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Exogenous Shocks to Crime and Resolution of Court Cases: Do Such Shocks Impact on Investments?

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Abstract*: The interaction between justice sector and private investments has widely been acknowledged by economists and governments. For instance, services provided by police and courts have been found to affect private investments in most economies. However, there is limited information regarding the growth trajectory private investments would follow when an exogenous shock to crime and resolution of court cases occurs. Therefore, this paper investigated the impact of exogenous shocks to crime and resolution of court cases on private investment. The analysis entailed the use of vector auto regressive model and Kenyan data for the period 1960-2016. The results showed that an exogenous shock to crime and resolution of cases impacts on private investment for a relatively long period of time. Hence, Governments should speedily ease down the memories of crime once a major crime engulf the economy and expansively secure the affected firms and other economic agents with future propensity to be hit by a comparable crime. Further, for courts with high pendency of cases, prioritizing cost effective programmes that would substantially and within a short period of time reduce a huge chunk of pending cases, would positively impact on private investment for a long period.*

Key words: *crime, resolution of court cases, shock, impact, private investments*

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I. Introduction

Background

Most investment theories may not be fully applicable to developing economies since in these economies, government institutions play an immense role on private investment behavior (Acemoglu, Johnson & Robinson, 2005). In developing economies, the role of government institutions in shaping investment behaviour has remained imperative. From economic theory, the institution's hypothesis links incentives to invest in physical capital, human capital and technology to economic institutions, and puts forth that economic prosperity results from these investments (Acemoglu et al., 2005). One of the institutions is the justice sector which according to Palumbo, Giupponi, Nunziata and Sanguinetti (2013), is conceptually a market for justice whose services influence proper functioning of markets. Stiglitz (2001) asserts that a market economy requires justice institutions that enforce laws and contracts, protect property rights, and provide security for factors of production. Barro and Sala-I-Martin (2004) explicates that enforcement of the rule of law increase firms' probability of maintaining possession of their accumulated capital.

For economies to grow and prosper social infrastructure of law and order is essential. Kuehnel (2010) links services offered by police and courts to the ability of economic players to retain the rights to their goods and profits, thereby shaping their incentive to invest. According to Kuehnel (2010), a government that spends sufficient resources on enforcement of rule of law, renders its economy to move to equilibrium with strictly positive growth. Palumbo et al. (2013) assert that security of property rights provides economic agents with incentive to invest by protecting returns on investment, reduces transaction costs and dissuades opportunistic behavior. Hence, institutional services that strengthen the rule of law affect the ability of economic agents to retain rights to their economic resources and to thrive in a secure environment. Once the rule of law is observed, economic agents would incur less transactional cost and would consequently be willing to commit more of their scarce resources on investments. This notion is concurred by Barro and Sala-I-Martin (2004) who affirms that observance of the law and enforcement of property rights work like tax reductions, and would lead to capital accumulation. Once capital accumulates, economic growth would be realized.

According to Dougherty (2013), without high-quality justice sector institutions, transaction costs may be prohibitive, deterring market transactions and firm entry thereby inhibiting competition and trade. For instance, government expenditure relating to security, enforcement of property rights and maintenance of public order can exert a positive effect on private investment (Njuru, Ombuki, Wawire & Okeri, 2014). Marang'a, Kosimbei and Ouma(2018a), concurs that increased provision of justice sector services of security and dispensation of justice affect private investments positively. Also, the less congested the justice sector services, the higher the growth of private investments (Marang'a et al., 2018b).

Christopher (2006) argued that crime imposes direct losses that reduce profits and investment funds; induces government to spend money on crime prevention that would otherwise be available to stimulate growth; induces households to spend money on security precautions rather than on investments; erodes human capital by injuring and killing skilled workers and; discourages foreign investment. Insecurity negatively affects business environment and firm's profit maximization (Kippra & World Bank, 2004). Ngugi and Nyang'oro (2005) observed that a crime-risky environment discourages investments by either reducing investment returns or leading to a precautionary behaviour by firms. Further, studies by Bellani (2014), Boehm (2015), Chemin (2004), Dougherty (2013), Giacommelli and Menon (2013), Irmen and Kuenhel (2009), García-Posada and Mora-Sanguinetti (2015), Kippra and World Bank (2004), Martinez-Matute and Garcia-Posada (2016), and Ponticelli and Alencar (2016) showed that the justice sector relates with private investment.

However, there is limited information regarding the growth trajectory private investments would follow when an exogenous shock to crime and resolution of court cases occurs especially in developing economies. For instance, studies focusing on Kenyan economy namely; Kiprop (2013), Marang'a et al. (2018a & b), Mbaye (2014), Menjo and Kotut (2012), Mundia (2014) and Njuru et al. (2014) did not explore the impact of exogenous shocks to crime and resolution of cases by courts on private investments. To address this information gap, this paper investigated the impact of exogenous shocks to crime and resolution of court cases on private investments after the onset of shocks, focusing on Kenya as one of the developing countries. According to Republic of Kenya (2017), the economic growth envisaged in Kenya's economic blueprint, the Vision 2030, would require a secure environment where justice is dispensed expeditiously.

Private Investments Trends in Kenya

According to World Bank (2017), the contribution of private investment to economic growth has globally averaged at 15.38 per cent for the period 1995-2015 with various regions registering different growth rates. For instance, private investment to Gross Domestic Product (GDP) for developing European and Central Asian countries averaged at 17.51 per cent. Further, private investment to GDP for Latin American countries was 14.89 per cent while that for Sub-Saharan African (SSA) countries was 13.12 per cent over the same period (World Bank, 2017). Kenya, a member of SSA countries, registered 14.71 per cent, which was slightly above the average for SSA countries but still less than the global, European and Central Asian countries averages. The growth for Kenya has been characterized by fluctuations over time. Figure 1 illustrates the trend of private investment in Kenya between 1963 and 2016.

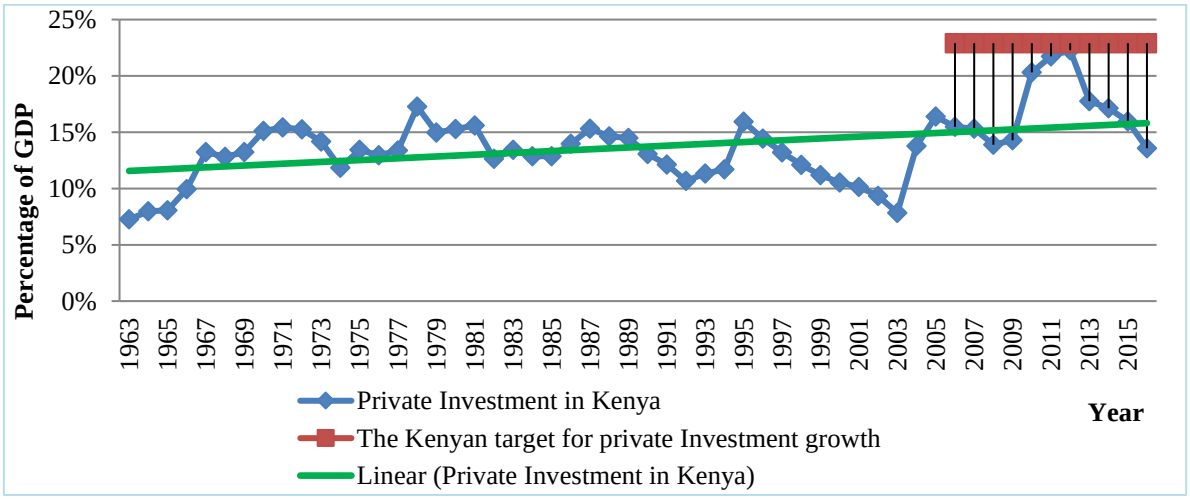

Figure 1: Private investment trends in Kenya, 1963-2015

Source: Author computation using data sourced from KNBS

From Figure 1, private investment increased from 7.25 per cent in 1963 to 15.11 per cent in the year 1971. This followed the implementation of strategies earmarked in the Sessional Paper No. 10 of 1965 on African socialism and its application to planning in Kenya, and whose overarching objective was to protect local infant industries. This was followed by a decline to 11.84 per cent in the year 1974. The decline could be attributed to the oil crisis of 1973 and severe drought of 1974 (Njuru, Ombuki, Wawire & Okeri, 2014). Thereafter, private investments registered a steady increase to reach 17.26 per cent in the year 1978.

For the period 1978-1992, private investments declined hitting a low of 10.66 per cent in the year 1992. This was followed by a rise, which settled at 15.94 per cent in the year 1996, and thereafter a decline to 7.82 per cent in the year 2003. The decline in the year 1997 could be attributed to impact of post-election violence of the year 1997 (Ocharo, Wawire, Ng'ang'a & Kosimbei, 2014). Njuru et al. (2014) assert that the destruction of infrastructure by *El Nino* rains in 1998 could also have stifled the growth of private investments.

From the year 2003, there was a moderate growth reaching 16.39 per cent in the year 2005, which coincided with the period under Economic Recovery Strategy (ERS) (2003-2006). This was followed by a decline to 13.88 per cent in the year 2008 when Kenya experienced post-election violence. There was moderate recovery until the year 2012 after which, the increase declined until the year 2016. This decline covered the year 2013 when Kenya held its general elections. The decline in private investment between year 2015 and 2016 could be attributed to the decline in overall Gross Fixed Capital Formation (GFCF) to GDP from 21.7 per cent in the year 2015 to 17.2 per cent in 2016 mainly because of a decrease in value additions to transport equipment and machinery (Republic of Kenya, 2017). The share of transport equipment declined from 22.3 per cent in the year 2015 to 14.2 per cent in 2016, a period where the imports of transport equipment also declined (Republic of Kenya, 2017). From the time Kenya set its growth target for private investment to GDP at 22.9 per cent in the year 2006, illustrated by the uppermost curve in Figure 1, the subsequent growth remained below the target as depicted by the shaded area in Figure 1. Overall, the linear trend in Figure 1 shows that private investments rose marginally from an average of 12 to 15 per cent in the period 1963-2015.

Even though one of Kenya's macroeconomic policy objectives has been the need to enhance private investments due to the expected positive contribution to economic growth, the contribution of private investments to economic growth has not reached the desired level. In the Kenya's economic blueprint, the Vision 2030, private investment as a percentage of GDP was targeted to reach 22.90 per cent by year 2013 and above 24 per cent by year 2030 (Republic of Kenya, 2007). To realize this target, the Government embarked on various policy, legal and institutional reforms and provision of an enabling infrastructure (Republic of Kenya, 2007 & 2013). Despite the reforms, the contribution of private investments to GDP stood at 17.76 per cent in the year 2013 and averaged 17.22 per cent between 2007 and 2016 (Republic of Kenya, various issues). This contribution was less than the national target of 22.9 per cent by an average of 6.78 per cent. Persistence of this problem would definitely impair the achievement of other social economic growth targets. For instance, it would be difficult to raise the overall GFCF to meet its desired growth rate which would subsequently affect the realization of the desired economic growth rate of 10 per cent per annum, unemployment reduction and increase of public revenue.

Crime and Resolution of Court Cases in Kenya

Provision of security in Kenya as a public service is primarily provided by the National Police Service (NPS). The NPS is established under Article 243 of the Kenyan Constitution and comprises of Kenya Police Service, Administration Police Service and the Directorate of Criminal Investigations. Weak provision of security, or what can be construed as insecurity, is outwardly manifested by increased level of crime. According to Republic of Kenya (2007), crime was to be reduced by 46 per cent between the years 2006 to 2012. However, crime increased by 7.8 per cent from 72,225 incidents in the year 2006 to 77,852 incidents in 2012 (Republic of Kenya, 2008 & 2017). According to Republic of Kenya (2007), reduction of crime is expected to support Kenya's socio-economic transformation. Specifically, reduction of insecurity has been pinpointed as an essential ingredient for growth of tourism, agriculture, wholesale trade, retail trade and manufacturing (Republic of Kenya, 2007).

Resolution of cases in Kenya is vested and exercised by courts and tribunals established under Article 159 of the Kenyan Constitution (Republic of Kenya, 2010). The existing courts in Kenya are Supreme Court, Court of Appeal, High court, Employment and Labour Relations Court, Environment and Land Court, Magistrates Court, Kadhis Court and Court Martial (Republic of Kenya, 2017b). According to Hall and Keilitz (2012), resolved cases in relation to filed cases reflects efficiency of courts. Hall and Keilitz (2012) assert that the ideal minimum efficiency ought to be 100 per cent such that in each period, courts are able to resolve cases equal to the filed ones and hence not accumulate pendency. In Kenya, the rate of resolution of cases on average remained below the minimum ideal rate of 100 per cent over the period (Republic of Kenya, various issues).

Shocks to Crime and Resolution of Court Cases

According to Brooks (2014), a shock denotes an unexpected or unpredictable change on a variable. Lutkepohl (2005) explicates that it is of interest in applied work to know the impact of an exogenous shock to a variable on other variables. In public sector, it is important to be privy to shocks that could engulf the economy since they could yield imbalance in growth of economy. Further, having information on time period that the impact of shock would take before subsiding is important to policy makers since negative shocks are often detrimental to

growth. For instance, a negative shock may stagger capital adjustments by firms as they respond to such shocks. Once a negative shock occurs, a firm may end up selling its accumulated capital hence affecting its profitability.

In the justice sector, an exogenous shock to crime and resolution of cases may occur. If this happens, proper functioning of markets and hence investments could be impaired. According to Fedderke and Luiz (2008) and Ngugi and Nyang'oro (2005), massive conflicts and bleach of law and order, public disorder, political uprisings and sudden changes in governance imposes huge constraints to the economy and justice institutions and hence can be construed as shocks. In Kenya, political instability that occurred in the years 1992, 1997 and 2008 can be construed as shocks to the justice sector since it is the justice sector institutions that were vested with primary responsibility of preventing their occurrence or mitigating their impact once they occur. The instabilities were unexpected and increased police workload in the upstream through increased reported offences. In most instances, such instabilities would ultimately trickle down to courts through increase in filing of cases. According to Maja and Arnab (2004), courts react to an increase in filed cases or litigation by resolving more cases. Therefore, a shock to crime would be expected to trigger a surge of resolved cases. Since cases filed in courts are exogenous, resolved cases were used in this paper because most policy interventions around them can be internally spearheaded by courts. Moreover, courts exist to dispense justice, a function executed through resolution of cases.

Given the uncertainty stemming from shocks to justice sector, capital accumulation would be vulnerable. For instance, Aysan et al. (2007), Fedderke and Luiz (2008) and Le (2004), established that surges in political instability were detrimental to private investment. In Kenyan economy, Ocharo et al. (2014) pointed that post-election violence of 1997 could have stifled private investments. Since occurrence of future shocks could not be ruled out completely, it was imperative to empirically understand the impact of such shocks on private investment and consequently advice policy.

II. Methodology

Theoretical Framework

Two theoretical perspectives were used as the foundation for the analysis that was undertaken in this paper. The first perspective emanates from classical criminology theory which explicates that the underperformance of some macroeconomic aggregates for instance slow economic growth, low investments and rising unemployment may yield a rise in criminal activities. Anupama (2011) in political economic model of crime, explains that political and socioeconomic factors like income deprivation, poverty, inequality and unemployment sustain crime. Nickerson (1983) explains that the higher the income inequality, the higher the crime and hence amelioration of income gap would reduce crime by enhancing the living conditions of the poor consequently reducing their propensity to commit crimes. Thus, unemployment increases poverty leading to deprivation and increase of conflict (Nickerson, 1983).

The second perspective draws from economic theory and propagates that crime and resolution of cases by courts drives private investments. Specifically, the modified neoclassical theory of investment that captures a government activity as a productive input (Barro & Sala-I-Martin, 2004; Kuehnel, 2010; Pintea & Turnovsky, 2006) supports the role of institutional services on private sector growth. In neoclassical investment theory, firms maximize their discounted flow of profits over indefinite time and produce output *(y)* using a production function with capital and labour as inputs (Jorgensen 1963 & 1967; Jorgenson & Hall, 1971). The modified neoclassical investment theory assumes that a government activity*(g)* is one of the productive inputs that supplement the traditional neoclassical inputs of capital *(k)* and labour *(l)*. Defining y as *Y/L* and private capital k as *K/L*, where K and L are aggregate capital and labour in the economy, at any given time *t*, a representative firm produces its output (*y)* using a production function of the form;

$$y_t = ALf(k_t, g_t) \quad \ldots\ldots (1)$$

where g_t is the productive government input available to a firm at time *t*. In this study, g_t represents crime and resolution of court cases. Further,

$\partial y/\partial k = f_1 > 0$ and $\partial y/\partial g = f_2 > 0$ while

$\partial^2 y/\partial k^2 = f_{11} < o$ and $\partial^2 y/\partial g^2 = f_{22} < o$.

Over time, private capital (k) is reduced by depreciation rate (δ) and increased by gross investment (I) such that;

$$\dot{k}_t = I_t - \delta k_t \quad \text{..... (2)}$$

From Jorgensen (1963 & 1967), with initial capital ($K(0)$) as given, the time path of investment chosen to achieve the target capital stock is that which maximizes the net present value (NPV) given as;

$$NPV(0) = \int_0^{\infty} \{ALp_y f(k_t, g_t) - wL_t - p_k I_t\} e^{-rt} dt \quad \text{..... (3)}$$

where p_y is the price of output, w iswage, p_k is price of capital, r is discount rate and e is the exponent. From Equation (3), it is evident that upon optimization, the final derived investment equation will encompass a government activity as a driver of investment. Application of this theoretical framework in empirical work is explicated in Marang'a et al. (2018b).

Empirical Model Specification

The two strands of theories reviewed in Section 3.1 show that crime and resolutions of court cases would affect macroeconomics variables, and alternatively, the performance of macroeconomic variables would influence justice sector performance. In such a scenario, an appropriate empirical model ought to encompass the twin dynamism. Therefore, to achieve the study objective, a multivariate Vector Autoregressive (VAR) model was used to capture the possible bi-directional relationships. The empirical model was specified as follows;

$$\begin{Bmatrix} INV_t \\ RES_t \\ CRIM_t \\ INT_t \\ Y_t \end{Bmatrix} = \begin{Bmatrix} \partial_{11} & \partial_{12} & \partial_{13} & \partial_{14} & \partial_{15} \\ \partial_{21} & \partial_{22} & \partial_{23} & \partial_{24} & \partial_{25} \\ \partial_{31} & \partial_{32} & \partial_{33} & \partial_{34} & \partial_{35} \\ \partial_{41} & \partial_{42} & \partial_{43} & \partial_{44} & \partial_{45} \\ \partial_{51} & \partial_{52} & \partial_{53} & \partial_{54} & \partial_{55} \end{Bmatrix} \begin{Bmatrix} INV_{t-1} \\ RES_{t-1} \\ CRIM_{t-1} \\ INT_{t-1} \\ Y_{t-1} \end{Bmatrix} + \ldots + \begin{Bmatrix} \lambda_{11} & \lambda_{12} & \lambda_{13} & \lambda_{14} & \lambda_{15} \\ \lambda_{21} & \lambda_{22} & \lambda_{23} & \lambda_{24} & \lambda_{25} \\ \lambda_{31} & \lambda_{32} & \lambda_{33} & \lambda_{34} & \lambda_{35} \\ \lambda_{41} & \lambda_{42} & \lambda_{43} & \lambda_{44} & \lambda_{45} \\ \lambda_{51} & \lambda_{52} & \lambda_{53} & \lambda_{54} & \lambda_{55} \end{Bmatrix} \begin{Bmatrix} INV_{t-p} \\ RES_{t-p} \\ CRIM_{t-p} \\ INT_{t-p} \\ Y_{t-p} \end{Bmatrix} + \begin{Bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \end{Bmatrix}$$

where private investment (INV) is a function of resolution of cases (*RES*), crime (*CRIM*), interest rate (*R)* and output (*Y)*. Further, ∂ and λ are coefficients, μ is the error term and p is the maximum number of lags. The choice of VAR model was preferred because of various reasons. Chemin (2004) explains that the theoretical standpoint on how the justice sector impacts on an economy is not clear. According to Enders (2015) and Lutkepohl (2005), when such clarity lacks, VAR model can be used to determine the relationships of variables since it does not impose rigid a priori restrictions on their dynamic interrelationships. Secondly, since private investment, crime and resolution of cases may be affected by own previous levels as well as current and previous levels of other variables, VAR model was preferred since it incorporates lagged variables. A VAR model expresses each variable as a linear function of its own past values, past values of other variables and a serially uncorrelated error term (Stock & Watson, 2001).

Study Data and Measurement of Variables

The study used secondary annual time series data for the period 1960-2016. Crime was measured using annual crime incidents reported to the police controlled for population growth. The resolutions of court cases was calculated using annual resolved cases by courts of law. Interest rate was measured by average annual lending rate on loans by commercial banks while output was calculated using annual growth rate of real GDP. Data on private investments and output was sourced from statistical abstracts and economic surveys published by Kenya National Bureau of Statistics (KNBS). Data on resolution of cases and crime was obtained from statistical abstracts and economic surveys published by KNBS, published Judiciary reports, and Judicial and Police Department's reports from Kenya National Archives. Data on interest rate was sourced from World Bank and Central Bank of Kenya reports.

Estimation Procedure

Since the study used time series data, it was imperative to test if the data was stationary or non-stationary prior to estimation. Brooks (2014) asserts that the use of non-stationary series for estimation would yield statistics without a standard distribution. Stationarity test was done using Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. It was therefore imperative to ascertain the stationarity properties of the series to avoid spurious regression. To realize this, KPSS test for stationarity was carried out. According to Brooks (2014), KPSS test results are more consistent compared to Augmented Dickey Fuller and Phillip Perron test results which tend to reject the null hypothesis of presence of unit root in incidence of close to unit root. This was followed by determining the optimal lags for the VAR model. According to Enders (2003), a VAR model will be mis-specified when lag length is too small and over-parameterized if the number of lags is too large. Further, Lutkepohl (2005) explain that the chosen lag length by different criteria and log likelihood (LR) test should satisfy VAR residual serial correlation LM test.

An unrestricted VAR model was foremost estimated using two lags automatically chosen by the statistical software. Using the estimated model, the lag structure was analyzed to determine the appropriate lag length. This entailed the use of sequential modified LR test statistic test and a multiple of criteria namely; Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). The lag that was adopted was the one chosen by majority of the criteria and which satisfied VAR residual serial correlation LM test. The chosen optimal lag was then used to estimate the VAR model. Before adoption of the VAR results, various diagnostic tests were conducted to ensure that estimates were unbiased and consistent. These tests were VAR residual serial correlation test, VAR residual white heteroscedasticity test, VAR normality test and VAR stability test. Once the estimated results had satisfied the diagnostic tests, VAR estimates were used to generate impulse response (IR)graphs which were explained to address the research objective.

III. Results and Discussion

Pre-estimation and Diagnostic Tests Results

First, unit root test for stationarity was done. The null hypothesis for KPSS test is that stationarity is either around the mean or a linear trend, while the alternative hypothesis is that the series is non-stationary due to presence of a unit root. Whenever the computed test statistics were less than the critical value, the null hypothesis was not rejected and the study concluded that the series were stationary. From Table A1 in the Appendices, all the computed test statistics were less than the critical values at level. This led to the conclusion that all variables were integrated of order zero and hence stationary. Consequently, the estimation was carried out without differencing the variables.

Secondly, appropriate length for the VAR was selected. To get the optimal lag length, unrestricted VAR model was estimated using two lags automatically selected by the statistical software. Consequently, sequential modified LR test statistic, FPE, AIC, SIC, and HQ information criterions were generated to aid in choosing the appropriate lag length. The results on lag selection presented in Table A2 showed that the LR test, FPE criterion and AIC selected 3 lags while SIC and HQ criterion selected 2 lags. The study therefore adopted 3 lags since they were chosen by majority of the criteria. Moreover, these results were complemented with VAR Lag Exclusion Wald Test. The results for the test given in Table A3 shows a joint Chi-square test statistic of 46.79833 for 3 lags had a *p*-value of 0.005179 < 0.05. The study therefore concluded that 3 lags were essential. Consequently, unrestricted VAR model was re-estimated using 3 lags. The results for the re-estimated VAR model are given in Table A4. However, before the model could be adopted to generate causality results, diagnostic tests were carried out. According to Shin and Pesaran (1999), a VAR model should be nonsingular, all the roots should be within the unit circle and there should be no full collinearity. The results for various diagnostic tests are given in Table A5, A6 and A7. However, a summary of results for these tests is given in Table 1.

Table 1: Summary of results for the Diagnostic Tests

VAR Condition Check	Result	Conclusion
Residual serial correlation	LM 32.7496 *p*-value = 0.1374 >0.05.	There was no serial correlation at lag order 3
Residual Heteroscedasticity	Chi = 464.9825 p-value = 0.3029 > 0.05	There was no heteroscedasticity in VAR estimates
Stability Test	All roots have modulus less than one and lie inside the unit circle	The VAR model was stable

Source: Own computation using data from various sources

The diagnostic test results in Table 1 showed that the estimated VAR model was stable. Further, there was no serial correlation and heteroscedasticity on residuals.Since the VAR diagnostic tests were satisfied, the estimated model was used to generate impulse response functions that explained the objective of the study.

Impact of an Exogenous Shock to Crime on Private Investments

According to Enders (2015), IR functions traces the response of variables across time due to occurrence of an exogenous shock. The impact of a positive shock to crime on private investment is illustrated in Figure 2.

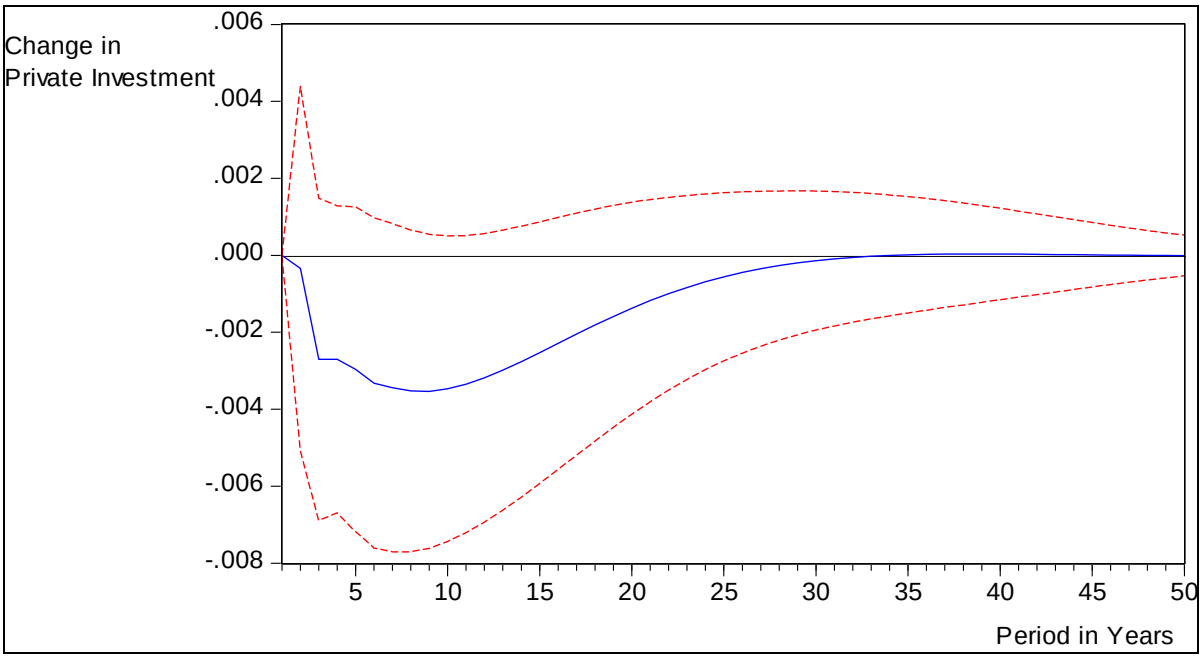

Figure 2: Impact of an exogenous shock to crime on private investments

Source: Research data

From Figure 2, the impact of an exogenous shock to crime on private investment would last after close to 30 years. At the onset of a positive shock to crime, private investment would rapidly decline until the 3rd year. This contradicts the previous empirical finding by Rios et al. (2016), that crime did not exhibit diminished industrial growth in short run. However, the finding concurred with that of Rios et al. (2016) that as time progresses, crime reduced investments. Private investors therefore seem to react to a sudden surge in crime by rapidly scaling downwards their planned investments. This could be attributed to investors shying away from investing in an environment where the likelihood of loss of capital is high, or cost of provision of private security is rising.

The reduction would continue, though relatively mildly, until the 9th year. This could be ascribed to a situation where private investors have adjusted to the impact of shock and are now securing their investments and resources privately. The mild decline implied that there could be some investments going to provision of private security. From the 9th year, private investment would start to recover from the impact of shock. This could be associated to a state where the government has probably heightened security and investors' confidence is rebuilding leading to capital accumulation. Further, the impact of a shock to crime would decrease private investments, a finding that supported empirical work by Appel and Loyle (2012) that investors are more likely to invest in secure areas, Christopher (2006) that crime reduces investments, KIPPRA and World Bank (2004) that investments rises in a secure environment, Marang'a et al. (2018a) that insecurity reduces investments.

Impact of an Exogenous Shock to Resolution of Cases on Private Investments

Figure 3 illustrates the impact of a shock to resolution of court cases on private investment.

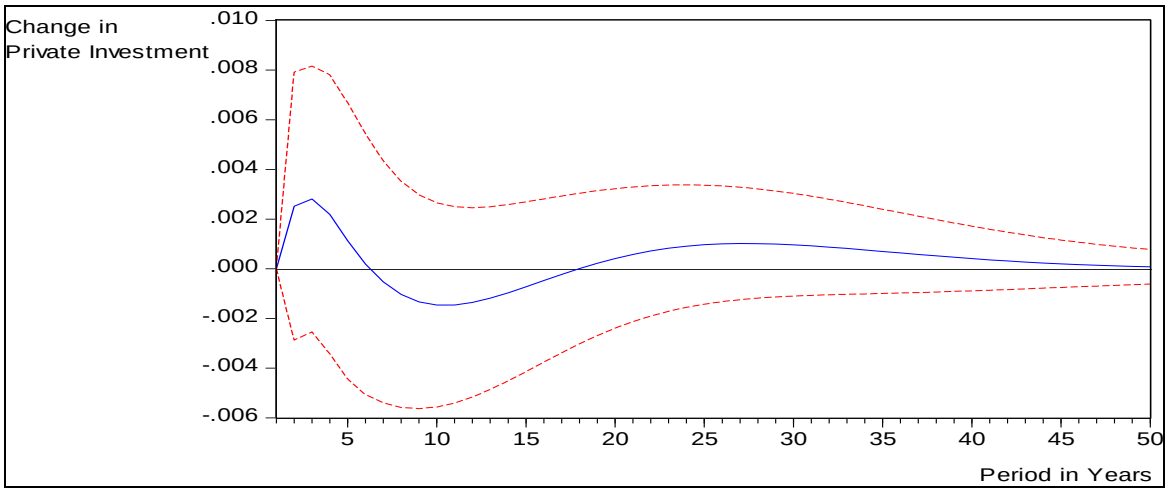

Figure 3: Impact of an exogenous shock to resolution of court cases on private investment

Source: Research data

The IR graph in Figure 3 explicates the response of private investments over a 50-year horizon to the impact of a positive shock on resolution of cases. The x-axis shows the period after the shock while the vertical axis shows annual change in private investments. In general, the overall impact would take approximately 45 years to fizzle out. Upon the onset of a shock, private investment would increase rapidly until the 3rd year. This could be attributed to increase in investors' confidence on protection of property rights thus probably attracting new investments and expanding the existing ones. Further, this is a pointer that initiatives to dispose a huge number of cases would translate to improved private sector environment. After the 3rd year, private investments reduced up to the 7th year, though remained on the positive side. This implies that the initial impact of the shock would have subsided, a pointer to finalization of cases by first instance courts, or in the Kenyan court structure, the magistrate court.From the 7th year, private investments further reduced entering the negative side till the 10th year. This could be attributed to the filing of appeals, a pointer that resolution of casesfully assists firms' contracting behaviour once appeal channels are fully exhausted. Therefore, quick resolution of appeals would render growth of private investment not to oscillate on the negative side. After the 10th year, private investment rose until the 28th year entering positive side in 18th year. This could be attributed to a situation where enhanced dispensation of justice has fully released investments funds previously not under optimal use in short-run due to appeals. From the 28th year, private investments slowly diminished over a span of 20 years. The slow fizzling out could be a pointer that once the investors' confidence on dispensation of justice is boosted, it would take time to diminish. In general, the impact of a positive shock to resolution of court cases would have a positive effect on private investments, reinforcing the previous findings by Marang'a et al. (2018a) and Dougherty (2013) that there exists a relationship between legal systems and investment level in Kenya and Mexico respectively.

IV. Recommendations

The Police should timely respond to crime incidents upon their occurrence and promptly offer security to the affected economic agents or other similar agents with future propensity to be affected by the re-occurrence of such a crime. This is linked to the finding that a positive shock to crime drastically reduces private investments at its onset. Therefore, prompt action would render investors not to commit their scarce resources on provision of private security since the enhanced public security provided by the Police would tend towards being a near-pure public good. The resources saved by private agents could then be utilized for other capital investments. The Police and investment promotion agencies should ease down the negative perception about insecurity once a major crime incident engulf the economy. A major incident would take the form of a sudden wave of crime whose re-occurrence would be detrimental to firm entry or expansion. This is ascribed to the study result that a positive shock to crime on private investments takes a long period to subside. The longer the period it takes for the impact of such a shock to subside, the longer and harder it would be to convince investors that investment environment has improved back to pre-existing condition.

The Judiciary should target to substantially finalize existing old cases or case backlog within a short span of time. This is reinforced by the finding that a positive shock to resolution of caseshas a lengthy impact on private investments. A positive shock would probably yield a sizeable injection of economic resources to the economy otherwise held inactive through court injunctions or restrictions. Further, once a huge chunk of old unresolved cases has been determined, it would be easier for courts to cope with incoming demand without creating additional backlog. The preferable timeline for finalization of a case would be within one year since the date a case is filed in a court. This is informed by the study finding that the impact of a shock to dispensation of justice renders private investment to be on a growth trajectory in the short run. Considering the short-run period of 5 years, by setting the maximum period to finalize a given case to be 1 year, then such a case would be finalized within the short-run even if it is appealed in all superior courts. The setting of timeline would render courts to be instantaneous. This implies that investors would within a short time be able to optimally utilize vital economic resources withheld by courts in form of cash deposits, or other capital resources whose use has been curtailed through court injunctions.

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Appendices

Table A 1: Unit root test results

Variable	Test Statistic	Critical Value at 5 %	Conclusion
INV	0.355952	0.463	Stationary
RES	0.129815	0.463	Stationary
CRIM	0.041848	0.463	Stationary
INT	0.015549	0.463	Stationary
Y	0.383794	0.463	Stationary

Table A 2: VAR lag order selection results

Endogenous variables: INV CRIMREST Y INT, Exogenous variables: C
Sample: 1960 2016, Included observations: 53

Lag	LogL	LR	FPE	AIC	SEC	HQ
0	156.8480	NA	2.23e-09	-5.730112	-5.544235	-5.658633
1	279.9746	218.3755	5.53e-11	-9.433002	-8.317742*	-9.004127*
2	305.4751	40.41601	5.57e-11	-9.451892	-7.407249	-8.665621
3	335.1683	41.45842*	4.99e-11*	-9.628993*	-6.654968	-8.485327
4	354.2443	23.03515	7.12e-11	-9.405445	-5.502037	-7.904383

* indicates lag order selected by the criterion

Table A 3: VAR lag exclusion Wald test results

Sample: 1960 2016, Included observations: 54
Chi-squared test statistics for lag exclusion: Numbers in [ ] are p-values

	INV	CRIM	RES	Y	INT	Joint
Lag 1	54.08549	27.61457	14.17312	19.70654	11.06961	126.9019
	[2.01e-10]	[4.33e-05]	[0.014546]	[0.001418]	[0.050017]	[1.33e-15]
Lag 2	22.47802	2.722437	3.530024	11.67228	7.739116	46.49802
	[0.000425]	[0.742685]	[0.618850]	[0.039565]	[0.171212]	[0.005616]
Lag 3	4.501083	3.364838	4.694798	17.82158	17.74205	46.79833
	[0.479739]	[0.643931]	[0.454250]	[0.003179]	[0.003288]	[0.005179]

Table A 4: VAR estimates

Sample (adjusted): 1963 2016
Included observations: 54 after adjustmentsStandard errors in ( )& t-statistics in [ ]

	INV	CRIM	RES	Y	INT
INV(-1)	0.750234	1.67E-05	-0.966931	38.25160	-113.7971
	(0.16030)	(0.00484)	(1.01435)	(20.5271)	(58.1612)
	[4.68020]	[0.00344]	[-0.95325]	[1.86347]	[-1.95658]
INV(-2)	-0.336830	-0.001589	0.434170	-34.26772	57.31725
	(0.18883)	(0.00570)	(1.19490)	(24.1810)	(68.5140)
	[-1.78374]	[-0.27858]	[0.36335]	[-1.41714]	[0.83658]
INV(-3)	0.139550	0.005315	-0.770834	-29.63286	33.94650
	(0.13007)	(0.00393)	(0.82308)	(16.6565)	(47.1944)
	[1.07285]	[1.35262]	[-0.93652]	[-1.77905]	[0.71929]
CRIM(-1)	2.902021	0.809242	6.141215	169.5323	-698.7475
	(5.18791)	(0.15674)	(32.8281)	(664.336)	(1882.32)
	[0.55938]	[5.16310]	[0.18707]	[0.25519]	[-0.37122]
CRIM(-2)	-13.61084	0.035131	-53.86500	-893.6954	-5712.819
	(6.76119)	(0.20427)	(42.7836)	(865.802)	(2453.15)
	[-2.01308]	[0.17198]	[-1.25901]	[-1.03222]	[-2.32877]
CRIM(-3)	3.761529	0.163608	7.489120	-43.79392	5782.639
	(5.49541)	(0.16603)	(34.7739)	(703.713)	(1993.89)
	[0.68449]	[0.98544]	[0.21537]	[-0.06223]	[2.90018]
RES(-1)	-0.030262	0.000694	0.476293	-9.373303	-0.468574
	(0.02592)	(0.00078)	(0.16404)	(3.31957)	(9.40561)
	[-1.16740]	[0.88576]	[2.90358]	[-2.82365]	[-0.04982]
RES(-2)	0.088760	0.000858	-0.070783	-5.827482	5.448557
	(0.03197)	(0.00097)	(0.20233)	(4.09444)	(11.6011)
	[2.77598]	[0.88852]	[-0.34985]	[-1.42327]	[0.46966]
RES(-3)	0.012220	-0.000997	0.077019	9.230396	20.34827
	(0.02918)	(0.00088)	(0.18461)	(3.73601)	(10.5855)
	[0.41884]	[-1.13146]	[0.41719]	[2.47066]	[1.92227]
Y(-1)	0.004550	2.40E-05	-0.004854	0.403598	0.157855
	(0.00105)	(3.2E-05)	(0.00663)	(0.13410)	(0.37996)
	[4.34456]	[0.75862]	[-0.73254]	[3.00963]	[0.41545]
Y(-2)	-0.005280	9.68E-07	-0.009814	-0.211565	-0.138019
	(0.00125)	(3.8E-05)	(0.00792)	(0.16035)	(0.45434)
	[-4.21679]	[0.02559]	[-1.23854]	[-1.31938]	[-0.30378]
Y(-3)	0.000599	4.24E-05	0.003997	0.028183	-0.360185
	(0.00123)	(3.7E-05)	(0.00777)	(0.15733)	(0.44579)
	[0.48728]	[1.14249]	[0.51411]	[0.17913]	[-0.80798]
INT(-1)	-0.000892	-5.24E-06	-0.005567	-0.079550	0.350284
	(0.00037)	(1.1E-05)	(0.00234)	(0.04736)	(0.13420)
	[-2.41227]	[-0.46909]	[-2.37844]	[-1.67956]	[2.61020]
INT(-2)	-0.000309	1.41E-05	-0.000283	-0.010685	-0.039772
	(0.00042)	(1.3E-05)	(0.00265)	(0.05353)	(0.15168)
	[-0.73821]	[1.11747]	[-0.10687]	[-0.19959]	[-0.26222]
INT(-3)	-0.000599	7.96E-06	-0.004274	-0.162461	0.180711
	(0.00040)	(1.2E-05)	(0.00253)	(0.05129)	(0.14531)
	[-1.49635]	[0.65762]	[-1.68666]	[-3.16777]	[1.24361]
C	0.027864	-0.001545	0.917323	16.62416	-15.13784
	(0.03911)	(0.00118)	(0.24751)	(5.00874)	(14.1917)
	[0.71237]	[-1.30704]	[3.70625]	[3.31903]	[-1.06667]

Table A5: Serial correlation test results

VAR Residual Serial correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Sample: 1960 2016
Included observations: 54

Lags	LM-Stat	Probability
1	28.39233	0.2901
2	17.03709	0.8804
3	32.74960	0.1374

Table A 6: Heteroscedasticity test results

VAR Residual Heteroscedasticity Tests

Sample: 1960 2016
Included observations: 54
Joint test:

Chi Square	df	Prob.
464.9825	450	0.3029

Table A 7: Lag structure AR roots results

Roots of Characteristic Polynomial

Endogenous variables: INV CRIMRES Y INT
Exogenous variables: C
Lag specification: 1 3

Root	Modulus
0.942480	0.942480
0.691907 - 0.491917i	0.848951
0.691907 + 0.491917i	0.848951
0.772834 - 0.147417i	0.786768
0.772834 + 0.147417i	0.786768
-0.378589 - 0.644774i	0.747706
-0.378589 + 0.644774i	0.747706
0.092342 - 0.625000i	0.631785
0.092342 + 0.625000i	0.631785
-0.219055 - 0.549481i	0.591536
-0.219055 + 0.549481i	0.591536
-0.506860	0.506860
0.389283 - 0.305380i	0.494771
0.389283 + 0.305380i	0.494771
-0.343414	0.343414

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