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CONGESTION IN THE JUSTICE SYSTEM AND PRIVATE INVESTMENTS

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ABSTRACT

Purpose: Public goods and services play a vital role in a given economy. Most importantly, optimal supply of public goods and services is desirable. The justice system services are public services that, as argued by most economists and governments, would be expected to spur the growth of private investment. However, these services are prone to congestion which may influence their supply and level of use. This study investigated the effect of congestion in the justice system on private investments growth in Kenya.

Methodology: Drawing from the modified neoclassical theory of investment, a government service characterized by congestion was integrated as an input in the firm's production function to derive a structural model for private investment growth. Utilizing data for the period 1960 to 2016, two-stage least square (2SLS) instrumental variable (IV) method was used for estimation.

Results: The study found that congestion in the justice system reduces growth of private investment. This implies that congestion increases firm's adjustment costs, decrease their profitability and consequently reduces capital accumulation.

Recommendation: To enhance the growth of private investments, we recommend reduction of congestion in the justice system to the possible minimum. This can be achieved by upscaling resolution of disputes out of court to reduce inflow of new caseload. Consequently, the waiting period between hearings and mentions for existing cases would reduce translating to speedy conclusion of cases. The justice system institutions with involvement of litigants and their legal representatives should continuously undertake activities targeting rapid finalization of old cases, but not at the expense of inbound demand for justice. Consequently, congestion would diminish creating a legal and contracting environment characterized by minimal delay hence supporting accumulation of capital.

Key words: *Congestion, Private investments.*

1.0 INTRODUCTION

1.1 Background to the Study

Economic theory provides linkage between private capital accumulation and economic growth. Most governments also acknowledge that private investment is an essential component for growth, creation of employment and increase in public revenue. According to World Bank (2017), the contribution of private investment to economic growth has averaged at 15.38 per cent globally for the last two decades with various regions registering diverse growth rates. For instance, private investment to Gross Domestic Product (GDP) for developing European and Central Asian countries averaged at 17.51 per cent between 1995 and 2015, that for Latin American countries was 14.89 per cent while the Sub-Saharan African (SSA) countries registered 13.12 per cent (World Bank, 2017). This has led policy makers to prescribe diverse public-sector initiatives aimed at enhancing growth of private investments. The initiatives by the public sector has been generally accepted as the critical role of institutions in development (Acemoglu & Johnson, 2005). Given the crucial role of institutions in an economy, then their optimal performance is desirable.

This paper zeroed-in on justice system institution. According to García-Posada and Mora-Sanguinetti (2015), the justice system (JS) influences firm growth through investment decisions faced by entrepreneurs. Stiglitz (2001) asserts that JS institutions are important for markets as they enforce laws and contracts, protect property rights, and provide security for factors of production. Further, strengthening of the rule of law affects the ability of people to retain the rights to their goods and profits thereby shaping their incentives to invest (Kuenhel, 2010). Barro and Sala-I-Martin (2004) concur that maintenance of law & order and enforcement of property rights increase the probability of firms maintaining possession of capital assets they have accumulated. According to Palumbo, Giupponi, Nunziata and Sanguinetti (2013), security of property rights protects returns on investment, reduces transaction costs and dissuades opportunistic behaviour.

Consequently, most developing economies have put up measures to upscale efficiency levels of their public institutions. Recent empirical studies have shown that rivalry in consumption of public goods and services yields congestion, a form of inefficiency, which increases firm’s adjustment cost leading to slow capital accumulation. Pintea and Turnovsky (2006) demonstrated that productive government inputs that are characterized by congestion, affects the desired level of capital accumulation.

This study investigated the effect of congestion in the JS on private investments growth in Kenya. As highlighted in Kenya’s Vision 2030, the target growth rate of private investment as a percentage of GDP was to be at least 22.90 per cent by the year 2013 and above 24.00 per cent by the year 2030. However, private investments to GDP stood at 17.76 per cent in 2013 and averaged at 17.06 per cent between 2006 and 2016. There has been concerns that provision of JS services in Kenya, often characterized by delays, could be contributing to this. As emphasized in Kenya’s Vision 2030, the achievement of growth target for private investment would require interventions to dispense justice expeditiously (Republic of Kenya, 2007). Despite this, by June 2017, there were 533,350 pending cases (PC) in courts up from 426,508 in 2013 (Judiciary 2015 and 2017b) and up from 20,188 cases in 1965 (Republic of Kenya, 1967). Out of the 533,350 pending cases, those classified as backlog (cases older than 1 year since the date of filing) were 315,378 (Judiciary 2017b). This is a pointer to existence of congestion.

1.2 Demand and Supply for Justice, Congestion and Firm Behaviour

In markets, timeliness in delivery of JS services especially the enforcement of contracts and protection of property rights is an essential characteristic (World Bank, 2001 and Klerman, 2006). According to Palumbo *et al.* (2013), while traditional markets are cleared by price, the justice market clears through variations in time taken to provide justice services. Hence, demand and supply factors come into play. At times, the market is characterized by imperfections. According to Kuenhel (2010), the rule of law is imperfect in the sense that property rights in the intermediate-good sector are not fully secured hence prone to expropriation. Messick (1999) explicate that the demand for justice is influenced by structural characteristics of the economy, quality and quantity of legislation, costs of accessing services and diffusion mechanisms for out-of-court resolution. Further, supply of justice is influenced by quantity and quality of labour and capital, reforms and uptake of technology in the JS.

Delay in timely provision of JS services often leads to piling up of such services, a phenomenon referred to as congestion. According to Barro and Sala-I-Martin (2004), congestion emanates whenever a public good is partially rival and hence its use as a productive input by one agent diminishes its usefulness to others. This occurs when over time, the demand for JS services is not marched, to the minimum, with proportionate supply. As expounded by the Organization for Economic Cooperation and Development (OECD) (2013), congestion would occur whenever the JS is unable to finalize matters in each period, equal to the incoming ones.

In relation to firm's behaviour, congestion is categorized as either relative or aggregate. According to Barro and Sala-I-Martin (2004), aggregate congestion occurs when services received by a single firm decreases in aggregate usage while relative congestion occurs when services derived by a single firm depends on its size relative to aggregate of firms. Eicher and Turnovsky (2000) assert that the JS services are subject to aggregate congestion. In an economy, existence of a negative congestion externality means that the benefit each representative firm gains from consuming a public good decrease with the number of firms consuming the good. This would cause the growth rate of government services to be less than the desired or the equilibrium growth rate. In Kenya, since access to justice is not dependent on firm size, then congestion in provision of JS services can be construed as aggregate congestion.

Irmen and Kuehnel (2009) provided linkage between productive government activity characterized by congestion firm's behaviour. This entailed the use of a theoretical model that capitalized on Euler equations in continuous time. Whenever a public good was introduced into the firm's production function, there was an increase of returns to private capital, stimulating private investment and consequently long-run growth. This diminished if the public good was characterized by congestion as an externality. The exposition of aggregate congestion by Irmen and Kuehnel (2009) and as further explicated by Barro and Sala-I-Martin (2004), guided the conceptualization of congestion as used in this paper.

2.0 LITERATURE REVIEW

Empirical literature on private investments growth is wide especially on drivers of capital accumulation. Given this diversity, we have accentuated on literature with a greater bearing on interaction between private investment and congestion in the justice system. Ponticelli and Alencar (2016) examined variation in congestion of civil courts across Brazilian municipalities and firm's access to finance and investment. This entailed the use of firm level data covering the period 2000 to 2009 to estimate a model using instrumental variable (IV) strategy. The study found that congestion reduced capital investment and firms operating in areas with less congested courts had more access to investment loans.

García-Posada and Mora-Sanguinetti (2015) examined the impact of congestion in the JS on firm size, growth and on entry and exit rates in Spain. Congestion was calculated using the sum of pending cases (PC_{t-1}) and filed cases (FC_t) divided by resolved cases (RC_t). By using within-group estimator and firm level data for the period 2001-2009, the study found that congestion hampers firm growth and entry. The paper recommended that preference should be given to declaratory judgements as this would have more impact on firm growth.

Giacommelli and Menon (2013) investigated the effect of judicial efficiency and firm size across Italian municipalities using data for the year 2008. This entailed least square (LS) estimation with robust standard errors supported with two-stage least square (2SLS) for robustness analysis. Judicial efficiency was measured using average length of proceedings calculated using PC_t added PC_{t-1} divided by sum of FC_t and RC_t. The results were that reduction in length of proceedings exerts a positive effect on firm size.

Mora-Sanguinetti (2012) estimated the effect of congestion on proportion of investments in housing sector. The study used 2 step-generalized method of moments (GMM) for estimation utilizing panel data for 50 Spanish provinces for the period 2001-2007. The results were that increase in congestion, calculated by dividing the sum of PC and FC divided by the RC, reduced the share of property investments in Spanish provinces. Mora-Sanguinetti (2012) suggests that in situations of extreme congestion in the justice system, investors would avoid tenancy market due to inability to effectively enforce tenancy contracts.

Pintea and Turnovsky (2006) analyzed public capital when the services it yields are subject to both relative and aggregate congestion. The study combined systematic numerical methods with a derived macroeconomic equilibrium in a two-sector growth model comprising profit-maximizing private firms and public firms. Pintea and Turnovsky (2006) further compared the equilibrium dynamics regarding the roles played by the two forms of congestion on increase in public investment. This was accomplished by calibrating the model to a benchmark economy and then assessing the numerical effects of the two policy shocks relative to the benchmark. The findings were that congestion reduces the long-run equilibrium growth rate.

Overall, empirical research demonstrates that congestion affects private investment performance negatively. In instances of high congestion in the JS, protection of life, property and businesses would be adversely affected. Additionally, incentives to cooperate in a contract may weaken if a slower JS render the discounted value of punishment from deviation to be lower. Inefficient

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contract enforcement would therefore prompt firms to adopt inefficient technologies that would harm productivity. All these have the potential to impede optimal economic performance.

Despite the existence of empirical literature on interaction between congestion in the JS and private investments, there is knowledge gap in Kenyan context. This is evidenced by studies by Karumba (2009), Kiprop (2013), Kiptui (2005), Mbaye (2014), Menjo and Kotut (2012), Mundia (2014) and Njuru, Ombuki, Wawire and Okeri (2014). These studies did not provide information knowledge on effects congestion on private investment but majorly focused on fiscal and monetary policy determinants of private investment growth. Such information could have provided more information on what could be occasioning the slow growth of private investments in Kenya. This paper strived to bridge this knowledge gap.

3.0 METHODOLOGY

3.1 Theoretical Model

The theoretical framework for this paper was primarily informed by the neoclassical theory of investment attributed to Jorgensen (1963 & 1967) and Jorgenson and Hall (1971). Further, the modifications by Barro and Sala-I-Martin (2004), Kuehnel (2010) and Pintea and Turnovsky (2006) to capture a productive government input, also prone to rivalry in consumption, in the neoclassical production function was instrumental. In neoclassical theory of investment, firms seek to maximize their profits over indefinite time and produce output using a neoclassical production function that comprises two inputs capital and labour.

Consider a neoclassical production function defined as;

$$Y = AF(K, L) \quad \text{……………………………………………………………………..….. (1)}$$

such that at a given level of technology (*A*), firms produce output (*Y*) using private capital (*K*) and labour (*L*). Equation (1) is assumed to be concave, linearly homogeneous in *K* and *L*, exhibits positive but diminishing marginal products with respect to *K* and *L* and satisfies the *inada* conditions. Further, the economy is assumed to consist of *N* identical private firms growing at a constant exponential rate and has a constant population of *L* individuals. Defining output *y* as *Y/L* and private capital *k* as *K/L*, at any given time *t*, a representative firm produces its output (*y*) using a production function of the form;

$$y_t = ALf(k_t) \quad \text{……..……..………...…………….………...………...………….. (2)}$$

The representative firm is further assumed to be a price taker and is facing adequate demand for *y*. Over time, private capital (*k*) is reduced by depreciation rate *(δ)* and increased by gross investment *(I)* such that;

$$\dot{k}_t = I_t - \delta k_t \quad \text{………………………………...……………………...…….……..….. (3)}$$

Following Barro and Sala-I-Martin (2004) and Pintea and Turnovsky (2006), a government activity enters equation (2) as productive input hence;

$$y_t = ALf(k_t, g_t) \quad (4)$$

where g_t is the productive government input available to a firm at time $t, \partial y/\partial k = f_1 > 0$, $\partial y/\partial g = f_2 > 0$, $\partial^2 y/\partial k^2 = f_{11} < o$ and $\partial^2 y/\partial g^2 = f_{22} < o$.

The productive government input g is subject to congestion. Following Eicher and Turnovsky (2000) and Kuehnel (2010), g in presence of congestion is defined as;

$$g = GK_a^{\sigma_G - 1} \qquad 0 < \sigma_G < 1 \quad (5)$$

where G is the total available public input, K_a is aggregate private capital and σ_G is the scale of congestion associated with G. Equation (5) depicts aggregate congestion hence congestion reduces the effective productivity of aggregate private capital.

Congestion of a public input affects firm's productivity via adjustment costs. From Barro and Sala-I-Martin (2004), the adjustment cost equation (ϕ) in presence of congestion is defined as;

$$\phi_t = \phi_t(I/g) \quad (6)$$

Substituting Equation (5) in (6) yields;

$$\phi_t = \phi_t(I/GK_a^{\sigma_G - 1}) \quad (7)$$

such that $\partial\phi/\partial I > 0$ and $\partial\phi/G < 0$.

According to Jorgensen (1963 & 1967), the time path of investment chosen to achieve the target capital stock is that which maximizes the NPV given as;

$$NPV(0) = \max \int_0^\infty \pi_t e^{-rt} dt \quad (8)$$

Substituting the profit equation in Equation (8) yields;

$$NPV(0) = \max \int_0^\infty [p_y y_t - wL_t - P_k I_t] e^{-rt} dt \quad (9)$$

where π is the neoclassical profit function for the firm, p_y is price of output, w is wage, p_k is price of capital, I is investment, r is discount rate and e is the exponent. Substituting Equation (4) that captures productive government input and Equation (7) that captures adjustment cost of capital in Equation (9) yielded;

$$NPV(0) = \int_0^\infty \{ALp_y f(k_t, g_t) - wL_t - [p_k + \phi(I/GK_a^{\sigma_G - 1})]I_t\} e^{-rt} dt \quad (10)$$

subject to accumulation of capital defined by Equation (3) and initial value K (*0*) as given. To optimize, we set the current-value Hamiltonian as follows;

$$H = e^{-rt}\{[Lf(k,g) - wL - [1 + \phi(I/GK_a^{\sigma_G - 1})]I + q(I - \delta k\} \text{ .... (11)}$$

For simplicity, the subscript t was dropped while p_k, p_y and A normalized to 1. The maximization required solving the first order conditions, $\partial H/\partial L = \partial H/\partial \iota = 0$ and $\dot{q} = -\partial H/\partial k$ as well as the transversality condition $\lim_{t\to\infty}(qKe^{-rt}) = 0$ which yielded;

$$\frac{\partial H}{\partial L} = \{f + L[\frac{\partial f}{\partial k}.\frac{\partial k}{\partial L}] - w\}e^{-rt} = 0 ... \Rightarrow f - f_1 k = w \text{ .... (12)}$$

$$\frac{\partial H}{\partial \iota} = \{-L[1 + \phi + \iota[\frac{\partial z}{\partial \phi}\frac{\partial \phi}{\partial \iota}] + qL\}e^{-rt} = 0 ... \Rightarrow 1 + \phi + L.\frac{\iota}{g}.\phi' = q \text{ .... (13)}$$

$$\frac{\partial H}{\partial k} = \{L[\frac{\partial f}{\partial k}] - \iota L[\frac{\partial z}{\partial \phi}\frac{\partial \phi}{\partial g}\frac{\partial g}{\partial k}]. - q\delta L\}e^{-rt} = 0 ... \Rightarrow \frac{1}{q}[f_1 + [\frac{\iota}{g}]^2 L.\phi'.\sigma_G.\frac{g}{k}] = \delta \text{ .... (14)}$$

where ι is the gross investment per unit of effective labour. Equation (12) is the first static efficiency condition and shows that $MPL = w_i$. Equation (13) is the second static efficiency condition and indicates that marginal revenues of an investment, measured by the shadow price q, must equal the marginal costs of investment. The optimum requires that the market interest rate (r) to coincide with the sum of net capital gain, $\dot{q}/q - \delta$, and marginal product of capital added to marginal adjustment costs weighted with investment hence;

$$\dot{q}/q - \delta + 1/q[f_1 + L.(\iota/g)^2.\phi'.\sigma_G.g/k] = r \text{ .... (15)}$$

Equation (15) is the dynamic efficiency condition and determines optimal capital accumulation. Further, $\partial H/\partial q = I - \delta k$ implies that in equilibrium, the net investments equals zero and gross investments equal depreciation of K. From (15), $\dot{q}$ becomes;

$$\dot{q} = q(r + \delta) - [f_1 + L.(\iota/g)^2.\phi'.\sigma_G.g/k] \text{ .... (16)}$$

Barro and Sala-I-Martin (2004) upholds that the relation between q and ι/g implied in equation (13) is monotonically increasing function of q whose inverse relationship is;

$$I/g = \varphi(q) \text{, where } \varphi'(q) > 0 \text{ .... (17)}$$

The adjustment cost function given by equation (6) can therefore be defined as;

$$\phi(I/g) = b.I/g = b\varphi(q) \quad ; \quad \phi' = b > 0 \text{ .... (18)}$$

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where b is sensitivity of adjustment costs to g such that a higher b implies a higher adjustment cost. According to Barro and Sala-I-Martin (2004) and Ott and Soretz (2007), from equation (13) and (18) optimal investment requires that;

$$\varphi(q) = (q-1)/2b \qquad (19)$$

Using equations (3) and (15) together with equations (18) and (19), the equilibrium is given by a system of differential equations;

$$\dot{k} = \iota - \delta k \qquad (20)$$

$$\dot{q} = q(r+\delta) - [f'(k) + 1/L.b\varphi^2.\sigma_G.g/k] \qquad (21)$$

Equation (21) depends via φ on investment ratio (ι/k) since from equation (17), it follows that;

$$\varphi(q) = \frac{I}{g} = \frac{\iota}{k}.\frac{L}{g/k} = (q-1)/2b \qquad (22)$$

Consequently, investment equation in presence of congestion ($\sigma_G \neq 1$) becomes;

$$\dot{\iota} = \{\frac{g/k}{2bL}[r+\delta-\frac{dy}{dk}] + (\iota/k)[r+\delta+\delta(1-\sigma_G)] - \frac{(\iota/k)^2}{2}[2-\sigma_G]\}k \qquad (23)$$

Which can be summarized as;

$$\dot{\iota} = f(\sigma_G, g, r, y, k, \delta) \qquad (24)$$

3.2 Empirical Model Specification

To determine the effect of congestion on private investments, a structural model drawn from Equation (24) was specified as;

$$Pinv = \alpha_1 + \alpha_2 congestion + \alpha_3 justice + \alpha_4 security + \alpha_5 interest + \varepsilon \qquad (25)$$

where *pinv* is private investment growth, *congestion* stands for congestion associated with provision of justice system services, *justice* represents dispensation of justice, *security* stands for provision of security and *interest* is lending rate on loans. According to Bellani (2016), increase in investments may increase judicial system workload generating congestion and on the reverse, higher investments may create greater incentive to maintain an efficient contracting environment with minimal congestion. This implies that *congestion* is endogenous and correlated with the error term ε, with an expected value of zero. Interest rate (r) is uncorrelated with ε hence its exogenous while *justice* and *security* are endogenous. Because of potential endogeneity between *congestion* and private investment, two-stage least square (2SLS) instrumental variable (IV) method was used to estimate Equation (25). The expected sign for the coefficient for *congestion*, α_2, was negative such that congestion is a negative externality to private investment growth.

3.3 Estimation Procedure

Determination of the effect of congestion on private investments entailed estimation of the structural model specified in Equation (25). As explained by Ponticelli and Alencar (2016) and Mora-Sanguinetti (2012), congestion in the justice system and firm behaviour are endogenous. To address the challenge of endogeneity, 2SLS IV method was used to avoids bias faced by LS estimation. According to Brooks (2014) and Murray (2006), LS cannot be used directly on structural equations since the endogenous variables are correlated with the errors.

First, stationarity properties of the series were determined. Second, correlation analysis between endogenous variables and potential instruments to get an indication of potential relevance of the instruments. This was followed by first stage regression which entailed estimation of the following equation;

$$Congestio\hat{n} = \theta + \lambda_i Z_i + \mu \quad \text{......} \quad (26)$$

where Z_i contains variables that would affect congestion but not private investment except through congestion and Z_i has some association with $congestio\hat{n}$. The coefficient $\lambda_i \neq 0$ and one of the λ_i is not perfectly correlated with Z_i such that Z_i are exogenous. The instrumental variables (Z_i) used were pending cases (PC), filed cases (FC), establishment of National Council on Administration of Justice (NCAJ), establishment of National Police Service Commission (NPSC) and Independent Policing Oversight Authority (IPOA) (*D1*) and election related crimes (*D2*). For robustness analysis, an alternative measure of congestion was used.

In the second stage of LS regression, *congestion* in Equation (25) was replaced with fitted values obtained from the first stage. This entailed estimation of the following equation;

$$Pinv_t = \alpha_1 + \alpha_2 congestio\hat{n} + \alpha_{i_t} X_{it} + \varepsilon \quad \text{......} \quad (27)$$

where X_i is a vector of other variables in private investment equation.

3.4 Study Data and Measurement of Variables

The study utilized secondary annual time series data for the period 1960-2016. Congestion was computed using the ratio of annual PC_t to PC_{t-1} added to FC_t. Data for computing congestion were sourced from statistical abstracts and economic surveys published by Kenya National Bureau of Statistics (KNBS), published Judiciary reports, the hitherto Judicial and Police Department's reports. Private investments defined as accumulation of capital by private agents for productive purposes over time was measured using real annual gross fixed capital formation (GFCF) less government investment divided by real GDP. Data on *Pinv* were obtained from statistical abstracts and economic surveys. Interest rate defined as average annual lending rate on loans by commercial banks was expected to reduce growth of private investment. Data on interest rate were obtained from Central Bank of Kenya reports. Dispensation of justice was measured using annual resolved cases by courts and was expected to spur the growth of private investment. Promotion of security was calculated using per capita crime and was hypothesized to reduce capital accumulation. Data on *justice* and *security* were sourced from statistical abstracts and economic surveys, Judiciary and National Police Service (NPS) reports, and the hitherto Judicial and Police Department's reports.

4.0 FINDINGS AND DISCUSSION

4.1 Descriptive Statistics

The study data was analyzed to discern its characteristics prior to estimation. This involved determination of the mean, median, maxima, minima and standard deviation. Congestion in the JS averaged at 0.415 with a deviation from the mean of 0.167. The minimum level of congestion was 0.114 and the maximum was 0.810. Private investments growth had a mean of 0.134, a minimum of 0.073 and a maximum 0.223. A standard deviation of 0.032 and a median of 0.134 for private investment depicted marginal variation from the mean. The descriptive statistics for the other study variables are given in Table A1.

4.2 Pre-estimation Analysis and Tests

Foremost, time series property tests were conducted using Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. The test results revealed that all the study variables were stationary at level. This guaranteed that the estimation using these variables could not yield spurious results. Details on stationarity test results are provided in Table A2 in the appendices. To get an indication whether the chosen instruments would be relevant to explain changes in congestion as captured in Equation (26), correlation analysis between congestion and potential instruments was done. The results given in Table A3 shows existence of correlation between congestion and instruments which was also robust to the alternative measure for congestion. This signified that the instruments would be appropriate in the first stage regression.

4.3 Diagnostic and Stability Test Results

In the second stage of regression, the estimated values for congestion were used instead of the original values as specified in Equation (25). The initial 2SLS IV estimates are provided in Table A4. Before the adoption of the results, diagnostic tests were conducted to ensure that the results were unbiased and efficient. From Table A5, the Ramsey RESET test statistic for the omitted variables of 1.193621 had a *p*-value of 0.2797. Since the *p*-value was greater than 0.05, the null hypothesis that coefficients of powers of fitted values are all zero could not be rejected and hence there were no omitted variables.

The autoregressive conditional heteroscedasticity (ARCH) test statistic of 0.061649 had a *p*-value of 0.8039. The null hypothesis of constant variance was therefore rejected, and the study concluded there was no ARCH on residuals. The Jarque-Bera statistic of 1.4738 had a *p*-value of 0.4786 greater than 0.05. Hence, the null hypothesis that residuals were normally distributed could not be rejected implying that the residuals were normally distributed. Further, serial correlation in residuals was found to exist. This was evidenced by LM test statistic of 18.59219 with a *p*-value of 0.001 which led to rejection of the null hypothesis that there was no serial correlation in residuals. To address serial correlation, the model was re-estimated using heteroskedasticity and autocorrelation consistent (HAC) standard errors. The results are given in Table 1.

To confirm if parameters were stable, cumulative sum (CUSUM) test was done. From Figure A1, the CUSUM line is within the two critical lines. This implied that the parameters were stable. Before the results were utilized in addressing the study objectives, instruments diagnostics tests were done. From Table A6, the *f*-statistics of 12.6938 was statistically significant at 5 per cent as evidenced by the *p*-value of 0.0028 leading to rejection of the null hypothesis that congestion was exogenous. From Table A7, the *chi*-square statistic of 2.72039 had a *p*-value of 0.2566. Since the *p*-value was greater than 0.05, the null hypothesis that the instruments were uncorrelated with error term was not rejected and therefore they were valid. From Table A8, the adjusted partial r-squared for all endogenous variables were greater than the critical values of 9.53, 6.61, 4.99 and 4.30 at 5, 10, 20 and 30 per cent significance level respectively, leading to rejection of the null hypothesis that the instruments were weak.

4.4 Research Findings and Discussion

Having satisfied the diagnostic test results, the 2SLS estimation results were used to explain the effects of congestion on private investment growth as detailed in Table 1.

Table 1: Effect of congestion on private investments

Estimation method	Instrumental variables (2SLS) regression			
Dependent variable	Private investment			
Wald chi2(4)	97.61			
Prob > chi2	0.000			
Explanatory Variables	**Coefficient**	**HAC Std. error**	**z**	**P>z**
Congestion	[-0.1624305] *	0.0880936	-1.84	0.065
Justice	[0.0017303] ***	0.0003189	5.43	0.000
Security	[-0.0039072] ***	0.0011509	-3.39	0.001
Interest	[-0.0040078] ***	0.0006812	-5.88	0.000
Constant	[0.33665] ***	0.0776043	4.34	0.000

Note: [***] denote significant levels at 1% while [*] denote significant level at 10%
Source: Author's computation using study data from various sources

The coefficient for congestion was negative (-0.1624305) and significant at 10 per cent level (*p*-value of 0.065). Therefore, an increase in congestion would reduce the growth of private investment. This finding is unique in that it demonstrates that the extent of congestion in Kenyan JS is high as to influence private investments performance. Ordinarily, congestion in the JS would exist but the extent if low, it wouldn't be detrimental. The finding that congestion adversely affects private investments growth agrees with those of Posada and Sanguinetti (2013) and Giacommelli and Menon (2013). Moreover, the results agree with that of Chemin (2012) that speedier justice system increases investment, and Eicher and Turnovsky (2000) that congestion reduces productivity of capital. However, the finding contradicts that of Dao (2008).

From Table 1, all variables were significantly different from zero as evidenced by *chi*-square statistic of 97.61 which was statistically significant at 1 per cent given (*p*-value of 0.000). Interest rate had a negative effect on private investment growth as shown by a coefficient of -0.004 with a *p*-value of 0.000. This was in conformity with study expectation and economic theory. The finding agrees with that of Menjo and Kotut (2012) and Njuru *et al.* (2014) that as interest rate rises, private investment slows down. The coefficient for *justice* was positive (0.0017303) and statistically significant at 1 per cent (*p*-value of 0.000). Growth of crime would lower private investment growth. This is affirmed by a negative coefficient for security (-0.0039072) which was statistically significant at 5 per cent level (*p*-value of 0.000).

For robustness analysis, an alternative measure of congestion proxied by change on average time to proceedings drawn from Giacommelli and Menon (2013) was used. The argument was that the higher the average time to proceedings, the higher the congestion. From Table A8, the coefficient for congestion is negative (-0.2533365) and statistically significant at 1 per cent significance level (*p*-value of 0.000). The estimated model for robustness analysis satisfied the diagnostic tests as elaborated in Table A10, A11 and A12. Equation (25) was also estimated using LS technique for comparison like in Ponticelli and Alencar (2016). Since the estimated LS model given in Table A13 showed residual autocorrelation and heteroscedasticity as detailed in Table A14, the model was re-estimated using robust standard errors. The results in Table A15 further confirm that the coefficient of congestion is negative though marginally insignificant (*p*-value of 0.121). In Table A16, all coefficients under LS estimation had a lesser magnitude and relatively weak *p*-value as compared with those under 2SLS results. This reinforced the use of IV approach for estimation.

5.0 SUMMARY AND RECOMMENDATIONS

5.1 Summary

The study aimed at determining the effect of congestion in the JS on private investments. To achieve this, a structural model was estimated using IV method to control for potential endogeneity between congestion and private investments. The results were that an increase in congestion reduces the growth of private investments in Kenya. Therefore, congestion in the JS is a negative externality to private investment performance.

5.2 Recommendations

To boost the growth of private investments, congestion in the JS should be reduced to the possible minimum. This can be achieved by upscaling the resolution of disputes out of court. Such an action would reduce the inflow of new caseload, yield condensed waiting period between hearings and mentions for existing cases and subsequently hasten finalization of cases. Further, the JS institutions in conjunction with litigants and their legal representatives should carry out joint pendency reduction exercises targeting rapid finalization of old cases. Consequently, congestion would diminish yielding a favorable contracting and legal environment for capital accumulation by investors. One area for future research would be micro-analysis of linkage of congestion associated with specific case types with firm level, sector and locational investments.

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APPENDICES

Table A1: Descriptive statistics for the series

Variable	*Mean*	*Median*	Max.	Min.	Std. *Dev.*	No of obs.
Congestion	0.415	0.446	0.810	0.114	0.167	57
*Congestion**	0.842	0.777	2.003	0.132	0.549	57
Pinv	0.134	0.134	0.223	0.073	0.032	57
Justice	362,047	380,909	584,691	113,887	122,606	57
Security	0.004	0.004	0.006	0.002	0.001	57
Interest	14.72	14.00	30.55	8.39	5.97	57

*Key: Max = Maximum, Min= Minimum, Std. Dev= Standard deviation, No of obs.=number of observations *Congestion used for robustness analysis.*

Table A2: KPSS test results for stationarity of the series

Variable	Test Level	Trend & Intercept	Test Statistic	Critical Value at 5 %	Conclusion
Congestion	Level	Trend & Intercept	0.10412	0.146	Stationary
*Congestion**	Level	Trend & Intercept	0.078718	0.146	Stationary
Pinv	Level	Intercept	0.339609	0.463	Stationary
Justice	Level	Intercept	0.418726	0.463	Stationary
Security	Level	Trend & Intercept	0.126032	0.146	Stationary
Interest	Level	Trend & Intercept	0.135784	0.146	Stationary
FC	Level	Trend & Intercept	0.137834	0.146	Stationary
PC	Level	Trend & Intercept	0.063569	0.146	Stationary

Table A 3: Correlation between congestion and instruments

	Congestion	*Congestion**
PC	0.9562	0.9240
FC	0.4533	0.2506
NCAJ	0.4253	0.5803
D1	0.3320	0.5114
D2	0.1758	0.1681

Table A 4: Initial 2SLS regression results

Dependent variable	Pinv			
Wald chi2(4)	22.22			
Prob > chi2	0.0002			
Variable	**Coefficient**	**Std. error**	**z**	**P>z**
Congestion	-0.1624	0.1001	-1.62	0.105
Justice	0.0017	0.0006	2.77	0.006
Security	-0.0039	0.0014	-2.78	0.005
Interest	-0.0040	0.0013	-3.19	0.001
Constant	0.3367	0.0880	3.82	0.000

Table A 5: Diagnostic test results

OLS condition	Test	Test statistic	Critical value	Conclusion
Normality Test	Jarque- Bera	1.4738	0.4786	Errors are normally distributed
Serial Correlation	Breusch-Godfrey LM	18.59219	0.0001	There is serial correlation
Heteroskedasticity	ARCH	0.061649	0.8039	There is no heteroscedasticity
Omitted Variable	Ramsey RESET	1.193621	0.2797	There are no omitted

variables

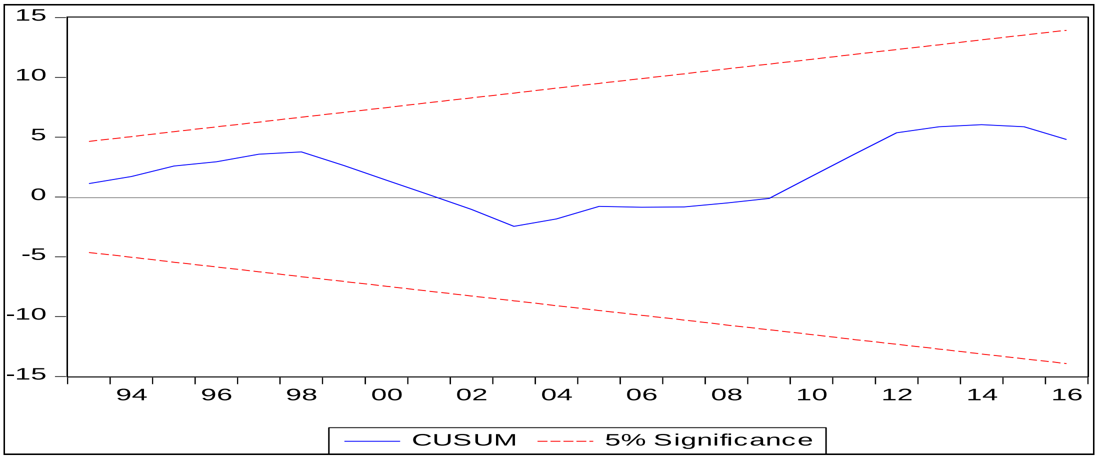

Figure A 1: The CUSUM graph for the estimated investment equation

Table A 6: Endogeneity test results

Test of endogeneity		
Ho: Variables are exogenous		
HAC regression F (3,49)	= 12.6938	(p=0.0028)
(Based on Bartlett kernel with 55 lags)		

Table A 7: Validity of instruments test results

Test of overidentifying restrictions		
Score chi2(2)	= 2.72029	(p=0.2566)
(Prewhitening performed with 1 lag)		

Table A 8: Weak instruments test results

Variables	**Shea's Partial R-sq.**		**Shea's Adjusted Partial R-sq.**	
Congestion	0.2341		0.1590	
Justice	0.6105		0.5723	
Security	0.1986		0.1201	
2SLS relative bias	5%	10%	20%	30%
	9.53	6.61	4.99	4.30

Table A 9: Effects of congestion on private investments, robustness analysis

Instrumental variables (2SLS) regression				
Wald chi2(4)	131.22			
Prob > chi2	0.0000			
Variables	**Coefficient**	**HAC Std. error**	**z**	**P>z**
*Congestion**	[-0.2533365] ***	0.0628676	-4.03	0.000
Justice	[0.0008625] **	0.0003981	2.17	0.030
Security	[-0.0012924] ***	0.0002371	-5.45	0.000
Interest	[-0.0029906] ***	0.0004023	-7.43	0.000
Constant	[0.205515] ***	0.0182957	17.92	0.000

**Calculated following Giacommelli and Menon (2013); [***] [**] denote significant levels at 1 and 5 per cent respectively*

Table A 10: Endogeneity test results, robustness analysis

Test of endogeneity		
Ho: Variables are exogenous		
HAC regression F(3,48)	= 21.4048	(p=0.0000)
(Based on Bartlett kernel with 55 lags)		

Table A 11: Instruments validity results, robustness analysis

Test of overidentifying restrictions	
Score chi2(2)	= 1.57518 (p = 0.4549)
(Prewhitening performed with 1 lag)	

Table A 12: Weak instruments test results, robustness analysis

Variables	**Shea's Partial R-sq.**		**Shea's Adjusted Partial R-sq.**	
*Congestion**	0.0491		0.0441	
Justice	0.8517		0.8371	
Security	0.6269		0.5903	
2SLS relative bias	5%	10%	20%	30%
	9.53	6.61	4.99	4.30

Table A 13: LS regression results

Variables	**Coefficient**	**Std. error**	**t**	**P>t**
Congestion	0.0458609	0.0389343	1.18	0.244
Justice	0.0008884	0.0003918	2.27	0.028
Security	-0.000978	0.0005034	-1.94	0.057
Interest	-0.0025258	0.0008502	-2.97	0.004
Constant	0.1550084	0.0331079	4.68	0.000
F(4, 52)=7.21; Prob > F=0.0001				

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Table A 14: Diagnostic test results for LS estimation

OLS condition	Test	Test statistic	Critical value	Conclusion
Serial Correlation	LM	29.286	0.0000	There is serial correlation
Heteroskedasticity	ARCH	15.5241	0.0001	There is heteroscedasticity
Omitted Variable test	Ramsey RESET	1.29	0.2893	Model has no omitted variables
Normality Test	Jarque- Bera	2.5752	0.2759	Errors are normally distributed

Table A 15: LS regression results, RSE

Variables	Coefficient	Robust Std. error	t	P>t
Congestion	0.0458609	0. 0290713	1.58	0.121
Justice	0.0008884	0. 0003569	2.49	0.016
Security	-0.000978	0.0003321	-2.94	0.005
Interest	-0.0025258	0.000647	-3.90	0.000
Constant	0. 1550084	0. 0224376	6.91	0.000
F (4, 52) =8.56; Prob > F =0.0000				

Table A 16: Comparison of 2SLS and LS regression results

	Dependent Variable - Private investment			
	2SLS		**OLS**	
Variables	**Coefficient**	***p*-value**	**Coefficient**	***p*-value**
Congestion	[-0.1624305] *	0.065	[0.0458609]	0.121
Justice	[0.0017303] ***	0.000	[0.0008884] **	0.016
Security	[-0.0039072] ***	0.001	[-0.000978] ***	0.005
Interest	[-0.0040078] ***	0.000	[-0.0025258] ***	0.000
Constant	[0.33665] ***	0.000	[0. 1550084]***	0.000

Note: [***] denote significant levels at 1%; [**] denote significant levels at 5% while [*] denote significant level at 10%