time in order to reduce bankruptcy filing among companies particularly in developing economies with unstable economic climate. Within the purview of information

available, the current researchers observe that literature on economic implications of bankruptcy in developing countries is non-existence. Hence, the current study is aimed at filling such space in lieu of post Covid-19 period.

Methodology

Structural evaluation requires better understanding of structure / framework within which an entity is conceptualised. This provides ground for this study to employ certain variables of interest that underlie the country economic system, Nigeria in this case. In other words, variables such as Gross Domestic Product, Aggregate Demand, Aggregate Supply, Manufacturing or Industrial Production, Innovation and Capital Investment and Multiplier Effect were considered as variables for the study. A large number of these variables have been previously employed by Gross et al (2019). Meanwhile, the use of only survey data by current study compared to Gross et al indicates difference. However, expression of expert opinion about the possible implications of bankruptcy in post Covid-19 regime can only be obtained through primary data as secondary data is largely unfeasible. Structural Equation Modeling (SEM, henceforth) technique is employed for the purpose of study analysis. As previously indicated, SEM is used to aid understanding, predicting and evaluating a phenomenon or variable of interest and also a potential for quantitative interpretation of primary data (Kaboski and Townsend, 2011). More importantly, SEM takes into cognizance measurement error in variables which other related techniques such as classical regression ignore in the analysis. Thus, the study developed a Bankruptcy Implication Model that captures the underlying variables. The measurement and structural models of developed by the study are displayed below:

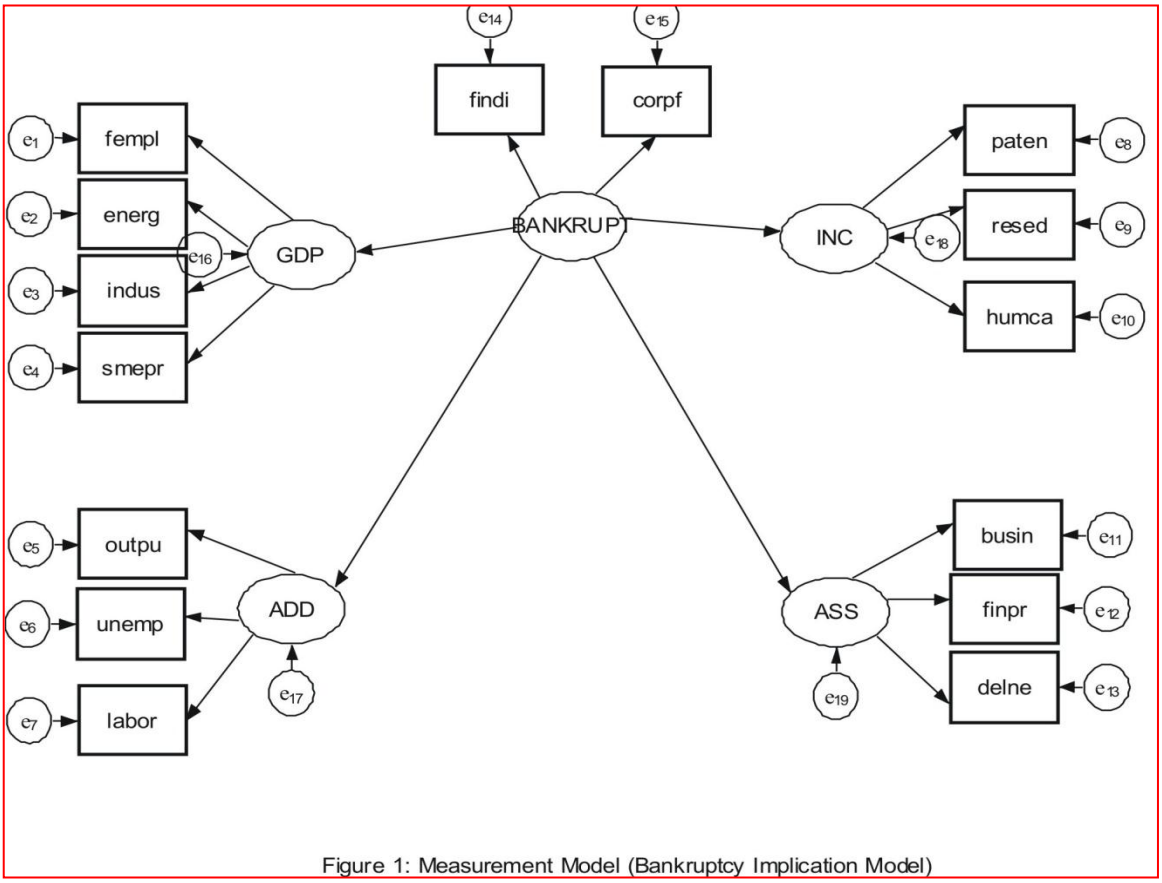

Figure 1: Measurement Model (Bankruptcy Implication Model)

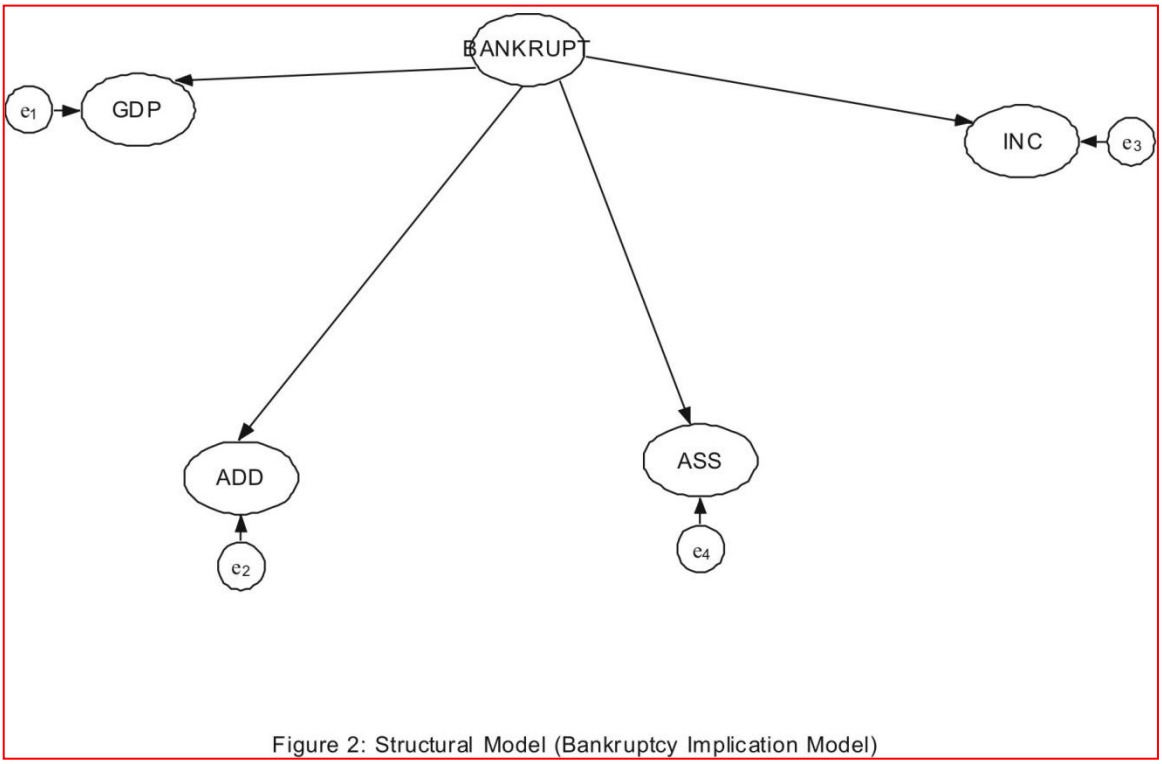

Figure 2: Structural Model (Bankruptcy Implication Model)

From the models above, a system of simultaneous equations were derived. These equations are combined in two ways. In the first instance, system equations are generated from measurement model and another set of system equations were derived via structural model. These sets of system equations are stated as:

Measurement model system equations

$$fempl = \beta_1 GDP + e_1 \ldots\ldots (1)$$
$$energ = \beta_2 GDP + e_2 \ldots\ldots (2)$$
$$indus = \beta_3 GDP + e_3 \ldots\ldots (3)$$
$$smepr = \beta_4 GDP + e_4 \ldots\ldots (4)$$
$$outpu = \beta_5 ADD + e_5 \ldots\ldots (5)$$
$$unemp = \beta_6 ADD + e_6 \ldots\ldots (6)$$
$$labor = \beta_7 ADD + e_7 \ldots\ldots (7)$$
$$paten = \beta_8 INC + e_8 \ldots\ldots (8)$$
$$resed = \beta_9 INC + e_9 \ldots\ldots (9)$$
$$humca = \beta_{10} INC + e_{10} \ldots\ldots (10)$$
$$busin = \beta_{11} ASS + e_{11} \ldots\ldots (11)$$
$$finpr = \beta_{12} ASS + e_{12} \ldots\ldots (12)$$
$$delne = \beta_{13} ASS + e_{13} \ldots\ldots (13)$$
$$findi = \beta_{14} BANKRUPT + e_{14} \ldots\ldots (14)$$
$$corpf = \beta_{15} BANKRUPT + e_{15} \ldots\ldots (15)$$

Where; fempl (formal employment); energ = energy consumption; Indus = industrial production; smepr = small scale amd medium scale enterprises production; outpu = output gap; unemp = unemployment rate; labor = labour unit cost; paten = patent rights; resed = research and development; humca = human capital; busin = business investment; finpr = finished products; delne = delivery networks; findi = financial distress; corpf = corporate failure

Structural Model system equations

$$GDP = \beta_{16}BANKRUPT + e_1 \ldots\ldots\ldots(16)$$
$$ADD = \beta_{17}BANKRUPT + e_2 \ldots\ldots\ldots(17)$$
$$ASS = \beta_{18}BANKRUPT + e_3 \ldots\ldots\ldots(18)$$
$$INC = \beta_{19}BANKRUPT + e_4 \ldots\ldots\ldots(19)$$

GDP = Gross Domestic Product; ADD = Aggregate Demand; ASS = Aggregate Supply; INC = Innovation and Capital Investment; BANKRUPT = Bankruptcy

Maximum Likelihood Estimation Method was utilised to analyse the study data as preliminary data analysis indicates multivariate normality which is informed by Mardia's multivariate Kurtosis (normal distribution) coefficient with a value of 0.0311 (p>.05). The study employed survey research design to obtain the perception and opinions of experts in fields that have better understanding of bankruptcy and its potential economic implications. This group people consists of Credit and Loan officers at the banks (Deposit Money Banks in Lagos and Abuja), Official Receivers (Trustees) at courts (Abeokuta, Ikeja and Ibadan), Economics and Finance lecturers at Universities (University of Ilorin, Nigeria and University of Ibadan, Nigeria), a selected Polytechnic (The Federal Polytechnic, Ilaro) and Debt Management Officials at Nigeria Debt Management Office. However, the determination of total population is unattainable due to nature of the study design. As a result, the researchers rely on figure for infinite population recommended by Godden (2004) as obtained from Kenya Projects Organisation (2012). In this regard, the population of the study is assumed by the researchers to be greater than 50,000. Having arrived at a particular population figure the study further employed two-stage sample size determination formula developed by Cochran in 1977. The two-stage procedure is shown as follows:

$$size = \frac{t^2 \times s^2}{d^2} = \frac{(1.96)^2 \times 0.5^2}{(0.05)^2} = 384 \text{ .....equation (20)}$$

t = confidence level at 0.05; s = population proportion; d = margin of error

The study calculated 5% of the population to be 2,500 and since the result is greater than the outcome of equation (20), the second formula was applied to get the optimal sample size. This is done below as:

$$optimal\ sample\ size = \frac{pop}{1 + \frac{pop}{size}} = \frac{384}{1 + \frac{384}{2{,}500}} = 333 \ldots\ldots equation(21)$$

Moreover, stratified random sampling was used to select 333 respondents among whom structured questionnaires were administered electronically through survey monkeys. The close-ended questions which were categorical (or ordered) were posed to the selected respondents on key focus of the study as well as on demographic factors. Out of total 333 copies sent through online survey monkey, only 296 were returned and filled correctly representing 88.8% retrieval rate. Meanwhile, pertinent responses were missed on two to three question items on 5 returned copies and these were discarded for the purpose of data analysis. The remaining 291 copies were therefore considered for the analysis. The researchers are fully aware the possible implication of under-sampling given the fact that current study is taking into consideration some of the important macroeconomic variables. To counter such, the researchers apply sample weights to correct for possible under-representation of the population. In this regard, the current study provides ground for future research where large scale data perhaps with qualitative data (for instance, interviews) will be considered. However, it is important to remind the audience that current global Covid-19 greatly limit people physical interactions with one and another.

Presentation of Results, interpretation and Discussion of Findings

This section begins with presentation of estimation results of measurement and structural models with the use of maximum likelihood estimation method. However, Table 3 exhibiting findings from measurement is not showing here because of space but contained in the Appendix. Accordingly, Table 1 and Table 2 depict estimation results from structural model and test static (like goodness-of fit and this subsection is followed by Tables on results from revealing inferential estimates obtained from the analysis. These are presented as:

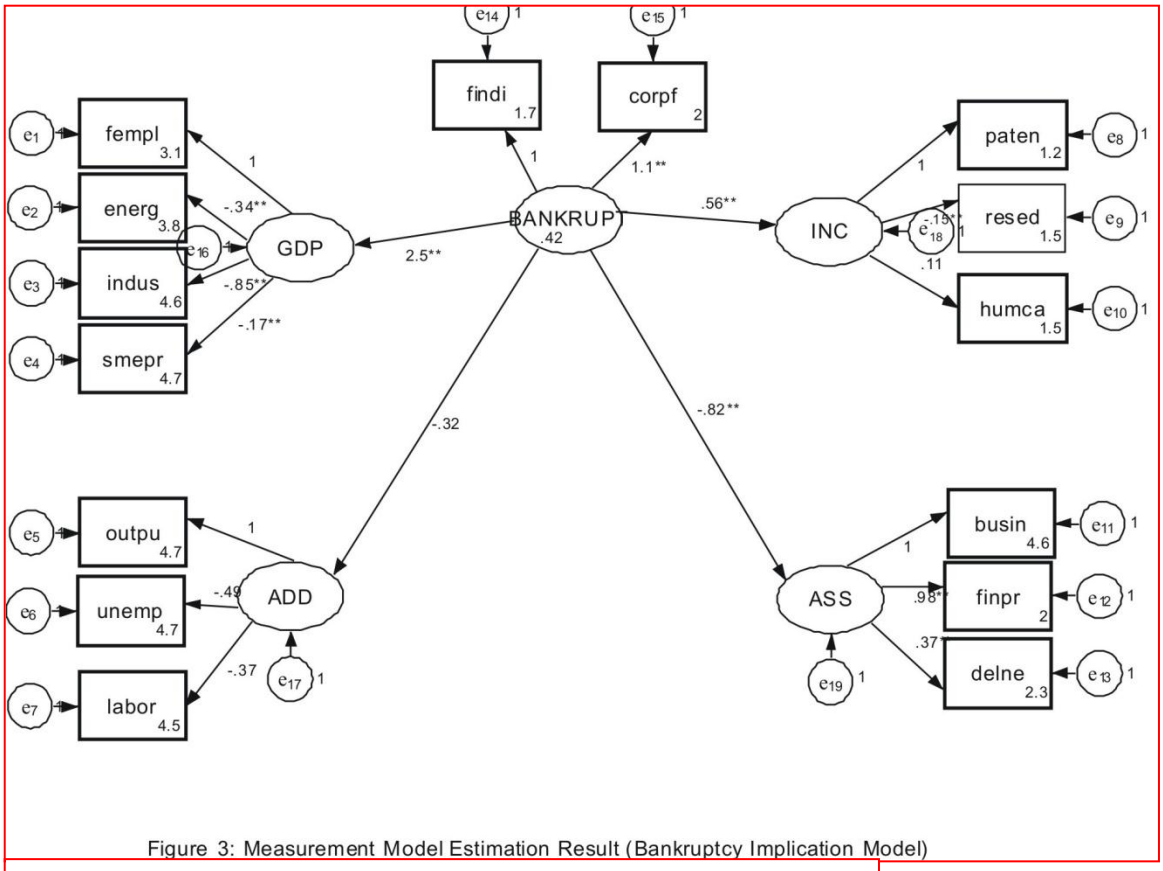

Figure 3: Measurement Model Estimation Result (Bankruptcy Implication Model)

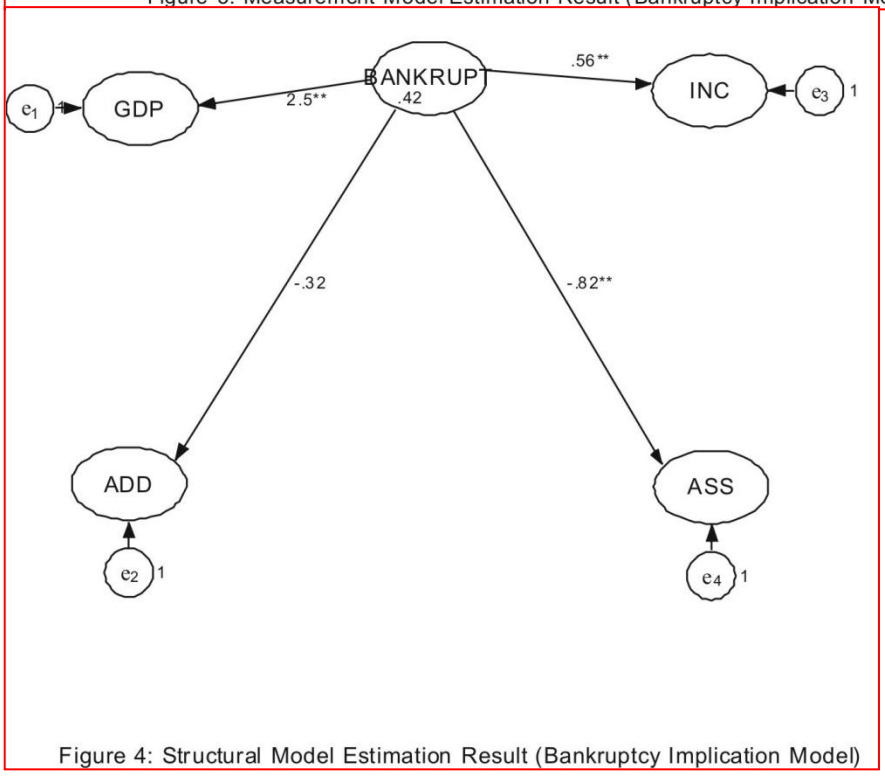

Figure 4: Structural Model Estimation Result (Bankruptcy Implication Model)

Table 1: Structural Model Estimation Result

	Coef.	Std. Err.	z	P>|z|
Structural |				
GDP <- |				
BANKRUPT	2.468177	1.170394	2.11	0.035
ADD <- |				
BANKRUPT	-.3230772	.3784671	-0.85	0.393
INC <- |				
BANKRUPT	.5588257	.4181122	1.34	0.001
ASS <- |				
BANKRUPT	-.8184169	.4496001	-1.82	0.000

Source: STATA Output, 2020

Table 2: Summary Statistics

Fit statistic	Value	Description
Likelihood ratio |		
chi2_ms(105)	9790.005	model vs. saturated
p > chi2	0.553	
chi2_bs(105)	6570.441	baseline vs. saturated
p > chi2	0.097	

Stability index = 0

All the eigenvalues lie inside the unit circle.
SEM satisfies stability condition.

Source: STATA Output, 2020

Interpretation and Discussion of Findings

In Table 2, it is indicated that the models developed and tested by the researchers efficiently fit the data of the study (chi2: p>.05). Again, in Table 2 (and Table 4 in Appendix) stability index reveals that Structural Equation Model (the key model) satisfies stability condition being a non-recursive model. The sign, "two asterisk" (**) in Figure 3 and Figure 4 indicates significance of variables at 5% level of significance. Interestingly, the information in Table 1 presents important but puzzling findings about economic implications of bankruptcy in a developing country with Nigeria in focus. Table 1 provides scientific response to question posed by the study which read as what are the economic implications of bankruptcy in a developing country like Nigeria taking into account post Covid-19 period.

Surprisingly, the estimates in Table 1 imply that should bankruptcy of companies happen in Nigeria in post Covid-19 period Gross Domestic Product will significantly increase ($\beta_{16} = 2.46; p < .05$). In fact, this is finding is against a priori expectation of the study. Although positive relationship between bankruptcy and increased gross domestic production is yet to be scientifically supported by growth models or development theories the increase in gross domestic product in Nigeria even when the number of bankrupt increases provides possible explanation. For instance, Nigeria Stock Exchange reported large number of

companies had been delisted due to some issues relating to financial distress yet there has been evidence of marginal economic growth in the country (National Bureau of Statistics, 2019). However, it has been established by the study that components of GDP such as energy consumption (p<.05), industrial production (p<.05) and production by small scale and medium enterprises (p<.05) as shown in Table 3 (Appendix) will fall significantly if more bankruptcy is filed in post Covid-19 period in Nigeria. Findings about components of GDP employed are consistent with evidence from Grybinenko (2017) but in contrast at aggregate GDP level.

In a similar fashion, potential occurrence of bankruptcy in Nigeria in post Covid-19 era is empirically found to likely cause an increase in innovation and capital investment ($\beta_{19} = .55; p < .05$) in the country. However, an incidence of bankruptcy of Nigeria companies is more likely to cause a significant decrease in research and development investments in the country as only surviving companies engage in R&D programmes with little or no effort from government. This is similar to findings by Grybinenko (2017) In line with expectation, potential incidence of bankruptcy of Nigeria companies in post covid-19 period will cause significant decrease in aggregate supply ($\beta_{18} = -.81; p < .05$). As a result, there will be low level of finished products and significant cut in delivery networks. The possible implications of bankruptcy if happens in the post C0vid-19 on aggregate demand as another latent variable was found insignificance along with its measurement variables.

The findings from this study indicate that there are likely devastating implications of bankruptcy in post Covid-19 regime particularly in a developing economy such as Nigeria in lieu of the perceptions and opinions of experts in financial administration and financial management who possess better understanding of bankruptcy. This implies that a country will benefit significantly from policies aimed at curtailing bankruptcy filings. Such benefit has been previously established by Gross *et al* (2019). The study recognizes the use of secondary data or combination of survey data and secondary would have provided a complete holistic view of the possible implications of bankruptcy in post Covid-19 era. Although this is an indication for future research in such direction the current study provided and tested structural framework within which implications of potential bankruptcy can be analyzed and understood by economists, researchers, policy makers and governments.

Conclusion and Recommendations

This study employed maximum likelihood estimation method to analyze structural equation modeling using weighted survey data. From findings of the study, the researchers affirm that there are devastating economic implications of bankruptcy if occurs in Nigeria in post Covid-19 regime. Such likely significant economic implications include loss of formal employment, reduction energy consumption, fall in industrial / manufacturing production, and fall in small and medium scale enterprises output and finished products. In addition, potential occurrence of bankruptcy in post Covid-19 will significantly cause a decline in research and development programmes and reduction in delivery networks across the country. Therefore, the study recommends that government through its regulatory bodies adopt bankruptcy reforms that will ensure significant reduction in interest rates that will make borrowing companies better off and again such reforms should raise the costs of filing for bankruptcy.

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Appendix

Table 3: Measurement Model Estimation Result

	Coef.	Std. Err.	z	P>|z|
Measurement |				
fempl <- |				
GDP |	1	(constrained)		
_cons |	3.106695	.0685051	45.35	0.000
energ <- |				
GDP |	-.3440455	.049163	-7.00	0.000
_cons |	3.832636	.0489889	78.23	0.000
indus <- |				
GDP |	.085499	.0445289	1.92	0.000
_cons |	4.560669	.0459463	99.26	0.000

```
smepr <-  |
      GDP | -.1686987   .0441468    -3.82   0.000
    _cons |  4.690377   .0465411   100.78   0.000
----------+----------------------------------------
outpu <-  |
      ADD |         1  (constrained)
    _cons |  4.723849    .064752    72.95   0.000
----------+----------------------------------------
unemp <-  |
      ADD | -.0048564   .0693426    -0.07   0.944
    _cons |  4.713389   .0457395   103.05   0.000
----------+----------------------------------------
labor <-  |
      ADD |  -.037196   .0707442    -0.53   0.599
    _cons |  4.516736   .0457707    98.68   0.000
----------+----------------------------------------
paten <-  |
      INC |         1  (constrained)
    _cons |  1.236402   .0648859    19.06   0.000
----------+----------------------------------------
resed <-  |
      INC | -.1469872   .0772768    -1.90   0.017
    _cons |  1.466527   .0462365    31.72   0.000
----------+----------------------------------------
humca <-  |
      INC |  .1084939   .0899528     1.21   0.228
    _cons |  1.502092   .0460107    32.65   0.000
----------+----------------------------------------
busin <-  |
      ASS |         1  (constrained)
    _cons |  4.596234   .0651157    70.59   0.000
----------+----------------------------------------
finpr <-  |
      ASS |  .9758368   .0908846    10.74   0.000
    _cons |  1.995816   .0643234    31.03   0.000
----------+----------------------------------------
delne <-  |
      ASS |  .3655444   .0821418     4.45   0.000
    _cons |  2.320084   .0487757    47.57   0.000
----------+----------------------------------------
findi <-  |
  BANKRUPT |         1  (constrained)
    _cons |  1.713389   .0466431    36.73   0.000
----------+----------------------------------------
corpf <-  |
  BANKRUPT |  1.098746    .545165     2.02   0.044
    _cons |  1.951883   .0468283    41.68   0.000
------------+---------------------------------------
```

Source: STATA Outputs, 2020

Table 4: Stability Analysis of Simultaneous Equation Systems

Eigenvalue Stability Condition

Eigenvalue	Modulus
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0

stability index = 0

All the eigenvalues lie inside the unit circle.

SEM satisfies stability condition

Source: STATA Outputs, 2020