The Dynamics of Firm-Level Investment Behaviour of Private Firms in Zimbabwe under Uncertainty, Corruption and High Taxation Regime

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ABSTRACT

This paper contributes to theoretical literature by providing the first logical analysis of the dynamics of domestic investment behaviour of Zimbabwe's private firms under conditions of uncertainty, high taxation regime and high levels of public corruption. Many theories of investment behaviour that are applicable in developed countries such as the Tobin *q*, the flexible accelerator and Jorgenson neoclassical models assume perfect competitive and predictable business environments. However, Zimbabwe has heightened idiosyncratic uncertainties that frequently elevate both business and country risks, thereby depressing firm-level investment. The nexus between taxation, corruption and uncertainties has not been intensively interrogated in empirical literature that focus on firm-level investment decisions. The paper endeavours to incorporate the effects corruption, high taxation polices, and uncertainties by modifying the geometric Brownian model of motion, the endogenous growth model and the flexible accelerator theory of investment behaviour. Uncertainty which was proxied by the inflation rate was found to be negative and statistically significant at 5 percent level of confidence. An increase in business uncertainty by 1% would be expected to decrease firm-level investment marginally by 0.2 %. Corruption was found to be negative and significant at 10% confidence level, hence showing that an increase in corruption levels by 1% will cause firm-level investment to drop by at least 1000%. A high taxation regime was found to decreases firm-level investment by 882%. Policies that enforce zero corruption and low tax rate regimes should be implemented in order to reduce business uncertainty and increase both domestic investment and economic growth in developing economies.

Keywords: *Firm-level, Investment behaviour, Uncertainty, Corruption, Taxation, Zimbabwe.*
Jel Classification: *B40; C02; E22; G40.*

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1. INTRODUCTION AND BACKGROUND

The fundamental question in many financial and investment studies that examine domestic investment behaviour of private firms in developing countries is on how private firms make and time long-term investment decisions, given the existence of elevated idiosyncratic uncertainties, high public corruption and retrogressive taxation regimes. The paper confronts this important question by developing an inclusive dynamic framework of a firm-level investment behaviour of Zimbabwe's private firms. In the proposed framework, the paper endeavours to incorporate the effects corruption, high taxation polices, and uncertainties by modifying the geometric Brownian model of motion, the endogenous growth model and the flexible accelerator theory of investment behaviour. The development of the investment framework emanates from the recognition by the researcher that the body of theoretical and anecdotal empirical literature on firm-level investment behaviour in developing countries that include Zimbabwe is abounding with investment theories that consider high taxation regime, uncertainty and public corruption as both dichotomous and extricable variables that affect investment managerial decisions.

The paper argues that in Zimbabwe, corruption, high taxation regime and uncertainty are likely to be mutually exclusive in business environments of private firms. For this reason, there is therefore an ineluctable sense of urgency in the search for alternative theoretical configuration that is enclaved within a different conception of investment behaviour framework. It is expected that the investment framework can be used in developing countries to remedy the inadequacies and malaises of traditional investment theories. The decocted investment framework for Zimbabwe that takes into cognisance the effects of public corruption, idiosyncratic macro-uncertainty and high taxation regimes is particularly pertinent in today's Schumpeterian world, which is often characterised by faster technological obsolescence, shorter product lifestyles, increasing global volatilities, as well as increasing returns to scale.

Uncertainties Zimbabwe's firm-level environment emerge from both internal and external shocks and are usually driven by unexpected coterie of bottlenecks on the demand and supply-side. The logjams that engulf the country include exchange, inflation and interest rates variabilities, volatilities in international trade terms, informational inefficiencies in domestic financial and credit markets, political instability, technological and innovation reversion, expansionary fiscal and monetary contractions, government intervention in private market exchanges, and inconsistent monetary and fiscal policies. In addition, the country frequently rely on retributive tax regimes in order to finance its unsustainably high budget deficits, a major consequence of public corruption and profligacy. Private firms have also not been spared from the menaces of public corruption and rent seeking behaviours. Public corruption exerts significant costs on consumer welfare, aggregate domestic investment behaviour and economic development. We denote public corruption, macro-uncertainty and high taxation regimes as the "evil trilogy" in Zimbabwe. The "evil trilogy" often deters economic growth by impacting on the quantity, quality, effectiveness and efficiency of firm-level business equipment and machinery spending decisions. In many instances, "the evil trilogy" has immensely contributed to the growth of poverty, unemployment and general underdevelopment in the country.

For instance, corruption has been fostering huge seepages of financial and physical resources from the national budget towards private spending purposes that have much lower multiplier effects on the broader economy. In an attempt to obtain more corruption rentals from public expenditure activities, politicians in connivance with government bureaucrats have often raised taxes and hence, exerting unfair tax burdens on the poor people. For example, the government has recently introduced a non-discriminatory 2 percent tax on money transfers to fund high budget deficit which most people believe was caused by corruption. Muzurura (2018) in a study of Zimbabwe reports that high retrogressive taxes have two major impacts on domestic investment behaviour and economic

growth. First, they suggest a micro-effect on the distribution of income and sub-optimal utilisation of resources leading to productive inefficiencies in the broader economy. Second, they argue that retrogressive tax regimes have macro-effects on the level of capacity utilisation, price stability, employment generation, poverty alleviation, level of domestic savings, domestic investment and economic growth. However, levying high taxes is the primary sources of government revenue accounting for between 15 and 20 percent of GDP. As that is not enough, corrupt government officials and politicians often give allocative and distributive priority to public investments that produce higher private material gains for themselves at the expense of the majority who continue to wallow in abject poverty. In a vicious cycle manner, corruption rentals financed by confiscatory taxation policies subsequently intensify macro-uncertainties such as price instability, political instability and economic turbulence. Eventually, the "evil trilogy" damagingly affects essential drivers of economic growth and development such as domestic investment, employment generation and the sustainable use of natural resources.

The problem is that most mainstream traditional theories of investment behaviour such as the Tobin *q*, the Jorgenson neoclassical investment model and the flexible accelerator theory assume perfectly competitive business environments with full employment, prices stability, labour and capital flexibility, and fixed capital adjustment costs. However, the country has different economic and political conditions that may necessitate the modification of existing investment theories. Zimbabwe is characterised by imperfect financial and capital markets, information asymmetry, non-putty-putty capital, non-zero substitution elasticity, and non-diminishing returns to scale of production technology. In addition, critical idiosyncratic factors such as endemic political and public corruption and heightened macro uncertainty that are intrinsic in the firm-level environment are not appositely captured in main traditional investment theory frameworks.

Therefore, in this paper we propose a robust theoretical framework for the country by seeking to modify the flexible accelerator theory using the Brownian equation of motion in order to integrate uncertainty, taxation and corruption as critical variables in firm-level investment decisions. Our approach is germane given that many firm-level investment decisions are a matter of one choice among a crucible of feasible options. Indeed, in Zimbabwe like most developing countries a firm's option to invest or to defer long-term investment are probably influenced by taxation policies, incidences of public corruption and macro-uncertainties. Needless to say that our interest and motivation is to use the existing empirical and theoretical literature to build a better theory of firm-level investment behaviour under uncertainty, corruption and high taxation. These investment-related domains have not been integrated into a theoretical argumentation in empirical literature on Zimbabwe's firms' investment behaviour. Nevertheless, the ultimate objective of this paper is also to inform both managerial and economic practices of private firms in most developing countries. The paper is planned as follows; the first section covers introduction and background, the second covers literature review, the third section covers the conceptual framework and thereafter conclusions.

2. LITERATURE REVIEW

The insightful intuition of investing under uncertainty is that, if the future prospects of a firm's marketing mix is uncertain and firm-level investment decisions are irreversible, a firm's addition to the desired capital stock risks the probability that the firm will be stuck with excess capital in future (Baker *et al.*, 2016; Muzurura, 2018). A number of recent studies on uncertainty and investment irreversibility suggest that once sunk costs are incurred by a firm on fixed capital stock, the costs cannot be convalesced without the firm incurring extensive costs (Abdul, 2017; Davis and Cairns, 2018; Muzurura, 2018). Gupta and Jooste (2018) submit that the optimal rule of investment under uncertainty and irreversibility is not to invest when the expected net cash flows do not cover the Jorgenson's

opportunity cost of investment. Brueckner and Carneiro (2017) used a 5-year non-overlapping panel data comprising 175 countries during the period 1980 to 2010 and found that uncertainty associated with terms of trade volatility had important adverse effects on domestic investment behaviour in countries with pro-cyclical government spending. Knut *et al.* (2018) observe that delays in carrying out firm-level investment decisions under uncertainty exist when private firms are risk-neutral agents. According Fernández-Villaverde *et al.* (2011) deviations from the efficient wage- setting due to matching frictions in the labour market together with downward wage and price rigidities in the economy generate a strong and state-dependent amplification of uncertainty shocks and contribute to generate a countercyclical aggregate uncertainty. Oniore *et al.* (2016) show that investment irreversibility is caused by business uncertainty over future interest rates and transitory tax rates. Similarly, Bloom *et al.* (2018) report on variabilities in interest and inflation rates and business cycles as major causes of investment irreversibility.

A number of private firms prefer to spend less on fixed capital stock in the current period in order to reduce the probability of excess capacity tomorrow (Born and Pfeifer, 2014; Muzurura and Sikwila, 2018). However, Bekoe and Adom (2013) aver that a private firm that defers fixed investment decisions for too long also incurs an opportunity cost. Their findings suggest that value-to-waiting or the option value of investment drops when the firm's net present value of opportunity costs are higher compared to the cost of carrying out the irreversible investment. In addition, the firm risks being stuck with excessive fixed capital stock in the event of a business downturn that affect aggregated demand.

In Pakistani, Abdul (2017) shows that private firms are likely to cut down their level of investment spending when either idiosyncratic or macroeconomic uncertainties increases. Efrem *et al.* (2018) surveyed the role played by uncertainty for a number of countries' business cycles and established that factors such as the interaction between financial frictions and uncertainty, the global dimensions of uncertainty and uncertainty shocks in times of unconventional monetary and fiscal policies caused firms to defer long-term fixed investment decisions. Knut *et al.* (2018) used the real option effects in United States and demonstrated that uncertainty dampen the effects of monetary policy shocks, affect aggregate consumption, and that the effect was more pronounced for firm-level aggregate investment. Klößner and Sekkel (2014) examined international spill-overs of policy uncertainty and found evidence that was in favour of economic policy uncertainty connectedness for a number of countries, with the U.S. being the main exporter of policy uncertainty. Handley (2014) and Handley and Limao (2015) studied the nexus between policy uncertainty, trade, and real activity in a number of countries and reported that policy uncertainty was a key factor that affected trade and investment decisions in developing countries. Similarly, Born and Pfeifer (2014) found that terms of trade uncertainty was a relevant driver of real GDP in Chile.

Corinne *et al.* (2018) investigated 26 sub-Saharan African countries that were considered financial fragile in the 1990s and reported that robust fiscal institutions, the capacity to raise taxation revenue and reduction of current expenditure were important factors that helped to manage economic uncertainty. In various studies in developing countries, common uncertainty shocks related to business cycles were reported to produce large and persistent negative response in real economic activity (Bachmann and Sims, 2012; Berger and Vavra, 2014; Bloom, 2014) whilst the contributions of idiosyncratic uncertainty shocks were found to have a negligible effect (Céspedes, 2013; Davis and Cairns, 2018; Efrem *et al.*, 2018; Gupta and Jooste, 2018; Ozturk and Sheng, 2018).

Similarly, Furceli *et al.* (2018) utilised productivity growth of 25 industries from 18 advanced economies over the period 1985-2010 by examining the effects of aggregate uncertainty shocks as measured by the stock market volatility on sectoral productivity. They demonstrated that the effect on uncertainty and investment irreversibility was stronger in industries that relied greatly on external finance. Sticky prices are shown to magnify this effect due

to the negative impact of uncertainty on aggregate demand and, consequently, on firms' relative prices (Jurado *et al.*, 2015). In addition, Furceli *et al.* (2018) also showed that uncertainty induced industries to switch the composition of investment, and that the mechanism was stronger during recessions when credit constraints were more severe more than during economic expansions. Wolfgang *et al.* (2018) in a study of twenty-one countries reported a negative relation between firm-level investment and the cost of capital. Likewise, Ozturk and Sheng (2018) employed the price informativeness channel and reported that an increase in policy uncertainty reduced the investment-cost of capital sensitivity for firms from more opaque countries, firms with low analyst coverage, firms with no credit rating, and small firms. In agreement Niemann and Sureth (2013) and Auerbach and Gorodnichenko (2012) also showed that the effect of economic policy uncertainty on firm-level investment was greater for firms with higher firm-level uncertainty and during a recessionary business cycle.

According to Kang *et al.* (2014) higher economic policy uncertainty leads to increases in stock volatility and investment irreversibility. They show that when firms are not sure about costs of doing business owing to possible changes in regulation, cost of health care and taxes, firms become more careful with future investment plans. The effect of economic policy uncertainty on firm-level investment is greater for firms with higher firm-level uncertainty and during a recession (Knut *et al.*, 2018). Binding and Dibiasi (2017) also established that uncertainty negatively affected investment in equipment and machinery through real-option effect. However, Zhang and Lie (2015) through growth-option effects established that uncertainty positively influenced expenditures in research and development.

According to Niemann and Sureth-Sloane (2018) uncertainty about a one-time change in tax policy induces firms to provisionally stop investing in new business equipment by opting for a wait-and-see approach. Bloom *et al.* (2018) show that irrespective of the adverse effects of investment irreversibility on the user cost of capital, there is an aftershock effect that arises when investment irreversibility prevents the firm from selling fixed capital even when its marginal revenue product is too low. In agreement, Muzurura and Sikwila (2018) report that the issues of irreversibility of fixed investment decisions are important to firms operating in developing countries. Muzurura (2017) establishes that most firms in developing countries suffer from high and unpredictable inflation rates which are usually and equally matched by high relative price variabilities. Tsai (2017) demonstrates that inconsistent changes in taxation policies on imported fixed capital often leads to a substitution of productive domestic investments in favour of consumption activities, hence, lower optimum capital stock. Kandilov and Leblebicioğlu (2011) employed the neoclassical investment model and showed how exchange rate volatility affected investment behaviour of Colombian manufacturers for the period 1981 to 1987.

Researchers have commonly argued that corruption hurts domestic investment, economic growth and development by rechanneling much needed resources towards unproductive sectors therefore, causing inefficiencies and negative externalities in the economy (Bazzi and Clemens, 2013; Muzurura, 2018). Olken and Pande (2012) argue that more discretion over investment regulations by bureaucrats leads to a higher effective tax burden on firms, more corruption, and a greater incentive to move to the unofficial economy. O'Toole and Tarp (2014) posited that the cost of bribes distorted the efficient allocation of capital by reducing the marginal return per unit of domestic investment in developing countries.

Gamberoni *et al.* (2016) observed that weak output demand conditions, corruption, uncertainty, high taxation, frictions in domestic credit markets and weak labour market regulations increased investment inefficiency. Likewise, Manova (2013) finds that financial frictions and corruption restrict firm involvement in exporting operations that may influence total factor productivity. According to Zribi and Boujelbegrave (2011) access to finance can also affect firm-level distortions, primarily capital distortion and labour and size distortions via access to

short-term credit. Bazzi and Clemens (2013) in a study of credit constraints and international trade terms shows that changes in investment allocation efficiency of firms was caused by growing competition in domestic markets, tighter credit supply and legal issues. Ben *et al.* (2016) postulated that countries with a corrupted environment and bad governance often used seigniorage as a source of revenue and hence, this induced higher monetary expansion and therefore, higher inflation rates. According to Akitoby and Stratmann (2010) countries with higher levels of corruption tend to have a higher default risk thereby raising firm borrowing costs. Corruption raises operational cost, cost of capital, affects human capital stock development, creates investment uncertainty and reduces the productivity of private investment and economic growth (Paunov, 2016). High corruption levels are associated with lower investment equilibrium because corruption acts as a tax on investment (Aghion *et al.*, 2016; Muzurura, 2018).

In order to eliminate public corruption there is need for a clear, simple, easy to manage regulatory system, and a simple tax system (Davis, 2015) as well as predictable, timely, and clearly communicated policies (Baker *et al.*, 2016; Corinne *et al.*, 2018). Corruption decreases foreign direct investment inflows by altering its composition in favour of brownfield investments that have lower accelerator effects Bellos and Subasat (2013); Benedek *et al.* (2014) and Rose-Ackerman and Bonnie (2016) report that corruption increases uncertainty over the returns to fixed capital stock and also raises the cost of production, and hence, lower returns to capital employed. Dridi (2013) submits that high taxes and corruption lead to an increase in the cost of capital which reduce incentives to invest in new business equipment and machinery. Increasing marginal taxes have negative consequences on economic growth, labour supply and private fixed domestic investment (Njuru *et al.*, 2013). Ugur (2014) finds that high levels of firm taxation discourages both domestic and foreign fixed investments and hence hinders economic growth. Similarly, Keho (2010) avers that high taxes provide preferential incentives to specific sectors hence, leading to distortions in capital allocation and reducing the overall investment productivity. Tax induced corruption raises firms' operational costs, creates business uncertainty thereby deterring both domestic investment and foreign direct investment (Bellos and Subasat, 2013). Zouhaier (2011) and Zribi and Boujelbegrave (2011) also suggest that the negative link between taxation, corruption and firm-level investment behaviour happens through the crowding-out effect.

3. METHODS AND MATERIALS

3.1. Conceptual Framework

In order to reduce multicollinearity associated with the simple accelerator model our proposed framework starts from Koyck (1954) geometric Distributed Lag Model transformation of the flexible accelerator model as shown in equation

$$FC_t = \alpha + \theta_{0_t} + \theta_1 Qn_t + \theta_2 Qn_{t-1} + \theta_2 Qn_{t-2} + \cdots + \varepsilon_t \quad (1)$$

Where FC_t represents a private firm's fixed capital stock, Qn_t is the firm's output and the variable denoted by θ, is a constant rate of stock adjustment which has values ranging from zero to infinity. Assuming that an investment decay rate is given by $1-\theta$ and that the speed of fixed capital stock adjustment process is declining geometrically as time t increases, we can substitute θ by $1-\theta$ into Equation 1 to obtain;

$$FC_t = \alpha + (1-\theta)(Qn_t + \theta Qn_{t-1} + \theta^2 Qn_{t-2} + \cdots \theta^n Qn_{t-n}), \quad \text{where } 0 < \theta < 1 \quad (2)$$

Equation 2 shows that a private firm's desired fixed capital stock at time t is a result of current outputs as well as its past level of outputs. We set output as constant and equal to $\ddot{Q}\ddot{n}$ indicating that uncertainties, high taxation and corruption can stagnant the growth of a firm's output in the country. We compute $\ddot{Q}\ddot{n}$ by multiplying one period lag of Equation 2 by $1-\theta$ and subtracting the result from the same equation we get equation;

$$FC_t - (1-\theta)Fc_{t-1} = \alpha + \theta_0(Qn_t + (1-\theta)Qn_{t-1} + (1-\theta)^2 Qn_{t-2} + (1-\theta)^3 Qn_{t-3} + ..$$
$$FC_t - (1-\theta)FC_{t-1} = +\varepsilon_{tm} - (1-\theta)\{\alpha + \theta_t(Qn_{t-1} + 1 - \theta Qn_{t-2} + (1-\theta)^2 Qn_{t-3} \ldots + \varepsilon_{t-1} \quad (3)$$

Rearranging Equation 3 and simplifying it we get the following equation;

$$FC_t - (1-\theta)FC_{t-1} = \alpha(1-(1-\theta) + \theta_0 Qn_t + (\varepsilon_t - (1-\theta)\varepsilon_{t-1}) \quad (4)$$

By making FC_t the subject of the formula we get;

$$FC_t = \alpha(1-(1-\theta) + (1-\theta)FC_{t-1} + \theta_0 Qn_t + \mu_t, \text{ where } \mu_t = \varepsilon_t - (1-\theta)\varepsilon_{t-1}) \quad (5)$$

Hence, to demonstrate that the expected volume of firm output remains unchanged we reduce Equation 5 as follows;

$$\overleftarrow{FC} = \alpha(1-\theta)(\bar{Y} + \theta^2 + \theta^2\, \ddot{Q}n + \cdots \theta^n \ddot{Q}n) = \alpha(1-\theta)\ddot{Q}n(1+\theta+\theta^2+\cdots\theta^n), \quad (6)$$

Wherein $1+\theta+\theta^2+\cdots\theta^n = 1/1+\theta$ are weights in geometric series. Thus, Equation 6 can be simplified as follows:

$$\overleftarrow{FC} = \alpha\ddot{Q}n(1-\theta) * 1/(1+\theta) \quad \text{or} \quad \overleftarrow{FC} = \alpha Qn_t \quad (7)$$

Where $\overleftarrow{KC}$ represents a private firm's desired capital stock, Qn_t current output, α accelerator constant and t time where the long-run multiplier is given as follows;

$$\mu_0(1+(1-\theta)+(1-\theta)^2+(1-\theta)^3 \ldots = \frac{\mu_0}{1-(1-\theta)} \quad (8)$$

Once a private firm decides to increase its fixed stock to the optimum level in response to growing product demand, in many instances, the actual investment spending is not immediately carried out but involves dealing with inside and outside decision-making lags. The investment decision lags are invariably long and caused by the need to manage domestic credit constraints, to access international credit lines and even to source foreign currency required for imported equipment from black markets. Most significantly, long investment decision- making lags are required to manage macro-uncertainties, to deal with the cost of corruption rentals and to find ways to avoid high tax rates. This suggests that in instances of high public corruption, uncertainties and high taxation policies the paper argues that most private firms usually plan to adjust the fixed capital stock steadily rather than doing it quickly. Hence, in order to reflect the effects of corruption, taxation policy and uncertainty on delaying firm-level investment decisions, we lag Equation 5 as follows:

$$FC_{t-1} = \alpha(1-\theta)(Qn_t + \theta Qn_{t-1} + \theta^2 Qn_{t-2} + \cdots \theta^n Qn_{t-n} \quad (9)$$

Multiplying Equation 9 by θ or by $\frac{\mu_0}{1-(1-\theta)}$ (the investment multiplier) we get:

$$\theta\, FC_{t-1} = \alpha(1-\theta)\theta\,(Qn_{t-1} + \theta^2 Qn_{t-2} + \theta^3 Qn_{t-3} + \cdots \theta^{n+1} Qn_{t-n} \quad (10)$$

Subtracting Equation 9 from Equation 5 we show changes in fixed capital stock to changes in output as follows;

$$FC_t - FC_{t-1} = \alpha(1-\theta)(Qn_t + \theta^{n+1} Qn_{t-n}) \quad (11)$$

The term θ^{n+1} tends to be zero in infinitely geometrical series, and hence, the equation reduces to; $FC_t - FC_{t-1} =$

$$(1-\theta)\alpha\ddot{Q}n_t \quad (12)$$

Equation 12 shows that in the presence of uncertainties, high taxation regime and corruption rentals, overall firm-level investment is a fraction of the gap between the actual capital stock owned by the firm and its desired capital stock. Making FC_t the subject of the formula in Equation 12 we get;

$$FC_t = (1-\theta)\alpha FC_t + \alpha FC_{t-1} \quad (13)$$

And substituting (13) into Equation 11 we get the expanded form;

$$FC_t - FC_{t-1} = (1-\theta)\alpha(Qn_t + \theta FC_{t-1} - FC_{t-1} \quad or \quad I_{int} = (1-\theta)\alpha Qn_t - (1-\theta)FC_{t-1} \quad (14)$$

The Equation 14 demonstrates that the net private fixed investment by a firm given by $FC_t - FC_{t-1}$ or by I_{int} over a period of time is negatively related to the private fixed capital stock of the previous period and is also positively related to the total output level. By lagging the dependant variable, we also demonstrate the modification of the flexible accelerator effect on output growth. The country has lower domestic savings rates due to weak

economic growth, and therefore, FDI inflows are frequently utilised to augment domestic savings and investable funds (Muzurura, 2018). Representing domestic savings over time by (DS_t), we add changes in FDI inflows in order to get aggregate domestic savings required for investment, since saving is equal to investment. Equation 14 after adjusting for depreciation becomes:

$$FDI_{t-1} - FDI_t + FC_t - FC_{t-1} + \{1-\theta\}FC_{t-1} = DS_t \quad (15)$$

In order to incorporate investment uncertainty as a distinct variable in the framework, we proceed as follows. First we assume that net present value of returns to fixed capital to the firm is given by $Y = {}^{1}/_{1+r}$. Second we also assume that the firm incurs present value of the sunk costs given by $C = {}^{1}/_{1+r}$, where r is the firm's discount rate (cost of capital). Under net present value principles, we argue that a private firm can only carry out new fixed capital stock investment under uncertainty when future revenues exceed costs, that is, if $\frac{Y}{1+r} - \frac{C}{1+r} \geq 0$. Third, assuming that investment decisions of a private firm in developing countries follow a continuous-time stochastic process we hence, adopt a geometric Brownian motion (GBM) with a drift where C varies over time. Following a model by Morter and Peres (2010) the investment process must satisfy the following stochastic differential equation (SDE) in order to be considered a GBM.

$$dS_t = \emptyset S_t dt + \delta S_t dW_t \quad (16)$$

Where $\emptyset$ is mean (percentage of drift) of dQn and δ is the standard deviation (volatility of investment) of dS_t. According to Sigman (2006) the term W_t represents the Wiener process and is the random increment of a continuous-time stochastic process denoted by;

$$ds_t = \varepsilon_t \sqrt{dt} \quad (17)$$

In Equation 16 the term $\emptyset S_t dt$ is used to model deterministic trends whilst $\delta S_t dW_t$ will be used to model unpredictable events (uncertainty) during the motion. The Wiener process is an important process in the mathematical theory of finance which was used in the Black-Scholes option pricing model of investment theory (Muzurura, 2018). A Wiener process is a Brownian motion which follows a continuous-time Markov stochastic process whose increments are independent, no matter how small the time interval. Given the drift rate and volatility rate, we can represent GBM solution in this form; $S_t = S_0 e^{Z(t)}$, Where $Z(t) = \left(\varepsilon - \frac{\delta^2}{2}\right)t + \delta W_t$. Now given $S_t = S_0 e^{Z(t)}$. In order to demonstrate the GBM follows a Markov stochastic process we proceed thus,

$$S(t+g) = S_0 e^{Z(t+g)} = S_0 e^{Z(t)+H(t+g)-H(t)} = S_0 e^{Z(t)} e^{H(t+g)-H(t)} = S(t) e^{H(t+g)-H(t)}$$

Here the future state H $(t+g)$ depends on the future increment of the Brownian motion, that is, $H(t+g) - H(t)$ which is independent, hence proving the Markov stochastic process. However, Morter and Peres (2010) say the term denoted by ε_t in Equation 17 follows a standard normal distribution that has as zero mean and variance which are equal to one and is serially uncorrelated, that is, $E(\varepsilon_t \varepsilon_k) = 0, \aleph i, k, for\ all\ t \neq k$. In a recent study, Muzurura (2018) following Sigman (2006) shows that if s_t is a Wiener process, then any change in s or Δs, corresponding to a time interval Δt, satisfies must also satisfy the following conditions: (a) the relationship between Δz and Δt is given by $\Delta z = \varepsilon_{tm}\sqrt{dt}$ where ε_t is a normally distributed random variable with mean zero and a standard deviation of 1; (b) ε_t is serially uncorrelated, that is, $E(\varepsilon_t \varepsilon_{k)} = 0, for\ all\ t \neq k$. In Equation 17 the values of Δs for any two different intervals of time are independent, so that s follows a Markov process. Thus, if we let Δt's become infinitesimally insignificant, the increment of the Wiener process can be written as in Equation 16. In Equation 17 the term in ds disappears because its expectation is zero. Equations 16 and 17 indicate that future returns associated with investment under uncertainty are log-normally distributed with an expected value given by equation $E(Y_t) = Y_0 \exp(\partial t)$ where Y_0 is today's value of F, and a variance that grows exponentially with t_m. This

suggest that in investing under uncertainty and irreversibility a private firm there has an option to time or defer long-term fixed investment decisions. Deferring investment decisions to future periods allows the firm to maximize the expected present value of the option of investing under uncertainty given by F (Y). Hence, the equation

$$F(Y) = maxE[(Y_T - C) = Y_0\exp(-\beta T) \quad (18)$$

Where Y_T is the value of the fixed investment at the unknown future period in time T, on which the decision to invest is undertaken and $\beta > \partial$ is the discount rate *r*. If a private firm delays or defers the investment decision to a later period whilst holding the option to invest in future, this is equivalent to holding an asset which pays no return (dividends). However, by deferring investment decision under uncertainties caused by corruption and taxation policies may cause future capital stock to gain in value as time passes by. The fundamental condition for investment optimality (also referred as the Bellman equation), is that if the firm delays business equipment spending whilst holding the option to invest in the future is shown by Equation 19 (see Dixit and Pindyck (1994)).

$$\beta F = E(dF)/d_t \quad (19)$$

In Equation 19 βF shows the discounted normal rate of return of fixed capital spending that a firm would require from holding the option. The term $E(dF)/d_t$ shows the expected total return on capital employed per unit of time from holding the option. In this case, we can argue that the firm is equating the expected return on investment from deferring or delaying the investment with the opportunity cost of deferring investment decisions under uncertainty, corruption, high taxation regime and irreversibility. In actual practice, Equation 19 describes a condition of no-arbitrage in the investment decision of the firm. For an arbitrary values of s_0 Equation 16 we solve the equation as follows;

$$S_t = S_0\exp(\left(\mu - \frac{\emptyset^2}{2}\right) + \delta W_t \quad (20)$$

Using Ito's integral Lemma and assuming that $W_0 = 0$ we get;

$$\int_0^t \frac{dS_t}{S_t} = \mu_t + \delta W_t \quad (21)$$

Whilst the term $\frac{dS_t}{S_t}$ in Equation 21 looks like a derivative of $\ln S_t$, nevertheless it is an Ito iterative process that requires the use of Ito calculus and thus serves the stochastic counterpart of the chain rule commonly known as the Itô–Doeblin theorem.

If we differentiate the scalar function $h\,(t, z)$ twice, its expansion form using a Taylor series becomes;

$$\partial f = \frac{\partial h}{\partial t}dz + \frac{1}{2}\frac{\partial^2}{dz^2} + \cdots$$

Substituting Z_t for z and therefore $\mu_t + \delta_t dW_t$ for dz gives;

$$df = \frac{\partial h}{dt} + \frac{\partial h}{dz}\{\mu_t dt + \delta_t dB_t\} + \frac{1}{2}\frac{\partial^2 h}{dz^2}\{\mu_t^2 dt^2 + 2\mu_t\delta_t dt dW_2 + \delta_+^2 dW_t^2) + \ldots\ldots$$

In the infinite as the term $dt \to 0$ the terms dt^2 and $\delta_t dB_t$ tends to approach zero faster than the terms dW_t^2. Hence, making dt^2 and $\delta_t dB_t$ equal to zero and substituting *dt* for dW_t^2 we get;

$$df = \left\{\frac{\partial h}{dt} + \mu_t\frac{\partial h}{dz} + \frac{\delta_t^2\delta^2 h}{2dz^2}\right) dt + \mu_t\frac{dh}{dz}dW_t$$

The above expression can be shown also as follows,

$$dF = H'(X)dW + \frac{1}{2}H''(W)(dW^2) \quad (20)$$

If we substitute out for *dW* from Equation 19 gives

$$E(dH) = \partial W H'(W)dt + \frac{\partial}{2}H''(W)dt \quad (21)$$

Further substituting Equation 21 in Equation 19 we get

$$\beta H(W) = \partial Q E H'(W) + \frac{\partial^2}{2}W^2 H''(W) \quad (22)$$

Equation 22 shows a second order differential equation in W. The equation shows that if a private firm follows the optimal investment rule, its value of the option to defer and wait until uncertainty clears must satisfy Equation 22. Besides, the investment decision must also satisfy three boundary conditions which are; (1) $H(0) = 0$. The condition shows that if the value of the intended investment falls to 0, the firm's value of the option to invest under uncertainty is zero, hence, no investment will be undertaken by the firm (Muzurura, 2018). The other conditions is that $H(\tilde{Y} = \tilde{Y} - C$. This condition defines the net pay off to the firm from undertaking the investment at the value of Y. This condition shows the level at which it is optimal to invest now in the presence of uncertainty. The third condition is termed the 'smooth pasting' condition that requires that the function $H(Y)$ must be continuous and smooth around the optimal investment timing point. Solving Equation 22 subject to conditions given in the preceding paragraph gives;

$$H(Y) = aY^d \quad (23)$$

Where $d = (\tilde{Y} - S)/\tilde{Y}^e$ and e is given by Equation (24) (see Morter and Peres (2010))

$$e = \frac{1}{2} - \frac{\partial}{\beta^2} + \sqrt{(\frac{\partial}{\beta^2} - \frac{1}{2})^2 + \frac{2p}{\beta^2}} \quad (24)$$

And by substituting equation (24) in the first and second boundary conditions as given above, the net pay off associated with the optimal investment timing under uncertainty is given by;

$$\tilde{Y} = \frac{e}{e-1}S \quad (25)$$

Thus, if $e > 1$, it follows that $\frac{e}{e-1} > 1$ such that $\tilde{Q} > S$ and therefore, when investing under uncertainty and irreversibility the standard net present value criterion, that consists of setting equation $\tilde{Y} = C$ no longer holds (Morter and Peres, 2010; Caggiano *et al.*, 2015; Muzurura, 2018). It is apparent from Equation 25 that the magnitude of the wedge between $\tilde{Y}$ and C is increasing with the degree of uncertainty about future investment returns arising from the firm's operating environment. Uncertainty is measured by the variance $\emptyset^2$. This suggest that by increasing the value of the option to wait or defer investment, a firm can actually reduce fixed investment in the presence of uncertainty. Hence, investment decision rule under uncertainty and irreversibility requires that expected future returns on capital investment must not be less than the user or rental cost of capital plus the opportunity cost of exercising the option to invest.

The option by the firm to invest now has value because by deferring the investment, the firm can choose not to invest in uncertain business environment where it may incur losses. However, this option has no value if investment decisions can be reversed since divestment can take place in low-profit business environment that is characterised by uncertainty. This shows that there is an irreversibility effect on investment decisions of a firm. Greater uncertainty raises the value of the call option by deferring a commitment to invest by the firm. The partial framework at this stage implies that the irreversibility effect dominates any positive impact on investment. This suggest further that more uncertainty in the firm's macro-environment increases the marginal profitability of capital especially on risk taking private firms. Uncertainty, instability, and irreversibility have been the major causes of low investment in developing countries.

3.2. Corruption and Taxation Variables

Due to high taxation and public corruption in Zimbabwe, we assume that a private firm may decide to carry out the investment over two intertemporal periods, period *(D)* which is current period and period *(E)* representing a future period. This means that due to high taxation policies and public corruption, part of the firm's investment in fixed assets could be deferred to period *E*. However, in order to be a granted a government investment permit, we assume that a corruption rental plus a government tax is required for successful investment in the second period (E). Assume in the first period *(D)* request by bureaucrat for corruption rentals cr_1 and cr_2 are made known to the firm in advance so that the firm can access for example, an investment incentive. However, let's say that in period *(E)* cr_1 *is* known and cr_2 is not known in advance. A firm will be able to invest successfully in period *(E)* if the bribe or corruption rental is affordable.

Conversely, the firm will abandon the investment decision if the requested corruption rental is too prohibitive. In order to show that corruption and high taxation harm the firm in period *(E)* we further assume that *Invst* represents firm-level investment decision, the cost of capital is represented by *kc (Invst)*. Assume that in order for the firm to increase domestic investment a corruption rental cr_1 is required where *1* and *2* represent periods *D* and *E* respectively. As already assumed if cr_1 and cr_2 are known in advance the firm's profit is given by;

$$pr_i(Invst) = (\$pr(Invst) - \$cr_1 - \$gtx_1) + \vartheta(\$pr(Invst) - \$cr_2 - \$gtx_2) - KC(Invst), \quad (26)$$

Where $pr_i(Inv)$ represents profit stream and ϑ denotes the discount rate $1/1+r$ and $\$gtx_b$, denotes government tax. In order to maximise profit we differentiate the profit Equation 26 in order to get the first order condition, hence, the equation;

$$\pi_{i^1}(Invst) = (1+\vartheta)\$pr^1(Invst) - kc^1(Invst) \leq 0 \quad (27)$$

Note that $\$gtx$ can be incorporated in $\$cr$ since in some empirical literature corruption is equated to a tax incurred by the firm (see (Madani and Licetti, 2010; Mbaku, 2010)). Hence, we can prove that an interior solution *Inv** satisfying equation $\pi^1(Invst^*) = 0$ exists if $\pi^1(Invst^{*)} \geq 0$, or else the firm will not invest at all. But if we assume in period E that corruption rental $\$cr_1$ is known yet bribe $\$cr_2$ is a random variable, then in such instances, the firm will simple not increase domestic investment if $\$cr_2$ and *$gtx2* are not affordable. In this case the firm's expected profit function will be given by the following equation;

$$\pi_b(Invst) = (\$pr(Invst) - \$br_1 - \$gtx_1 + \vartheta \nexists\{\max(pr(Invst) - \$br_2, 0)\} - kc(invst), \quad (28)$$

Where the term $\nexists$ represents the expectation operator. If we denote the probability distribution function of $\$cr_2$ by R (.) then the FOC for expected profit maximisation of the firm becomes;

$$\pi_{b^1}(Invst) = \$pr^1(Invst) + \vartheta \int_n^{p(Invst)} \$pr^1(Invst) dR(br_b) - kc^1(invst) \leq 0 \quad (29)$$

Also it can be demonstrated that an interior solution *Inv*** satisfying $\pi_{b^1}(Inv) = 0$ exists if $\pi_b(Invst^{**})$ is less than 0, or else the firm will not increase domestic investment. Owing to the need to ensure that that the second order condition is mathematically satisfied, the derivation of Equation 28 assumes that profit stream is a concave function and that the cost of capital is a convex function. Since $\pi_{b^1}(Invst^{**}) \leq 0$, it therefore follows that *Invst*** is less than *Invst**. This means the firm will not invest when the cost of corruption and taxation are so high that they cannot be internalised without eroding future viability of the firm. In Zimbabwe, firm- level data is either inaccurate or inadequate. We can therefore transform the above micro analysis by using macro-level data. We assume that the firm produces only one good, and that output is produced with a well-behaved neoclassical production function with positive and strictly diminishing marginal product of physical capital. To meet this postulation, we adopt a Cobb-Douglas production function such that production at time *t* is given by;

$$Invst_t = FDI_{t-1} - FDI_t + FC_t - FC_{t-1} + \{1-\theta\}FC_{t-1} = DS_t{}^{\alpha}{}_t U_t^{\beta} C_t^{\theta} H_t^{\gamma} \quad (29)$$

on condition that profit maximisation given by;

$$\pi_{b^1}(Invst) = pr^1(Invst) + \vartheta \int_n^{p(Inv)} pr^1(Invst) dN(br_2) - k^1(invst) \leq 0, \text{ still holds.}$$

Where, DS_t is the level of domestic savings and U_t, H_t and C_t, are the stocks of domestic savings, uncertainty, corruption and human capital respectively at time t respectively. Equation 29 can also be derived as a Solow-augmented neoclassical model with constant returns to scale for all production factors such that $\alpha + \beta + \gamma + \theta = 1$. However, following a number of studies of investment under uncertainty and corruption in developing countries, the framework adopts an endogenous growth model where $\alpha, \beta, \theta, \gamma > 0$ and $\alpha + \beta + \gamma + \theta \geq 1$ subject to decreasing returns to scale with respect to human capital. This suggest that over the long-run the country tends to have constant human-capital ratio which can by normalised by 1, for simplicity. We thus define X_t as the product of the level of domestic investment behaviour under uncertainty, high taxation regime and corruption at time t. Hence, our final model in the presence of uncertainty, high taxation and high public corruption was specified as follows;

$$I_{tm} = A_{tm} DS_{tm} Corr_{tm} U_{tm} T_{tm} V_{tm} \quad (30)$$

Where I_t is aggregate investment, $Corr_t$ denotes corruption, U_t represent idiosyncratic uncertainties, T_t is taxation rates over time and DS_t is domestic savings. V_t is a row vector of other exogenous variables such as liquidity constraints, market size, exports, trade openness and so on.

4. FINDINGS AND DISCUSSIONS

Multicollinearity tests were carried out in order to avoid estimating a spurious model. Table 1 below shows that was no multicollinearity among all the variables and we thus concluded that all the variables did not move together in a systematic manner.

Table-1. Multicollinearity.

	Corr	Tax	UNCE
Corr	1.000		
Tax	0.475	1.000	
UNCE	0.265	-0.702	1.000

The Augmented Dickey and Fuller Unit Root test findings are in Table 2. The null hypothesis was that a variable had unit root against the alternative of the presence of stationarity. The presence of unit root indicates that the variable is not stationary and this may lead to wrong inference. Stationary series have constant mean, constant variance and constant autovariance. The stationarity tests were differenced starting with test at levels followed by first and second differences in that order. The probability value of ADF test statistic were then compared to 0.01, 0.05 and 0.1[2]. Any probability values below 0.01, 0.05 and 0.1[2] were deemed to be stationary.

Table-2. Augmented Dicky-Fuller Unit Root Tests.

Variables	t-ADF	Critical-1%	Critical-5%	Conclusion
D Investment	-2.748	-4.200	-3.175	I(0) 10%
DCorruption	-3.921	-4.122	-3.145	I(1) 5%
DTaxation	-2.990	-4.058	-3.120	I(1) 10%
Uncertainty	-3.268	-4.004	-3.100	I(0) 5%

The regression model was tested for serial autocorrelation using the Breusch-Godfrey test and the findings are shown in Appendix 1. Similarly, as shown in Table 2 heteroscedasticity a major problem in time series data was also tested for using the Breusch- Godfrey Pagan test. Finally the model was tested for correct specification using the Ramsey Reset test as shown in Appendix 3. After successful diagnostic tests, the regression output adopted for this

paper is hereunder specified in Table 3 where all variables have negative coefficient and statistically significant at 10% and 5%.

Table-3. Regression Output.

Dependent Variable: DD INVESTMENT				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
DLN_TAX	-8.822	2.575	3.426	0.0076
DCorruption	-10.390	4.514	-2.304	0.0469
Uncertainty	-0.002	0.001	2.674	0.0255
C	-3.139	1.707	-1.839	0.0990
R-squared	0.601	Mean dependent var		0.139
Adjusted R-squared	0.468	S.D. dependent var		6.748
S.E. of regression	4.918	Akaike info criterion		6.271
Sum squared resid	217.667	Schwarz criterion		6.445
Log likelihood	-36.763	Hannan-Quinn criter.		6.236
F-statistic	4.531	Durbin-Watson stat		2.932
Prob(F-statistic)	0.034			

Uncertainty which was proxied by inflation was found to be negative and statistically significant at 5 percent level of confidence. An increase in uncertainty by 1% would be expected to decrease firm-level investment marginally by 0.2 %. The results suggest that macro uncertainty associated with political and economic instability, investment policy inconsistency, currency convertibility, trade terms, the ease of doing business and protection of private property are likely to cause firms to defer or cease fixed investment spending. Deferring investment decisions to future periods allows the firm to maximize the expected present value of the option of investing under uncertainty. This is because there is likely to be an aftershock effect that arises when investment irreversibility prevents the firm from selling fixed capital even when its marginal revenue product is too low. Similar findings were shown in studies by Bloom *et al.* (2018), Muzurura (2018), Knut *et al.* (2018) and Binding and Dibiasi (2017). Corruption was found to be negative and significant at 10% confidence level suggesting that an increase in corruption by 1% will cause firm-level investment to drop by at least 1000%. The findings imply that public corruption is likely to lead to a higher effective tax burden on private firms. Public corruption particularly on the issuance of investment permits and foreign currency allocation inefficiently distort allocation of capital by reducing the marginal rate of return per each dollar invested in private firms operating in developing economies. The findings agree with Olken and Pande (2012), O'Toole and Tarp (2014), Godinez and Liu (2015) and Bazzi and Clemens (2013) who report that corruption hurts domestic investment by rechanneling resources towards activities and sectors with lower multiplier effects on the economy. However, our findings differ with Dreher and Gassebner (2013) who found corruption a necessary evil that greases efficiency in an economy. A high taxation regime was found to be to be negative and statistically significant at one percent. A unit increase in taxation rates decreases firm-level investment by 882%. The findings suggest that high taxation regimes favoured by policy makers are likely to increase corruption, raises firms' operational costs and creates more business uncertainty and hence, deterring economic growth through domestic investment and foreign direct investment transmission channels.

5. CONCLUSIONS AND RECOMMENDATIONS

The firm-level business environment is characterised by corruption and uncertainties arising from both economic and political settings. In addition, in Zimbabwe the major source of revenue for financing public deficits comes from high taxation rates. Public corruption is also endemic. The "evil trilogy" consisting of high taxation regimes, public corruption and uncertainty impairs firm-level investment decisions hence, leading to overall low domestic investment equilibrium and economic growth. However, most theories of firm-level investment behaviour

often exclude the evil trilogy by assuming perfect economic environment with no negative externalities. The paper proposed and tested a theoretical framework that was limited to three variables, corruption, uncertainty and taxation which were all found to decrease firm-level investment.

REFERENCES

Abdul, R., 2017. Firms investment decisions–explaining the role of uncertainty. Journal of Economic Studies, 44(5): 833-860.Available at: https://doi.org/10.1108/jes-02-2016-0041.

Aghion, P., U. Cagé, J. Akcigit and W. Kerr, 2016. Taxation, corruption, and growth. NBER Working Paper 21928, National Bureau of Economic Research, Cambridge, Massachusetts.

Akitoby, B. and T. Stratmann, 2010. The value of institutions for financial markets: Evidence from emerging markets. Review of World Economics, 146(4): 781-797.Available at: https://doi.org/10.1007/s10290-010-0073-7.

Auerbach, A.J. and Y. Gorodnichenko, 2012. Measuring the output responses to fiscal policy. American Economic Journal: Economic Policy, 4(2): 1-27.Available at: https://doi.org/10.1257/pol.4.2.1.

Bachmann, R. and E.R. Sims, 2012. Confidence and the transmission of government spending shocks. Journal of Monetary Economics, 59(3): 235-249.Available at: https://doi.org/10.5089/9781475586060.001.

Baker, S.R., N. Bloom and S.J. Davis, 2016. Measuring economic policy uncertainty. The Quarterly Journal of Economics, 131(4): 1593-1636.

Bazzi, S. and M.A. Clemens, 2013. Blunt instruments: Avoiding common pitfalls in identifying the causes of economic growth. American Economic Journal: Macroeconomics, 5(2): 152-186.Available at: https://doi.org/10.1257/mac.5.2.152.

Bekoe, W. and P.K. Adom, 2013. Macroeconomic uncertainty and private investment in Ghana: An empirical investigation. International Journal of Economics and Financial Issues, 3(2): 276-293.

Bellos, S. and T. Subasat, 2013. Governance and foreign direct investment in Latin America: A panel gravity model approach. Latin American Journal of Economics, 50(1): 107-131.Available at: https://doi.org/10.7764/laje.50.1.107.

Ben, A., M. Sami and S. Sassi, 2016. The corruption-inflation nexus: Evidence from developed and developing countries. B.E. Journal of Macroeconomics, 16(1): 1-25.

Benedek, D., E. Crivelli, S. Gupta and P. Muthoora, 2014. Foreign aid and revenue: Still a crowding-out effect? FinanzArchiv: Public Finance Analysis, 70(1): 67-96.Available at: https://doi.org/10.1628/001522114x679156.

Berger, D. and J. Vavra, 2014. Measuring how fiscal shocks affect durable spending in recessions and expansions. American Economic Review, 104(5): 112-115.Available at: https://doi.org/10.1257/aer.104.5.112.

Binding, G. and A. Dibiasi, 2017. Exchange rate uncertainty and firm investment plans evidence form Swiss survey data. Journal of Macroeconomics, 51: 1-27.Available at: https://doi.org/10.1016/j.jmacro.2016.11.004.

Bloom, M., M. Floettoto, N. Jaimovich and J.S. Terry, 2018. Really uncertain business cycles. Econometrica, 86(5): 1031-1063.

Bloom, N., 2014. Fluctuations in uncertainty. Journal of Economic Perspectives, 28(2): 153-176.

Born, B. and J. Pfeifer, 2014. Risk matters: The real effects of volatility shocks: Comment. American Economic Review, 104(12): 4231-4239.Available at: https://doi.org/10.1257/aer.104.12.4231.

Brueckner, M. and F. Carneiro, 2017. Terms of trade volatility, government spending cyclicality, and economic growth. Review of International Economics, 25(5): 975-989.Available at: https://doi.org/10.1111/roie.12291

Caggiano, G., E. Castelnuovo, V. Colombo and G. Nodari, 2015. Estimating fiscal multipliers: News from a non-linear world. The Economic Journal, 125(584): 746-776.Available at: https://doi.org/10.1111/ecoj.12263.

Céspedes, A., 2013. The impact of uncertainty shocks in emerging economies. Journal of International Economics, 90(2): 316-325.Available at: https://doi.org/10.1016/j.jinteco.2013.03.003.

Corinne, D., E. Fuli, D. Mulaj, G. Ramirez and R. Xu, 2018. Exiting from fragility in Sub-Saharan Africa: The role of fiscal policies and fiscal institutions. South African Journal of Economics, 86(3): 271-307.Available at: https://doi.org/10.1111/saje.12195.

Davis, G.A. and R.D. Cairns, 2018. The odd notion of reversible investment. Journal of Banking & Finance, 81: 172-180.Available at: https://doi.org/10.1016/j.jbankfin.2016.03.019.

Davis, S.J., 2015. Regulatory complexity and policy uncertainty: Headwinds of our own making. Document Prepared to Accompany Remarks Delivered at the Hillsdale College Free Market Forum on "Markets, Government, and the Common Good" in Omaha, Nebraska on 15-17 October 2015.

Dixit, A.K. and R.S. Pindyck, 1994. Investment under certainty. NJ: Princeton University Press.

Dreher, A. and M. Gassebner, 2013. Greasing the wheels? The impact of regulations and corruption on firm entry. Public Choice, 155(3-4): 413-432.Available at: https://doi.org/10.1007/s11127-011-9871-2.

Dridi, M., 2013. Corruption and economic growth: The transmission channels. Journal of Business Studies Quarterly, 4(4): 1-32.

Efrem, C., L. Guayn and A. Giovinni, 2018. A short review of the recent literature on uncertainty. Austrian Economic Review, 50(1): 68-78.

Fernández-Villaverde, J., P. Guerrón-Quintana, J.F. Rubio-Ramírez and M. Uribe, 2011. Risk matters: The real effects of volatility shocks. American Economic Review, 101(6): 2530-2561.Available at: https://doi.org/10.1257/aer.101.6.2530.

Furceli, D., S. Choi, Y. Huang and P. Loungani, 2018. Aggregate uncertainty and sectoral productivity growth: The role of credit constraints. Journal of International Money and Finance, 88: 314-330.Available at: https://doi.org/10.1016/j.jimonfin.2017.07.016.

Gamberoni, E., C. Giordano and P. Lopez-Garcia, 2016. Capital and labour (mis)allocation in the euro area: Some stylized facts and determinants, Questioni di Economia e Finanza (Occasional Papers) 349, Bank of Italy, Economic Research and International Relations Area.

Godinez, J.R. and L. Liu, 2015. Corruption distance and FDI flows into Latin America. International Business Review, 24(1): 33-42.Available at: https://doi.org/10.1016/j.ibusrev.2014.05.006.

Gupta, R. and C. Jooste, 2018. Unconventional monetary policy shocks in OECD countries: How important is the extent of policy uncertainty?. International Economics and Economic Policy, 15(3): 683-703.Available at: https://doi.org/10.1007/s10368-017-0380-8.

Handley, K., 2014. Exporting under trade policy uncertainty: Theory and evidence. Journal of International Economics, 94(1): 50-66.Available at: https://doi.org/10.1016/j.jinteco.2014.05.005.

Handley, K. and N. Limao, 2015. Trade and investment under policy uncertainty: Theory and firm evidence. American Economic Journal: Economic Policy, 7(4): 189-222.Available at: https://doi.org/10.1257/pol.20140068.

Jurado, K., S.C. Ludvigson and S. Ng, 2015. Measuring uncertainty. American Economic Review, 105(3): 1177-1216.

Kandilov, I.T. and A. Leblebicioğlu, 2011. The impact of exchange rate volatility on plant-level investment: Evidence from Colombia. Journal of Development Economics, 94(2): 220-230.Available at: https://doi.org/10.1016/j.jdeveco.2010.01.013.

Kang, W., K. Lee and R.A. Ratti, 2014. Economic policy uncertainty and firm-level investment. Journal of Macroeconomics, 39: 42-53.Available at: https://doi.org/10.1016/j.jmacro.2013.10.006.

Keho, Y., 2010. Estimating the growth-maximizing tax rate for Cote dIvoire: Evidence and implications. Journal of Economics and International Finance, 2(9): 164-174.

Klößner, S. and R. Sekkel, 2014. International spillovers of policy uncertainty. Economics Letters, 124(3): 508-512.Available at: https://doi.org/10.1016/j.econlet.2014.07.015.

Knut, A.A., G.J. Natvik and S. Sola, 2018. Economic uncertainty and the influence of monetary policy. Journal of International Money and Finance, 76(2): 50-67.Available at: http://dx.doi.org/10.1016/j.jimonfin.2017.05.003.

Koyck, L.M., 1954. Distributed lags and investment analysis. Amsterdam, The Netherlands: North-Holland Publishing Company.

Madani, D. and M. Licetti, 2010. Business regulation, reform and corruption. PREM Notes 155. Washington: World Bank.

Manova, K., 2013. Credit constraints, heterogeneous firms, and international trade. Review of Economic Studies, 80(2): 711-744.

Mbaku, J.M., 2010. Corruption in Africa: Causes, consequences and clean-ups. New York: Lexington Books.

Morter, P. and Y. Peres, 2010. Brownian motion. UK: Cambridge Press.

Muzurura, J., 2017. Corruption and economic growth in Zimbabwe: Unravelling the linkages. International Journal of Development Research, 7(1): 1197-11204.

Muzurura, J., 2018. Firm-level investment decisions under uncertainty and irreversibility in Zimbabwe. International Journal of Business, Economics and Management, 6(5): 201-218.Available at: https://doi.org/10.18488/journal.62.2018.56.201.218.

Muzurura, J. and M. Sikwila, 2018. Taxation, private fixed domestic investment behaviour and Zimbabwe economic growth. American Journal of Humanities and Social Sciences, 2(5): 26-39.

Niemann, R. and C. Sureth-Sloane, 2018. Investment timing effects of wealth taxes under uncertainty and irreversibility. Journal of Business Economics, 10: 1-31.Available at: https://doi.org/10.1007/s11573-018-0918-4.

Niemann, R. and C. Sureth, 2013. Sooner or later?–paradoxical investment effects of capital gains taxation under simultaneous investment and abandonment flexibility. European Accounting Review, 22(2): 367-390.Available at: https://doi.org/10.1080/09638180.2012.682781.

Njuru, S.G., C. Ombuki, N. Wawire and S. Okeri, 2013. Taxation and private investment: Evidence for Kenya. Management, 2(11): 78-93.

O'Toole, C.M. and F. Tarp, 2014. Corruption and the efficiency of capital investment in developing countries. Journal of International Development, 26(5): 567-597.Available at: https://doi.org/10.1002/jid.2997.

Olken, B.A. and R. Pande, 2012. Corruption in developing countries. Annual Review of Economics, 4(1): 479-509.

Oniore, J., G. Emily and U. Kenneth, 2016. The impact of exchange rate fluctuations on private domestic investment performance in Nigeria. Journal of Economics and Finance, 7(2): 1-9.

Ozturk, E.O. and X.S. Sheng, 2018. Measuring global and country-specific uncertainty. Journal of International Money and Finance, 88: 276-295.Available at: https://doi.org/10.1016/j.jimonfin.2017.07.014.

Paunov, C., 2016. Corruption's asymmetric impacts on firm innovation. Journal of Development Economics, 118: 216-231.Available at: https://doi.org/10.1016/j.jdeveco.2015.07.006.

Rose-Ackerman, S. and P.J. Bonnie, 2016. Corruption and government. Causes, consequences and reform. New York: Cambridge University Press.

Sigman, K., 2006. Geometric brownian motion. USA: Columbia University.

Tsai, I.-C., 2017. The source of global stock market risk: A viewpoint of economic policy uncertainty. Economic Modelling, 60: 122-131.Available at: https://doi.org/10.1016/j.econmod.2016.09.002.

Ugur, M., 2014. Corruption's direct effects on per-capita income growth: A meta-analysis. Journal of Economic Surveys, 28(3): 472-490.Available at: https://doi.org/10.1111/joes.12035.

Wolfgang, D., S. El Ghoul, O. Guedhami and M. Janzen, 2018. Policy uncertainty, investment, and the cost of capital. Journal of Financial Stability, 39: 28-45.Available at: https://doi.org/10.1016/j.jfs.2018.08.005.

Zhang, T. and L. Lie, 2015. Economic policy uncertainty and stock market volatility. Finance Review Letters, 15: 99-105.Available at: https://doi.org/10.1016/j.frl.2015.08.009.

Zouhaier, H., 2011. Corruption, investment and economic growth international. Journal of Economic Research, 2(5): 185-194.

Zribi, N. and Y. Boujelbegrave, 2011. The factors influencing bank credit risk: The case of Tunisia. Journal of Accounting and Taxation, 3(4): 70-78.

Appendix-1. Breusch-Godfrey Serial Correlation LM Tests

F-statistic	**1.089440**	**Prob. F(2,7)**	**0.3373**
Obs*R-squared	3.085936	Prob. Chi-Square(2)	0.2137

Dependent Variable: RESID
Method: Least Squares
Date: 01/10/19 Time: 14:52
Sample: 2000 2017
Included observations: 21
Presample missing value lagged residuals set to zero.

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
DLN_TAX	0.608	2.676	0.227	0.827
DCORR	0.208	4.897	0.043	0.967
UNCERTAINTY	0.000	0.001	0.110	0.915
C	-0.055	1.797	-0.031	0.976
RESID(-1)	-0.443	0.401	-1.104	0.306
RESID(-2)	0.101	0.430	0.234	0.822

R-squared	0.237	Mean dependent var	-7.01E-16
Adjusted R-squared	-0.307	S.D. dependent var	4.258
S.E. of regression	4.869	Akaike info criterion	6.307
Sum squared resid	165.997	Schwarz criterion	6.568

Appendix-2. Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	**0.958**	**Prob. F(3,9)**	**0.453**
Obs*R-squared	3.148	Prob. Chi-Square(3)	0.363
Scaled explained SS	1.788	Prob. Chi-Square(3)	0.617
F-statistic	0.958	Prob. F(3,9)	0.453

Dependent Variable: RESID^2
Method: Least Squares
Date: 01/10/19 Time: 14:54
Sample: 2000 2017
Included observations: 21

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	25.40198	9.359924	2.713909	0.0238
DLN_TAX	-21.38016	14.12391	-1.513757	0.1644
DCORR	27.45275	24.75786	1.108850	0.2962
UNCERTAINTY	-0.006282	0.004902	-1.281505	0.2320

R-squared	0.242	Mean dependent var	16.744
Adjusted R-squared	-0.010	S.D. dependent var	26.833
S.E. of regression	26.976	Akaike info criterion	9.675
Sum squared resid	6547.624	Schwarz criterion	9.849
Log likelihood	-58.888	Hannan-Quinn criter.	9.639
F-statistic	0.958	Durbin-Watson stat	1.966

Appendix-3. Ramsey RESET Test

Specification: DDINVESTMETN DLN_TAX DCORR INF C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.420761	8	0.685
F-statistic	0.177040	(1, 8)	0.685
Likelihood ratio	0.284553	1	0.593
F-test summary:			
	Sum of Sq.	**df**	**Mean Squares**
Test SSR	4.712692	1	4.713
Restricted SSR	217.6673	9	24.185
Unrestricted SSR	212.9546	8	26.619
Unrestricted SSR	212.9546	8	26.619
LR test summary:			
	Value	**df**	
Restricted LogL	-36.763	9	
Unrestricted LogL	-36.621	8	

Unrestricted Test Equation:
Dependent Variable: DDGFCE
Method: Least Squares