THE INFORMAL ECONOMY AND ECONOMIC GROWTH OF NIGERIA: A TIME-VARYING PARAMETER APPROACH

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ARTICLE INFO

ABSTRACT

Studies on the relationship between the informal economy and economic growth have been inconclusive as to whether the positive or negative relationship dominates. These results are partly due to the type of estimation technique such as fixed-parameter techniques. Fixed parameter techniques have been used to observe the relationship between economic growth and the informal economy. A caveat to the fixed-parameter estimation techniques used to observe the relationship between the informal economy and economic growth is the inability to account for annual disruptions. This paper seeks to examine the relationship between the informal economy and economic growth in Nigeria in the period from 1991 to 2015 using the Time-Varying Parameter (TVP) model. The TVP model is estimated in two stages. First, an Ordinary Least Squares (OLS) multiple regression is estimated and the outcome is subjected to the flexible least-squares approach. The results show the dominance of the negative effects of the informal economy on economic growth. The outcomes also reveal that overtime movements of time-varying parameters in the informal economy and economic growth are connected with economic and political events. This paper recommends the absorption of the informal economy into the official economy through government policy.

1. INTRODUCTION AND LITERATURE REVIEW

The size of the informal economy in many developing countries exceeds 40 percent of GDP (Baklouti and Boujelbene, 2019). Nigeria is not an exception as the size of the informal economy ranged from 50.49 per cent to 66.61 per cent of GDP in the period 1991-2015 (Medina and Schneider, 2018). The informal economy

was projected to decline as the formal sector grew (Meagher and Yunusa, 1996). Instead, the former has increasingly accounted for a significant proportion of economic activities (Oresajo, 2020). The reasons for the persistence of the informal economy has been addressed by the dualist, legalist, and structuralist schools. The dual school notes that informal sector activities continue because surplus labour from the traditional sector is not fully absorbed in the modern sector (Lewis, 1954; Harris and Todaro, 1970). The legal school argues that informal activities persist because of the costs, time, and effort of formal registration (De Soto, 1989; Loazya, 1997), while the structuralists maintain that it is the nature of development that leads to the sustained existence of the informal economy (ILO, 1972).

Activities in the informal economy are generally not registered or regulated by the relevant regulatory body. This concept emerged from studies on Kenya and Ghana's urban informal sector (ILO, 1972; Hart, 1973). In developing countries, informal economy activities are carried out openly. Participants in the informal economy include artisans, traders, barbers and hairstylists among others and also firms in the official economy that do not comply with government regulations on the activity. Generally, the size of informal sector activities is small, which leads to low productivity (De Soto, 1989). Limited access to credit from formal sources is also identified as a major constraint to the expansion of activities. Failure to register a firm hinders the firm from accessing funds formally. Consequently, informal economy firms rely on their savings and informal credit sources as their main sources of credit. Most activities in the informal economy are carried out by micro-enterprises that operate from fixed structures and/or mobile structures.

A beneficial quality of the informal economy is that it offers a livelihood and complements the activities of the formal sector (Dell'Anno, 2008). However, it poses obstacles for the implementation of economic policy and may cause damages to the economy. Furthermore, its existence limits the provision of public goods required for economic development as a result of tax evasion. This gives rise to an unfair advantage of the informal sector over the formal sector in terms of reduced cost which is caused by avoiding taxes (Almenar, Sanchez, and Sapena, 2019).

In the Nigerian context, the informal economy has been described taking into account the characteristics of participating individuals and firms. According to NBS (2010), informal economy firms employ less than ten (10) workers regardless of whether the firm is registered. The ownership structure is typically one-man business (sole ownership). The sector employs a large portion of the working population as the average of 82.6 per cent of the workforce in Nigeria is self-employed (World Bank, 2018). Its workforce is mainly composed of unpaid family members, apprentices and a limited number of paid employees. These

workers face varying levels of vulnerability characterised by lack of access to pensions, volatile incomes, and job insecurity (Oresajo, 2020). Activities in the informal economy are spread across different sectors of the economy but the wholesale and retail trade sectors dominate followed by manufacturing, accommodation and food services, agriculture, transportation and construction subsectors (NBS, 2010).

Findings on the relationship between the informal economy and economic growth are mixed. Various studies obtained results of the positive impact of the informal economy on growth (Baklouti and Boujelbene, 2019; Brambila-Macias and Guido, 2010; Dell'Anno, 2008; Oresajo, 2020). Others stress that the size of the informal sector is inimical to economic growth (Loayza, 1997). Wu and Schneider (2019) obtain mixed results from their analysis and attribute the outcome to the level of development. Although these authors provide empirical proof of the relationship, they fail to explore the impact of cyclical fluctuations and this is a caveat. Besides, country-specific studies on the relationship between economic growth and the size of the informal economy of Nigeria have been largely neglected. However, a recent study by Oresajo (2020) used a micro and macro approach to estimate the relationship between the informal economy and economic growth.

Although the relationship between economic growth and the informal economy may be affected by the economic cycle, related estimation techniques have not been used to study the relationship. Econometric techniques such as the Ordinary Least Squares (OLS) model and Error Correction Model (ECM) have been used to estimate the effects of the size of the informal sector on economic growth (Loazya, 1997; Oresajo, 2020). These techniques employ the use of fixed-parameter models in which the estimated parameters do not change over time. Therefore, the results may be misleading due to structural errors, specification errors, nonlinearities, proxy variables and aggregation (Tanizaki, 2000). Nevertheless, there is no consensus in the literature regarding the methods that should be used to estimate the relationship between the informal economy and economic growth. The time-varying parameter (TVP) model to the best of the author's knowledge has not been used to study the relationship between the informal economy and economic growth in developing and emerging economies but there are studies that have applied the technique to investigate the drivers of economic growth. Awe, Crandell, Adepoju and Leman (2015) used the TVP model to study the impact of money supply on economic growth, while Bhattacharya, Chakravartti and Mundle (2018) used a variant which is the principal component augmented time-varying regression (TVPR) approach to investigate the impact of corruption and institutions on economic growth.

Consequently, this paper investigates the impact of the informal economy on economic growth in Nigeria from 1991 to 2015 using the TVP model thereby, capturing the annual variation and connection with economic and political events. The period was selected due to the availability of data on the informal economy from 1991 to 2015 (see Medina and Schneider, 2018 for the dataset). The TVP model gained popularity on the assumption that stable parameters for regression analysis are no longer acceptable since regression parameters are subject to disruptions ([Tanizaki, 2000](#)). In addition, sudden changes may cause economic relationships to be misspecified using the traditional methods as the parameters are assumed fixed. The TVP model offers an advantage over the previous methods used as it helps examine the dynamics of the informal sector and economic growth as well as its possible connection with economic cyclical movements. This novel approach to accessing the effects of the informal economy on economic growth using the TVP model represents a contribution to the literature.

The rest of this paper is organised into three sections. Section 2 describes the methods and the data employed, while section 3 explains the results and section 4 offers some concluding remarks.

2. METHODS AND DATA

2.1 Specification of model

The relationship between the informal economy (*IE*) and economic growth (*GDPr*) is specified simply as;

$$GDPr = f(IE) \tag{1}$$

The control variables, life expectancy (*LIFEXPEC*), and investment (*INV*) are added in equation 2.

$$GDPr = f(IE, LIFEXPEC, INV) \tag{2}$$

Equation 2 is converted to a regression model after transforming all variables to logarithms[1].

$$gdpr_t = \beta_0 + \beta_1 ie_t + \beta_2 lifexpec_t + \beta_3 inv_t + u_t \tag{3}$$

$gdpr_t$ is the dependent variable while ie_t, $lifexpec_t$, and inv_t are the independent variables observed in the period 1991 to 2015. $gdpr_t$ is economic growth

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1　This accounts for the change in notation.

measured by GDP percentage growth, whereas ie_t, $lifexpec_t$, and inv_t represent the informal sector (% of GDP), life expectancy at birth and investment. The β_ts are the coefficients associated with the independent variables. The apriori sign associated with the coefficient connected with the informal sector is negative (β_1 <0). The relationship between $lifexpec_t$, inv_t and $gdpr_t$ is positive. An improvement in life expectancy improves human capital and by implication economic growth. Investment which is the amount spent on capital goods also improves economic outcomes. u_t is the error term distributed with mean zero and variance σ^2. The Ordinary Least Squares (OLS) method is used to estimate equation (3). The model specified in equation (3) is a fixed-parameter model because the estimated parameters are fixed over time and it also doubles as the observation equation of the TVP model.

2.2 Estimation Technique

To satisfy the objective of this paper, there is a need to consider a model in which the parameter is a function of time. The model that satisfies this condition is the time-varying parameter model. The TVP model is specified in a State-Space Form (SSF) as a combination of the observation equation in equation (4) and a transition equation in equation (5). This allows the unobserved variable associated with the observations to be estimated alongside the observed variables. The choice of the TVP model is premised on the fact that it allows the parameter coefficients to change over time.

The TVP model is specified in a State-Space Form (SSF) following Alptekin, Broadstock, Chen and Wang (2018).

$$y_t = \alpha_t + \beta_t x_t + u_t, \tag{4}$$

represents the dependent variable while x_t represents the independent variable. α_t is the time-varying intercept and β_t is a time-varying coefficient on x_t.

The transition equation which describes the dynamics of the time-varying parameters over time is specified in equation 5.

$$\alpha_t = \alpha_{t-1} + e_t, \quad e_t \sim N(0, \delta_e^2)$$
$$\beta_t = \beta_{t-1} + v_t, \quad v_t \sim N(0, \delta_v^2) \tag{5}$$

The time-varying parameter, β_t, is an unknown variable which models the relationship between y_t and x_t. β_t is assumed to follow the first-order autoregressive (model of the form $\beta_t = \beta_{t-1} + v_t$. u_t, e_t, and v_t are error terms which are mutually

independent at all-time points and distributed with a mean of zero and constant variance Equation (4) allows the parameters to be time-dependent while equation (5) determines the movement of the parameters.

Equation 3 is the fixed-parameter model and also doubles as the observation equation. Its adaptation to an observation equation comes with slight modifications in the interpretation of its parameters. β_0 is the time-varying intercept while β_1, β_2, and β_3 are the time-varying coefficients on *ie*$_t$, *lifexpec*$_t$, and *inv*$_t$.

A popular approach for estimating the TVP model is the Kalman filter. It has been criticised on the grounds of problems posed by convergence and a multitude of assumptions (Kalaba and Tesfatsion, 1989). Therefore, the Flexible Least Squares (FLS) approach of Kalaba and Tesfatsion (1989) as implemented in EVIEWS 9 was used to estimate the TVP model in equation (5). The FLS model is a better alternative as it imposes fewer assumptions.

2.3 Data

Annual data on the GDP growth (annual percentage), informal economy (per cent of GDP), life expectancy at birth and gross capital formation which was proxy for investment was gathered for the period 1991-2015 (see Appendix I and II). The data on the informal economy and GDP growth which are the main variables of interest are discussed in Figure 1 and 2 to give insight into the trend over time. Figure 1 shows the trend of the size of the informal economy between 1991 and 2015.
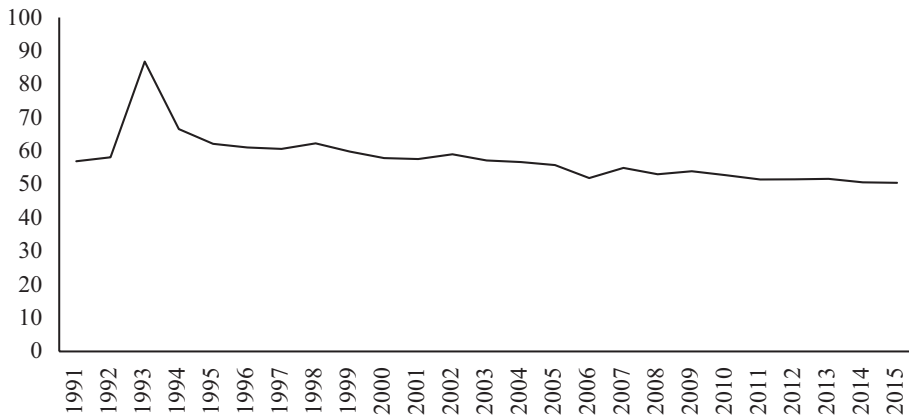

Figure 1. Size of the informal economy (percentage of GDP)
Source: Computed by the author

In 1991, the informal economy was 56.95 percent of GDP before rising to 58.17 percent in 1992. Thereafter, it rose astronomically to 86.82 percent in 1993 and fell shortly after to 66.6 percent in 1994. The period was characterised by a weak economy caused by civil unrest. Over the years, it fell slowly to 57.64 percent in 2001. In 2002, it rose slightly to 59.03 percent before falling slightly over the years to 50.49 percent in 2015. The stability of the informal sector was achieved by a mix of activities culminating in the advent of democracy in 1999, the successful implementation of the reform policy contained in the National Economic Empowerment Development Strategy (NEEDS) and a generally favourable environment. A close look at the trend in the informal economy shows that since 1994, it has been stable except for a slight dip in 2006.

Figure 2 shows the trend of GDP growth rate over the period 1991-2015. The trend shows more variability than the informal economy over the years with a major spike in 2002.

Figure 2. GDP percentage growth
Source: Computed by the author

In 1991, the economy grew at almost zero percent but increased to 4.46 percent in 1993. Afterwards, the country experienced three years of negative growth. The GDP growth rate rose again to 4.20 percent in 1996 and fell slowly to below one percent in 1999, which heralded the era of democracy. It grew to 5.02 percent in 2000 and subsequently peaked at 15.33 in 2002. Between 2003 and 2014, GDP growth rate was within the limits of 4.23 percent and 9.25 percent. The year 2015 was a period of weak growth for Nigeria occasioned by dwindling oil revenues as a figure of 2.65 percent was posted. The period preceded the first recession which Nigeria experienced in 25 years. The recession occurred in 2016.

2.4. Sources of data

The data on GDP growth rate (annual percentage), life expectancy and investment was obtained from the World Development Indicators (2020) (See appendix I and II for a brief description of the data used and the raw data). Almenar, et.al (2019) states that a common way of reporting the size of the informal economy is as a percentage of GDP. The size of the informal economy (per cent of GDP) was obtained from Medina and Schneider (2018). Medina and Schneider (2018) used the Multiple Indicators Multiple Causes (MIMIC) model approach to produce the estimates of the gray economy as a percentage of GDP. The dataset was collated for 158 countries and is comparable across countries as it is calculated as a percentage of GDP. Studies such as Baklouti and Boujelbene (2019) used Medina and Schneider's estimates of the informal economy in their growth model.

3. RESULTS AND DISCUSSION

3.1 Summary statistics

Selected descriptive statistics of the variables used in this paper to further describe the data used are shown in Table 1.

Table 1. Summary statistics (1991-2015)

Variable	Description	Mean	Standard deviation	Minimum	Maximum	Observations
$GDPr_t$	GDP growth (%)	4.852	3.775	-2.035	15.329	25
IE_t	Informal economy (% of GDP)	57.668	7.403	50.490	86.820	25
$LIFEXPEC_t$	Life expectancy at birth (years)	48.262	2.556	45.843	53.112	25
INV_t	Gross capital formation (% of GDP)	28.685	10.997	14.169	48.400	25

Source: Computed by the author (2020)

On average, economic growth ($GDPr_t$) and the informal economy (per cent of GDP) (IE_t) were 4.852 per cent and 57.668 (percent of GDP) respectively. The mean value of $GDPr_t$ was single-digit and barely adequate for economic development. IE_t was consistently high as its values ranged from 50.490 to 86.820 (percent of GDP) in the period 1991-2015. The maximum values of $GDPr_t$ and IE_t were 15.329 percent and 86.820 percent respectively. These statistics occurred in 1993. The maximum value for IE_t was an outlier. The lowest values of $GDPr_t$ and IE_t were -2.035 and 50.490 percent, and occurred in the same

year (2015). Intuitively, these results show some level of a mutual relationship between $GDPr_t$ and IE_t. $LIFEXPEC_t$ and INV_t have a mean value of 48.262 and 28.685 (percent of GDP) respectively. The standard deviation of the variables was not high and it was within a reasonable range. The number of observation was 25.

3.2 Stationarity results

It is important to observe the level of stationarity of the variables before analysis. Therefore, the variables used in the model were tested for unit roots using the Augment Dickey-Fuller (ADF) test. This exercise is necessary as TVP models are usually estimated using stationary data (Feldkircher and Hauzenberger, 2019). The ADF stationarity test shown in Table 2 suggests that $GDPr_t$, IE_t, $LIFEXPEC_t$ and INV_t are stationary at levels. Since all variables are stationary at levels, the TVP can be used.

Table 2. Augmented Dickey-Fuller Results

Variable	Levels	First differences	Order of integration
$GDPr_t$	-2.706*	-	I(0)
IE_t	-5.271***	-	I(0)
$LIFEXPEC_t$	-4.880***	-	I(0)
INV_t	-3.205***	-	I(0)

Note: (*) Significant at 10% level
      (**) Significant at 5% level
      (***) Significant at 1% level
Source: Computed by the author (2020)

3.3 Fixed parameter model result

The result of the growth model specified in equation (3) is presented in Table 3.

Table 3. Relationship between economic growth and the informal economy

$gdpr_t$	Coefficient	Standard error	T
ie_t	-6.183	1.174	-5.266
$lifexpec_t$	-25.999	6.609	-3.934
inv_t	-3.031	0.869	-3.490
c	137.498	28.738	4.785
R-squared	0.762		
Adj R-squared	0.728		
Number of observations	25		

Source: Computed by the author

The regression results show that there is a negative relationship between economic growth ($gdpr_t$) and the informal economy (ie_t). An increase in ie_t is associated with a decrease in $gdpr_t$. These fixed-parameter model results support the conclusions obtained by Loayza (1997) but contradict the positive outcomes of Oresajo (2020). The control variables are wrongly signed and a matter of concern for a developing country like Nigeria.

The outcome of the fixed-parameter model is limited in information as to how the informal economy has affected GDP growth over the years especially concerning information about when the informal economy's effects on economic growth peaked or suffered a downturn. This leads to the evaluation of the outcomes of the time-varying parameter model.

3.4 Time-varying parameter model results

The TVP model was applied to the data for Nigeria. The TVP coefficients and its corresponding standard errors associated with each variable specified in the growth model are shown in Table 4.

Table 4. Coefficients of the time-varying parameter model

Year	β_0	β_1	β_2	β_3
1991	114.264696	-4.746749	-22.431203	-2.104036
	(55.545300)	(1.206562)	(13.666144)	(1.060485)
1992	114.264753	-4.746742	-22.431197	-1.931028
	(55.545293)	(1.204215)	(13.666040)	(1.087927)
1993	114.264688	-4.746750	-22.431204	-2.120744
	(55.545293)	(1.203571)	(13.665961)	(1.095465)
1994	114.264607	-4.746760	-22.431214	-2.354114
	(55.545283)	(1.204076)	(13.666035)	(1.104644)
1995	114.264661	-4.746754	-22.431207	-2.196170
	(55.545273)	(1.204077)	(13.666037)	(1.136559)
1996	114.264739	-4.746744	-22.431198	-1.968863
	(55.545277)	(1.204078)	(13.666036)	(1.140798)
1997	114.264732	-4.746744	-22.431199	-1.980459
	(55.545280)	(1.204078)	(13.666036)	(1.124577)
1998	114.264741	-4.746743	-22.431198	-1.944732
	(55.545282)	(1.204078)	(13.666034)	(1.107096)
1999	114.264680	-4.746750	-22.431205	-2.112931
	(55.545283)	(1.204079)	(13.666034)	(1.117558)
2000	114.264724	-4.746745	-22.431200	-1.985223
	(55.545282)	(1.204079)	(13.666035)	(1.144410)

Year	β_0	β_1	β_2	β_3
2001	114.264725	-4.746744	-22.431200	-1.971408
	(55.545280)	(1.204079)	(13.666035)	(1.172612)
2002	114.264796	-4.746736	-22.431192	-1.773852
	(55.545283)	(1.204079)	(13.666035)	(1.192269)
2003	114.264753	-4.746741	-22.431197	-1.868520
	(55.545300)	(1.204080)	(13.666033)	(1.158351)
2004	114.264763	-4.746739	-22.431196	-1.826364
	(55.545310)	(1.204080)	(13.666031)	(1.159977)
2005	114.264738	-4.746742	-22.431199	-1.870221
	(55.545325)	(1.204080)	(13.666029)	(1.148979)
2006	114.264727	-4.746743	-22.431200	-1.881832
	(55.545345)	(1.204082)	(13.666027)	(1.117358)
2007	114.264730	-4.746743	-22.431200	-1.855805
	(55.545350)	(1.204081)	(13.666026)	(1.174642)
2008	114.264727	-4.746743	-22.431200	-1.845755
	(55.545365)	(1.204081)	(13.666024)	(1.178935)
2009	114.264792	-4.746735	-22.431192	-1.677704
	(55.545391)	(1.204081)	(13.666021)	(1.133404)
2010	114.264755	-4.746740	-22.431197	-1.752891
	(55.545397)	(1.204082)	(13.666021)	(1.190711)
2011	114.264703	-4.746746	-22.431203	-1.862052
	(55.545410)	(1.204083)	(13.666019)	(1.210928)
2012	114.264685	-4.746748	-22.431205	-1.896828
	(55.545423)	(1.204083)	(13.666017)	(1.236162)
2013	114.264757	-4.746739	-22.431196	-1.746085
	(55.545443)	(1.204083)	(13.666015)	(1.226775)
2014	114.264781	-4.746737	-22.431193	-1.694841
	(55.545466)	(1.204083)	(13.666012)	(1.194442)
2015	114.264729	-4.746743	-22.431200	-1.803620
	(55.545484)	(1.204084)	(13.666010)	(1.189839)
Average	114.2647	-4.746744	-22.43120	-1.921043
Minimum	114.2646	-4.746760	-22.43121	-2.354114
Maximum	114.2648	-4.746735	-22.43119	-1.677704

Source: Computed by the author (2020)

Note: Standard error in parenthesis

The TVP coefficients associated with the intercept (β_0), informal economy (β_1), life expectancy (β_2) and investment (β_3) are relatively stable except for investment which shows more variability, but it is not statistically significant. Of interest to this study are the informal sector coefficients which are discussed as follows. From Table 4 and Figure 3 respectively, it is observed that β_1 was -4.746749 in 1991. From 1992 to 1994, the informal economy fell in its importance to the

economy from -4.746742 to -4.746760. The downward trend ended in 1994. Afterwards, it grew gradually to -4.746743 in 1997. By 1995, it rose again to -4.746754, and thereafter maintained a stable level at -4.746744 between 1996 and 1997. It rose to -4.746743 in 1998 before falling to -4.746750 in 1999. From 2000 to 2002, the informal economy experienced an upswing from -4.746745 to -4.746736. In 2003, the effects fell slightly to -4.746741 before increasing to -4.746739 in 2004. Between 2005 and 2008, the informal economy fell slightly in its impact from -4.746742 to -4.746743. However, the time-varying coefficient of the informal economy was stable at -4.746743 during the period 2006-2008. The TVP coefficient increased to -4.746735 in 2009 and thereafter fell to -4.746740 in 2010 and -4.746748 in 2012 respectively. The period 2013-2014 was another period of a rise in informal economy activities before falling to -4.746743 in 2015, which incidentally was a general election year.

The movement of the time-varying parameter (β_1) of the informal economy for the period 1991-2015 is better appreciated using a chart and the outcome is presented in Figure 3.
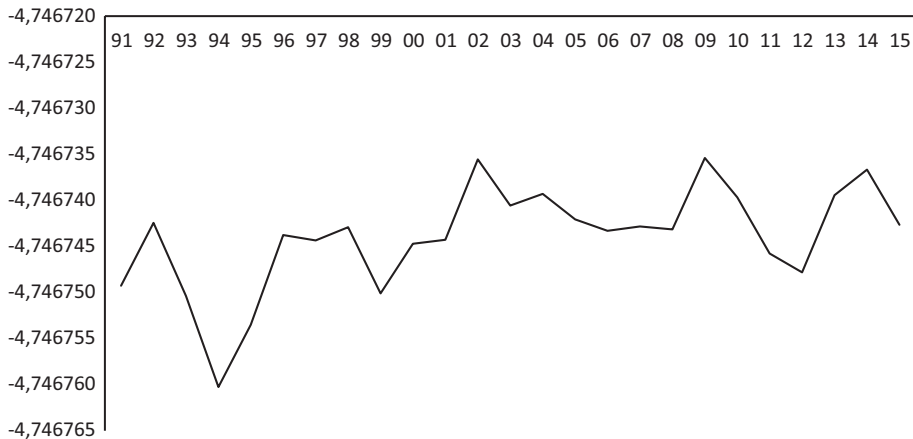

Figure 3. Movement of β_1
Source: Computed by the author (2020)

In 1995, a trough in the TVP coefficients of the informal economy occurred in Nigeria suggesting a reduction in the impact of the informal economy on economic growth during the period (see Figure 3). The year 1995 coincided with dwindling oil revenues, political upheavals and the resultant economic embargoes placed on the country to force it to adopt a democratic government. This period was also a period of uncertainty which affected the activities of the informal sector.

In the period 1991-2015, the country experienced three peaks in the activities of the informal sector. These occurred in 2002, 2009 and 2014. Except for the year 2009, other years were those preceding major elections. This is suggestive as optimism precedes the election year and results in increased informal economy activities. The year 2002 is also associated with the successful implementation of economic reforms of the Nigerian economy as contained in the National Economic Empowerment Development Strategy (NEEDS).

A negative relationship between the informal economy and economic growth dominated the entire period in the study. Despite the negative relationship, the period witnessed upswings and downswings. The average value of the informal economy time-varying coefficient was -4.746744, while the minimum and maximum values of the coefficient were -4.746760 and -4.746735 respectively. Generally, the results of the TVP model displayed a slight variation throughout the study period.

The results obtained from the TVP model align with those obtained from the fixed-parameter model, which supports the negative relationship of the informal economy with economic growth obtained by Loayza (1997). However, the results from the TVP model outperform the fixed-parameter model as it provides information on the annual variation in the informal economy over the period 1991-2015. A caveat identified in the research carried out is the possible biasedness of the TVP estimates due to the small size of the sample (Tanizaki, 2000).

4. SUMMARY AND CONCLUSIONS

This paper investigated the cyclical relationship between economic growth and the informal economy. The time-varying parameter model was used to generate annual coefficients of the informal economy over the period 1991-2015. The analysis reveals the dynamics underlying the relationship between the size of the informal economy and economic growth. Results showed that the TVP model fits the Nigerian economic data on economic growth, the informal economy and particularly the political dispensation in place at a point in time. Specifically, the model exhibited the ability to detect political regime changes and its effects on the relationship between the informal economy and economic growth. From 1991 to 2015, the time-varying coefficient was volatile in its movements. Overall, it was confirmed that the informal economy damage economic growth in line with previous studies.

Due to the negative effect of the informal sector on the economy, the informal sector must be encouraged to formalise its activities through policies such as

credit provision and easing the bottlenecks in their operation. The negative relationship between life expectancy, investment and economic growth suggests that the problem of the country may lie in deep-seated structural problems associated with political regimes which diminish the success of traditional determinants of economic growth. Therefore, a political solution to the economic problems of Nigeria is suggested if the country is to tap into the gains of formalising the informal economy.

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APPENDIX I

Description of variables

S/N	Indicator	Description	Unit	Source
1	GDPr	Annual percentage growth rate of real GDP per capita.	Percent	World Development Indicators, World Bank (2020)
2	IE	Informal economy calculated using the MIMIC approach	Percent of GDP	Medina and Schneider (2018)
3	LIFEEXPEC	Life expectancy at birth	Years	World Development Indicators, World Bank (2020)
4	INV	Gross capital formation (percent of GDP)	Percent of GDP	World Development Indicators, World Bank (2020)

APPENDIX II

Data used in the study

YEAR	GDPr	IE	LIFEXPEC	INV
1991	0.358353	56.95	45.875	48.400
1992	4.63119	58.17	45.857	43.774
1993	-2.03512	86.82	45.845	44.476
1994	-1.81492	66.61	45.843	42.068
1995	-0.07266	62.21	45.854	37.206
1996	4.19592	61.09	45.88	36.582
1997	2.9371	60.69	45.923	38.422
1998	2.58125	62.33	45.994	40.553
1999	0.584127	59.87	46.103	38.278
2000	5.01593	57.9	46.267	34.049
2001	5.91768	57.64	46.51	30.038
2002	15.3292	59.03	46.835	26.769
2003	7.3472	57.19	47.242	28.371
2004	9.25056	56.72	47.72	26.063
2005	6.43852	55.84	48.252	24.966
2006	6.05943	51.95	48.812	26.166
2007	6.59113	54.96	49.373	20.180
2008	6.76447	53.06	49.913	18.860
2009	8.03693	53.98	50.422	21.115
2010	8.00566	52.8	50.896	16.815
2011	5.30792	51.51	51.346	15.676
2012	4.23006	51.56	51.786	14.211
2013	6.67134	51.7	52.228	14.169
2014	6.30972	50.64	52.672	15.084
2015	2.65269	50.49	53.112	14.827

НЕФОРМАЛНА ЕКОНОМИЈА И ЕКОНОМСКИ РАСТ НИГЕРИЈЕ: ПРИСТУП ВРЕМЕНСКИ ПРОМЈЕНЉИВИХ ПАРАМЕТАРА

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САЖЕТАК

Студије о односу између неформалне економије и економског раста нису биле коначне у погледу тога да ли доминира позитиван или негативан однос. Ови резултати су дјелимично посљедица врсте примијењене технике процјене, као што су технике фиксних параметара. Технике фиксних параметара примијењене су за посматрање односа између економског раста и неформалне економије. Проблем код техника процјене фиксних параметара које се примјењују да би се посматрао однос између неформалне економије и економског раста јесте немогућност објашњавања годишњих поремећаја. Овај рад настоји да испита однос између неформалне економије и економског раста у Нигерији између 1991. и 2015. године, користећи модел временски промјењивих параметара. Модел временски промјењивих параметара процјењује се у двије фазе - прво, процјењује се вишеструка регресија редовних најмањих квадрата (ОЛС) и исход се подвргава флексибилном приступу најмањих квадрата. Резултати показују доминацију негативних ефеката неформалне економије на економски раст. Резултати такође откривају да су кретања временски промјењивих параметара у неформалној економији и економском расту повезана са економским и политичким догађајима. Овај рад препоручује апсорпцију неформалне економије у званичну економију путем владине политике.

Кључне ријечи:
економски раст, неформална економија, модел временски промјењивих параметара, Нигерија.