



# APPLICABILITY OF INVESTMENT THEORIES IN DEVELOPING ECONOMIES: SOME COMBOBULATING REALITIES?

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## **Abstract**

*Most developing countries recurrently experience high incidences of realised economic and political economic uncertainties and shocks that have both exogenous and endogenous origins. However, most theories of investment behaviour such as the (simple) flexible accelerator, the Tobin q and the neoclassical investment theories disregard numerous idiosyncratic factors that are inherent in developing countries by assuming perfect certainty in the firm's macro-environment. Most researchers tend to adopt traditional investment theories without modifying them to suit developing economies inherent characteristics. The aim of the paper was to unravel some challenges and also to provide some insights on the implications of applying traditional investment theories in the context of developing economies. The paper recommends that there is a need to reformulate fixed investment theories in order to incorporate the effects of uncertainty, investment irreversibility, corruption and political instability common factors that characterise developing economies.*

*Keywords: Developing Economies; Neo-classical; flexible Accelerator; Investment behaviour*

## **INTRODUCTION**

Domestic investment spending by firms is broadly defined to include inventory investment, residential investment, financial investments, foreign direct investment and fixed investment also known as business equipment investment. However, fixed investment is one of the most important and difficult to understand component of domestic aggregate investment. This is because fixed investment heavily relies on the formation of expectations by firms' regarding

future production output, demand, profitability and expected prices. More fixed investment by firms' means growth in market size relative to key competitors, more valuable product offerings, attaining cost efficiencies in the value-creation chain and faster business expansion into new areas of enterprise. Ultimately with optimal fixed investment a firm may be able to achieve sustainable competitive advantages that allows it the long-term to out-manoeuvre competitors, gain huge market share and deliver superior customer offerings and grow shareholder value.

Developing countries are often characterised by seamlessly political instability, endemic political corruption, economic uncertainties and other internal domestic markets volatilities that depress domestic fixed investment. Prompted by globalisation, trade openness and major benefits emerging from international trade, consumption activities in developing countries have been representing a larger component of domestic investment behaviour. Nevertheless, it is business equipment spending decisions of private firms that have been critically responsible for the regulation of the rate at which physical capital has been accumulating in these economies. Business equipment spending behaviour of private firms account for much of the volatility and movement of a country's gross domestic investment (GDP). In developed economies, private fixed investment behaviour of firms have been interrogated extensively hence, the proliferation of investment theories such as Keynes (1936) investment cycle, Clark (1941,1979) simple and flexible accelerator theories, Jorgenson (1961) neoclassical theory, Bischoff (1971) modified neoclassical theory, Tobin (1969)  $q$  theory, the liquidity theory and profitability theory. These theories place a lot of emphasis on the role played by fixed investment in improving national output, enhancing employment generation opportunities and in facilitating human capital development. The applicability of these theories in developed economies is without doubt, and hence impeccable findings in empirical literature. A critical examination of investment theories might provide significant perspectives in grasping the process of investment-driven economic growth in developing economies.

The problem however, is that developing economies have unique economic characteristics which makes that application of these theories to a large extent confusing. For instance, developing economies recurrently experience incidences of high realised economic and political economic uncertainties that frequently affect domestic investment behaviour of private firms. Examples of uncertainties that proliferate developing economies include unexpected bottlenecks on the demand and supply-side, exchange, inflation and interest rates variabilities and uncontrollable changes in international trade terms of exports, and informational inefficiencies in domestic financial and credit markets. The governments also frequently intervene in private market exchanges, hence resulting in regular episodes of market failure and loss of consumer surplus. These factors are not pertinently catechised in many traditional

investment theories that apply in developed economies. The main objective of the paper therefore is to point out challenges in applying traditional investment theories in the context of developing economies. The paper is organised as follows: Section one covers introduction and background, section two covers a review of theories of investment behaviour. Section three is on the materials and methodology whilst findings and recommendation are in section four.

## **THEORETICAL LITERATURE REVIEW**

The major traditional theories of investment behaviour can be traced to classical economists such as Smith (1805) and Ricardo (1817) who emphasized the significant contribution of business equipment spending towards economic growth and development. However, later versions on investment theories tends to rely on either a stock-oriented approach or a flow-oriented approach. The stock approach says that given an initial fixed capital stock, net fixed investment represents a gradual adjustment of the actual fixed capital stock towards the desired level of fixed capital stock. The flow approach in contrast, posits the existence of a convex investment function that measures the total cost in units of output of achieving the level of gross capital investment. Hence, if the firm's objective is to maximize the present value of fixed capital investments using a discount rate of its profits net of the costs of investment, then at each moment a firm makes an investment decision, the rate of fixed investment must satisfy the marginal value of installed capital at the current period.

**Keynes and Business Cycles-** Keynes (1936) showed that business equipment spending was progressively done by firms until the present value of future streams of revenue generated by the equipment, at margin, were equal to the opportunity cost of capital (discount rate) or until the net present value was equal to zero. Keynes (1936) rejected the micro-foundations of fixed investment behaviour that was based exclusively on technological conditions of capital productivity. Keynesians rule out the classical assumption that an economy automatically reverts to full employment output quickly and reliably and emphasises the central role of private fixed investment behaviour in the theory of aggregate output and employment. Keynesians argue that under economic conditions in which all markets clear, a shortage in aggregate demand may prevent the economy from producing at full capacity. Thus, expectations of demand relative to existing capacity, ability to generate investment funds and uncertainty were cited as fundamental determinants of investment behaviour.

Another central theme of Keynes's autonomous investment theory is that, although total savings and investment must be identical ex-post, domestic savings and investment decisions are generally taken by separate decision makers in a firm. According to Keynes, the investment or marginal revenue demand curve is extremely volatile because it relies on firms' forming

expectations of the profitability of business fixed investment. Hence, during an economy boom, firms forecast rapid expansion of the economy to subsist into the long-term. In response to such positive projections of future demand, most firms therefore increase their production capacity through high levels of investment in new machinery and equipment. As a consequence, the expenditure on business equipment propels further expansion in all firms, hence raising the demand for the products of other firms in different economic sectors. The final outcome is the growth of optimistic expectations among all firms in any economy.

However, Keynes claims that the optimistic prospects of high demand eventually overtake the economy's ability to sustain the expansion causing the economy to plunge into a recession. In such low business downturns, firms are then left with substantial excess and idle capacity producing unrealistically high volume output against a falling demand. Faced with declining demand and low profitability, firms cease business equipment spending. This according to Keynes will depress aggregate demand causing further downward pressure on economy growth. As demand and output continue to decline, firms become more pessimistic, hence, they keep business equipment spending near zero during the contraction period of the business cycle. With the passage of time the business cycle eventually oscillates upwards and the same firms find their capital stocks over-depreciated to the extent that they need to procure some new business equipment in order to increase the now low current levels of production. Keynes therefore termed the fluctuations of business cycles "animal spirits". Thus, Keynes supposed that the "animal spirits" of firms oscillated wildly in waves of optimism and pessimism throughout a business cycle. When combined with irrational and volatile business expectations by firms, the animal spirits made the thought of fixed private investment by Keynes, as an adjustment process towards equilibrium ineffective. Keynes theory emphasises that business equipment spending is a result of firms balancing the expected return on marginal efficiency of capital with the cost of capital, which also primarily depends on the real interest rate.

**The Simple Accelerator Theory of Investment**-The origins of the accelerator model can be traced to Clark (1917) who suggested that the demand for fixed investment varied not with the volume of demand for the finished product, but rather with the acceleration of the aggregate demand. The simple accelerator theory postulates that an increase in the rate of output or demand of a firm will necessitate a proportional increase in business equipment spending. Thus, the simple accelerator implies that the greater the firm's output and sales relative to capacity utilisation, the greater will be the firm's fixed investment spending on fixed investment. Assuming that capital-output ratio is some fixed constant  $\lambda$ , then optimum output stock is a constant proportion of a firm's output so that in any given period  $tm$ ,  $C^* = \lambda Q_{tm}$

(Samuelson, 1939; Hicks, 1956; Knox, 1952; Eisner, 1978).  $C^*$  is the optimal capital stock in period  $tm$ ,  $\lambda$  is the positive constant accelerator and  $Q_{tm}$  is output in period  $tm$ .

The accelerator theory therefore stresses on the relationship between the capital stock,  $C^*$  and the flow of output  $Q_{tm}$  and shows that the demand for capital goods is not derived from consumers' goods but originates from any direct demand on national output. Hence, any variations in a firm's output will lead to changes in the levels of business equipment and machinery demanded by the firm. Suppose that firms invest in business equipment in period  $t_m$  in order to bring their fixed capital stocks to the desired level  $C_{tm+1}$  in period  $t_{m+1}$ , then assuming zero depreciation, fixed investment behaviour of the firms is given by  $(I_{tm}) = C_{tm+1} - C_{tm}$ . But since  $C_{tm} = C^*_{tm}$  the equation can be reduced to  $I_{tm} = \delta (Q_{tm+1} - Q_{tm})$ . The simple accelerator is based on the understanding that firms install new business equipment when they want to increase output. The model predicts that fixed investment is proportional to the increase in output in the future period. If a firm's price is held constant and also if we assume that business expectations, profitability and costs of borrowing or costs of capital play an insignificant role in business fixed spending decisions, then accelerator theory of investment behaviour becomes similar to a basic Keynesian model of investment behaviour.

**The Flexible Accelerator Theory of Investment Behaviour**-The flexible accelerator model of investment behaviour originates from the same premise that says the larger the gap between the existing capital stock and the desired capital stock, the greater is the firm's rate of investment (Hicks, 1956; Eisner *et al.*, 1963) Godwin, 1948; Junakar, 1972). Hence, to produce any given level of output there must be an optimal or cost minimizing level of desired capital that is required by a firm. The equation for the desired capital stock is of the form:  $C^* = \alpha Y_{tm}$  where  $\alpha$  is the capital-output ratio which general depends on the relative price of capital and labour and  $Y_{tm}$  is the level of output at time  $t_m$ . However, the capital-output ratio represented by  $\alpha$  which is often assumed to be constant in the simple accelerator theory is allowed to vary with changing output in the flexible accelerator theory.

Unlike in the simple accelerator, the flexible accelerator theory proposes that firms do not carry a once off business equipment spending in a given period but plan to close a fraction of the gap between the desired capital stock  $C^*$  and the actual capital stock  $C$  in each period, in response to increasing output and product demand. The desired or optimum level of investment in business equipment is the total fixed capital stock that firms would want to have in the long-run to support the growing demand of its products (Hicks, 1956). This translates to a net investment equation of the form:  $I = \alpha (C^* - C_{tm-1})$  where  $I$  is net fixed investment spending,  $C^*$  represents the firm's desired capital stock,  $C_{tm-1}$  denotes last period's fixed capital stock, while  $\alpha$  shows the partial adjustment coefficient. The equation suggests that if there is a gap between

the actual business equipment stock and the desired business equipment stock, firms will plan to get rid of a certain fraction  $\alpha$  of this gap each period by making incremental investment in installed productive capacity. Assuming that different firms also make different investment decisions due to investment lags during the delivery of new business equipment, then in aggregate, the effect of an increase in demand on the fixed capital stock is distributed over time. This implies that the fixed capital stock at time  $tm$  is dependent on all the previous levels of output giving the equation;  $C^* = f(Y_{tm}, Y_{tm-1}, Y_{tm-2}, Y_{tm-n})$  where  $Y$  represents the level of output in a particular period, further implying that the equation can be rewritten as follows;

$$I_{tm}^n = \alpha \sum_i^n y (C_{tm-1}^* - C_{tm-i-1}^*)$$

Where  $I_t^n$  represents the net investment from period 1 to  $n$  periods. The actual net fixed investment carried out by a firm is the one that minimizes costs in the trade-off between having too little or too much of fixed capital stock and incurring stock adjustment costs  $\alpha$ . The above equation equations through successive substitutions can be reduce to;

$$I_{tm}^n = \alpha \sum_i y i (\Delta Y_{tm-1})$$

If a firm's expectations about future output are not static, then the net investment in replacement or new business equipment in the period  $tm$  should be an aggregate of all the expected future levels of output. The future levels of output in turn should be functions of past output and any other past variables that are important in forming expectations of future firm output. The lags represent delays caused by procurement, shipping logistics, eventual installation of machinery and the consequent demand for productive capacity, and also shows that physical capital adjusts gradually to recent firm-level experience. Owing to the fact that capital resources that are required for replacing or procuring more business machinery and equipment are not always in liquid investments, the flexible accelerator theory assumes that rational firms would wish to circumvent overreacting to temporary or transitory changes in the demand for their products by consumers. Therefore, the flexible accelerator model subliminally proposes that prospects of increasing firm's output in the future can be extrapolated from the past trends of a firm sales and output, and hence, determining the level of the desired fixed capital stock.

An important observation that can be derived from this analysis is that, by allowing for investment lags in the adjustment of the capital stock towards its long-run desired level as we have shown above, makes the neoclassical theory of investment virtually indistinguishable from the flexible accelerator theory. Koyck (1954) introduced an important distributed lag relationship to estimate the flexible accelerator model of investment by converting equation 2 into an infinite vector autoregressive model. Unlike in the flexible accelerator theory, the Koyck lag model assumes that the firm's optimum investment level in each period is a fraction  $(1 - \alpha)$  of the gap



between its existing level of fixed capital and its desired level. Assuming the depreciation of equipment and machinery stock to be proportional to last year capital stock, Koyck came up with gross fixed investment given by the following equation;

$$I_{gr} = (1-\alpha)Y_t - (1-\alpha \partial)C_{tm-1}$$

Where  $0 < \alpha < 1$  and  $\partial$  represents depreciation rate of machinery and equipment. The equation suggests that gross fixed investment is some fraction which lies between zero and one of the difference between firms' planned productive business equipment stocks and actual equipment and machinery stocks in the previous period. The lagged stock of fixed capital serves two major purposes in the flexible accelerator model. First, since a firm wishes to maintain an appropriate proportion of output to its stock of business equipment and machinery, the model compares the recent trends of a firm's output to the existing stock of business equipment and machinery. The flexible accelerator model posits that there are lags in firms' investment decisions that delay the adjustment process between the level of output and the level of the desired capital stock. These lags include: decision making lags which represents the time it takes for firms decide to increase productive capacity after noticing a rise in demand; administrative lags in the ordering of business equipment and machinery, financing lags in raising the necessary funding to buy the required machinery, and the delivery lags that occur between the ordering of machinery, its delivery and eventual installation. The length of these investment decision lags varies among firms and among different kinds of capital expenditures, depending on whether the firm is using internal financing, debt or equity or foreign direct investment inflows. The flexible accelerator theory have successfully explained investment spending behaviour in many developed countries (see Chenery, 1952; Eisner, 1963; Devereux, 1989; Mickiewicz, 2004; Bennett, 1989).

**The Neoclassical and Modified Theory of Fixed Investment Behaviour-** In formulating the neoclassical model Jorgensen (1963) made a number of important assumptions that include: efficiency in the use of fixed capital by firms; existence of diminishing returns to capital and labour; no adjustment costs to the firm, full employment in the economy where prices and labour and capital are perfectly flexible, and presence of perfect financial markets where firms can borrow and lend at given interest rates. Furthermore, the model also assumes the existence of a putty-putty firm capital, implying that once a firm makes a fixed investment decision, the same investment can be instantly adapted to different technologies without some further costs accruing to the firm. The assumption supposes that manufacturing technology is easily transferrable among different firms and hence, a firm's investment decisions depends mainly on the cost of capital rather than the nature of technology used in the manufacturing process. In addition, the neoclassical investment theory also assumes that real financial decisions undertaken by the firm are discrete from the firm's investment decisions, and that the

price of fixed investment equals the discounted value of the rental charges or user cost of capital. Based on these assumptions, according to Jorgenson (1963), the flow of net receipts from fixed investments ( $R_s$ ) at a time  $t_m$  is given by;

$$R_s(tm) = pr(tm)Q(tm) - wg(tm)L(tm) - qy(t)I(tm)$$

Where  $Q$  is a single firm's output and  $pr$  its price;  $L$  is the flow of labour and  $wg$  is the wage rate;  $I$  is the investment rate and  $qy$  is the price of capital goods. The neoclassical theory of investment behaviour starts from the premise that a private firm's objective is to maximise the discounted value of net cash flows subject to the technological constraints. Therefore, the present value ( $PV$ ) is given by;

$$\int_0^{\infty} e^{-rtm} R_s(tm) dt.$$

Thus, in the equation  $PV$  is defined as the integral of discounted equation where  $e$  is the continuous discounting exponent and  $r$  is the constant rate of interest at time  $tm$ . The  $PV$  of future cash flows is maximised subject to the first investment constraint in the following form:

$$C(tm) = I(tm) - \delta C(tm)$$

Where  $\delta$  is the rate of depreciation attached to business equipment ( $C$ ). The second investment constraint indicate that levels of a firm's output and the levels of labour and capital services are constrained by a firm's production function given by

$$H(Q, C, L) = 0.$$

The marginal productivity of labour  $L$  is equal to the real wage, the marginal productivity of a firm's fixed capital  $C$  is equal to its real user cost of capital or rental cost of capital should the firm decide to lease business equipment instead of outright purchase. Therefore, according to Jorgenson the crucial determinant of the firm's optimal capital stock is the user cost of capital which is also a function of the relative price of output and capital. Many empirical studies on investment behaviour suggest that the Cobb-Douglas production function given by equation (2.08) below is a good approximation of how the economy turns physical capital and labour into goods and services.

$$H(C_{tm} L_{tm}) = AK_{tm}^{\gamma} L_{tm}^{1-\gamma}$$

According to the neoclassical model, the real benefit of a unit of capital is the marginal product of capital (MPC) given by;

$$MPC = \alpha A(L/C)^{1-\alpha} = R_s/Pr$$

Where the ratio of  $R_s$  to  $Pr$  is the rental cost of capital or real user cost of capital. The MPC shows the increase in a firm's output produced by using one additional unit of capital in production. Higher production or output levels lead to a rise in the desired fixed capital stock. However, a higher real cost of capital means that the desired fixed capital stock will fall, the



extent being determined by the elasticity of substitution. The elasticity of substitution measures the ease with which firms can substitute between capital and labour when producing a given level of output. Therefore, the real cost of business productive equipment increases with the real cost of financing either from external debt or shareholder's equity. The latter represents the opportunity cost of holding fixed capital rather than selling it and saving the proceeds in order to earn interest income. According to the neoclassical model, the real cost of fixed capital also increases with higher depreciation rates since the value of fast depreciating assets fall more rapidly, meaning that faster replacement of business equipment and machinery becomes necessary. Hence, a firm's cost of fixed capital is made up of several constituents. The major ones being the real procurement price of equipment and machinery; the cost of financing the acquisition of a piece of business equipment and machinery; the tax rate on firm income/revenues; the depreciation rate of fixed capital stock; the availability of investment tax credits; and the expected present value of depreciation allowances and other investment incentives.

Thus, if MPC exceeds the cost of capital, firms find it profitable to add to their capital stock and vice versa. Therefore, according to the model the marginal cost of finance should equal the shareholder's opportunity cost of capital. The neoclassical model also shows the close relationship among private fixed investment behaviour, tax and interest rates. According to Hall and Jorgenson, (1967), an increase in the interest rates and tax rate net of subsidies on investment lead to a rise in the cost of capital by making a firm's business equipment more expensive relative to other goods in the economy. Similarly, a decrease in interest and tax rates lowers a firm's cost of capital and therefore raises the amount of profit, hence, increasing the incentive for firms to accumulate more fixed business equipment and machinery. Whereas the flexible accelerator model proposes that the desired fixed stock of capital is always nearly proportional to the prospective rate of firm's production or output, the neoclassical model allows the optimal ratio of output to the stock of fixed capital to vary with prices, interest rates, and tax codes.

The neoclassical theory of capital investment predicts that profit-maximising firms will invest in the capital stock until the expected marginal return of a unit of capital equals its marginal costs or when the net present value is equal to zero. This condition results in a long-run steady state relationship between the firm's optimal fixed capital stock, planned production levels, the real user cost of capital and the elasticity of substitution. According to the neoclassical model, firms choose optimal investment projects from their estimates of sales, from their specific production functions, and from the cost of employing capital goods (cost of capital). Hence, whilst increasing revenues or rising prices for output foster more demand for business

machinery and equipment, rising interest rates and borrowing costs, diminished investment tax credits and incentives, less generous depreciation allowances, higher customs duties on imported capital stock or higher corporate income tax rates tend to discourage the growth of private fixed investment spending on fixed capital goods. Chirinko (1986) using the neoclassical model suggests that private firms choose output and factor inputs so as to maximise their profits. However, the paper argues that if we assume that the production function of a firm in developing economy has a constant elasticity of substitution, then the demand for fixed investment by manufacturing firms can be specified in terms of output and the real cost of capital.

**Modified Neoclassical Model-** Bischoff (1971) extended the standard neoclassical model of investment behaviour with what they termed the putty-clay approach and came up with the modified neoclassical model of fixed investment behaviour. Bischoff's argument is that firms have a lot of flexibility in the choice of the proportion of business machinery investment compared to other factors of production particularly in the planning stage of production, hence, the proportion is termed soft-putty. This implies that at planning stages of investment decisions, a firm can easily forgo or defer the investment spending decision. On the other hand, once machinery and equipment are installed by the firm in order to increase productive capacity, there is much less flexibility in varying factor proportions, hence, the proportion of business equipment is hardened to clay-putty (Bischoff, 1971). In other words, it is costly for a firm to reverse the investment decision once installed without accruing significant costs. Bischoff (1971) claims that it is often easier to adjust a firm's factor proportions when the substitution between the factors is zero and consequently, fixed investment may be more responsive to changes in output compared to changes in the cost of capital. This suggests that the distributed lag of investment on changes in the relative prices of capital services has a different shape from the distributed lag of investment on changes in output. Assuming a conventional neoclassical model where a profit maximising firm is subject to constant returns to scale and a constant elasticity of substitution production function, the functional capital stock ( $C^*$ ) can be represented as:

$$C_{tm}^* = \alpha Y_{tm} EC_{tm-\delta}$$

Where  $C_{tm}^*$  shows a firm's desired fixed capital stock,  $Y_{tm}$  denotes the expected level of a firm's output in period  $tm$ ,  $EC$  indicates the expected cost of capital in the period  $tm$ . Therefore the variable user cost of capital is equal to;  $C_{tm} = PC[\{1 - tm\} + \delta - \frac{\{\pi\vartheta\}}{P}]$

where  $PC$  is price of capital goods,  $r$  is interest rate,  $tm$  represent corporate tax rate,  $\delta$  is depreciation rate,  $\pi\vartheta$  denotes expected rate of change in capital goods price (inflation) and  $P$  is

the general price level. The equation can be lagged in order to account for investment needed to retool and replace older business equipment, since the neoclassical model assumes that productive capacity decays at a constant rate.

According to Bischoff, fixed investment in firms consists of the replacement of depreciating machinery and equipment and a distributed lag adjustment of capital to its equilibrium value. If business expectations are static, it therefore means that future changes in a firm's output are unanticipated, and hence, net fixed investments in by a firm can be represented as a distributed lag on past changes in desired capital stock. Whilst the neoclassical mode of investment behaviour assumes that only price variables matter for investment decisions in perfect financial markets where internal and external finance are perfect substitutes, the modified neoclassical model assumes that both price and quantity variables matter in business fixed investment spending decisions made by firms. Nevertheless, both neoclassical models have been the most widely recognised theories of investment behaviour that were used in most industrialised countries. Empirical tests of the models using data from several industrialised countries have been quite successful (see Bischoff, 1969, 1971; Hines and Catephoros, 1970; Jorgenson, 1967, 1971; Eisner, 1978; Samuelson, 1939); Clark, 1979). The well-known proponents of both the neoclassical and modified neoclassical model such as Samuelson (1939) and McMahon *et al* (2005) also claim that the models' theoretical foundations are more rigorous and robust than those of other investment behaviour models such as the accelerator theories.

**The Tobin  $q$  Theory of Investment Behaviour-**The  $q$  theory of investment behaviour which owes its origins from contributions by Brainard and Tobin (1968) and Tobin (1969) differs from output-oriented models such as the accelerator, flexible accelerator and neoclassical investment theories. In contrast, the  $q$  model explains a firm's investment behaviour from a financial point of view and also in terms of portfolio balances. Tobin (1969) calculated the  $q$  ratio as the ratio of market value of installed fixed capital to its replacement cost. According to the  $q$  model of investment behaviour, when a firm finances the procurement of business equipment and machinery by issuing new shares in the stock market, the rising of the firm's share price reflects the investment decisions of the firm. Hence, the market value of the firm's installed fixed capital stock is the market value of its total capitalisation as measured by the multiplication of the total shares and current share price. Therefore, the firm's market value is determined by the stock market whilst the replacement cost represent the actual cost of existing stock if it is purchased at today's price. The Tobin's  $q$  theory has important implications in a firm's investment behaviour in that, it spurs private firms to carry out investment decisions on the basis of its value on the stock market. The  $q$  theory postulates that a firm's net fixed investment

should depend on whether the  $q$  ratio is greater or less than one. If the  $q$  ratio is greater than one, it means that investors on the stock market value a firm's installed machinery and equipment at more than its replacement cost. This suggests that when a firm is faced or forecasts an expanding product demand in the future, it can raise the market value of its fixed capital stock by buying more machinery and equipment through issuance of additional shares on the stock market.

Conversely, if a firm's  $q$  ratio is less than one, it implies that the stock market values the firm's total fixed capital at less than its current replacement cost, hence managers will not replace business equipment and machinery as they run down or depreciate. However, the  $q$  investment theory is also related to the neoclassical model in that if the marginal product of capital (MPC) exceeds the cost of fixed capital, then firms are earning profits on installed business equipment, thus making the firm more desirable to own. Positive returns to fixed capital raise the  $q$  ratio and therefore implying a higher market value for the firm. Similarly, if the MPC falls short of the cost of fixed capital, this lowers the  $q$  ratio inferring a lower market value for the firm. The  $q$  theory therefore reflects the expected future profitability of total fixed capital as well as the current level of profitability. Therefore, if managers seek to maximise the market value of their firms, they are advised to add to their total fixed capital stock more fixed investment. While the  $q$  model is equivalent to a version of the standard neo-classical investment model however, the model has the added advantage in that all relevant information about future expectations is summarised in the  $q$  ratio itself. Nevertheless, what is more relevant in determining the level of fixed investment in the  $q$  theory, is autonomous demand shocks such as permanent tax increases, high increases in interest rates and existence of a recessionary operating environment in the economy. The  $q$  theory thus implies a significant role for tax and interest rate policies in influencing investment decisions of private firms. The  $q$  model has been able to explain investment behaviour of private firms in developed economies (see Samuel, 1991; Rapach and Wohar, 1999; Blanchard et al., 1993; Cuthbertson and Gasparro, 1995; Ogawa and Kitasaka, 1999).

**The Liquidity/ Cash flow Theory of Investment Behaviour**-The role played by cash flows in firms' private fixed investment decisions is highly contentious in theoretical literature (Cohn, 2011; Eshun *et al.*, 2014). Most of the debate in empirical literature is focussed around understanding whether cash flows are an important determinant of fixed investment behaviour especially, its role in alleviating credit frictions and whether it proxies for omitted or mis-measured investment opportunities (Kim *et al.*, 2016). Early investment behaviour models particularly the works of Meyer and Kuh (1957), Klein (1951) and Tinbergen (1939), emphasised the importance of financial considerations especially liquidity or cash flows and expected

profitability on a firm's investment behaviour. Due to investigations mainly by Meyer and Kuh (1957), the liquidity or cash flows theory became a major investment theory in explaining business fixed spending behaviour of firms. Tinbergen (1938) showed that actual realized profits measured expected future profits and therefore private fixed business spending decisions by firms were governed by cash flows and profit expectations. In a later study, Tinbergen (1939) examined a number of industries in USA and showed that changes in investment behaviour were more closely related to changes in profits and resultant cash flows than with changes in output as predicted by the neoclassical theory and acceleration principle. The second reason provided in literature is that private fixed investment behaviour of firms is largely constrained by the supply of funds or by a firm's liquidity position (Meyer and Kuh (1957)).

This view is also largely associated with studies by Meyer and Glauber (1964), Dusenberry (1958), and Meyer and Strong (1990). Meyer and Kuh (1957) for instance stressed the importance of financial variables like cash flows for determining the demand for private fixed investment. Myer (1984) posits that firms consider internal sources of financing as more important due to the need to obviate costs that are associated with financial distress such as agency costs, the administrative and legal costs of bankruptcy, moral hazard, monitoring and transaction costs. However, Meyer and Kun (1957) indicated that if external funds were required by a firm for new or replacement fixed capital stock, firms would likely to issue the safest security first. Hence, they indicate that in raising external funds firms start with debt, then possibly hybrid securities such as convertible debentures, preference shares, and lastly by equity as a last alternative. This is also known as the pecking order hypothesis which indicate a certain ordering in a firm's choice of financing options.

According to Myers and Majluf (1984) and McDonald and Soderstrom (1986), unlike the pecking order hypothesis, some firms prefer the residual funds approach regarding financing decisions. They argue that the amount and financing available for private fixed investment by firms is partially a function of the residual funds available after proceeding down a hierarchy of prior claims on a firm's cash flow. The strong version of the liquidity theory says that financial constraints such as low sales and resultant weak cash flows operate at all times in the life of a firm, and hence, the cost of investable funds schedule becomes inelastic when internal funds are exhausted. On the other hand, the weaker version of liquidity theory submits that financial constraints only operate at low rates of capacity utilization where extreme pressure to improve the level of a firm's capacity may result in the use of outside sources of finance, such as bank borrowings. The residual approach starts from the total cash flows generated by the firm, which provide the base amount for distribution to various claimants and investment opportunities. Therefore, the firm's first priority is to service established levels of current debt which

incorporates both interest payments/instalments and associated principal obligations to creditors.

The established level of debt reflect a firm's evaluation of what constitutes its best mix of debt and equity financing (Michael and Aikaeli, 2014). During the evaluation exercise the firm trades-off taxation aspects, moral hazard issues and the cost of bankruptcy by factoring in expected allowance for growth in core lines of business. Schaller (1993) investigated the effect of asymmetric information, liquidity constraints on Canadian domestic investment using variables such as firm age, the degree of concentration of ownership, and the availability of collateral as indicators of the likelihood of cash flow challenges. The liquidity theory also claims that small firms have limited access to capital markets, and therefore are forced to rely more on internal funds (Cummins, 1999). Strong (1990) avers that if firms are credit rationed the rate of business fixed investment depends on the market interest rate, profitability and on cash flows. The liquidity model states that the capital stock will not adjust in every period to its optimal level as determined by the market interest rate and marginal productivity of capital.

**The Profitability Theory of Investment Behaviour-** The profitability theory of investment behaviour regards undistributed profits or retained earnings rather than cash flows as sources of internal funds for the procurement of business machinery and equipment. However, it is also important to note that there is a close linkage between profitability and liquidity theories of investment behaviour. This is because profitable mature firms which are likely to be dominant players in well-developed competitive markets are normally more liquid than small firms which are either on the take off stage or on the growth phase of the product life cycle. Another version of the liquidity theory maintains that when profits and retained earnings are low, firms reduce investment in long-term projects. Hence, firms' future investment decisions are affected by savings from past earnings and current profits (Stiglitz and Weiss, 1981). According to Gertler and Hubbard (1988), if the total income and total profits are high, retained earnings and liquidity are also likely to be high. Fazzari and Athey (1987) claim that retained earnings are cheaper to use and bring down the cost of capital when capital markets are imperfect. According to Cardoso (1993), firms prefer to reinvest extra profits in business expansion instead of keeping cash in banks or to pay dividends. However, according to Bernanke (1983) the cost of capital affects investment behaviour, because firms that use retained earnings must also consider the opportunity cost of holding financial assets and earning interest rather than investing in plant and equipment. Malinvaud (1982) submits that fixed investment decisions have two distinct phases. The first phase is the firm's decision to expand the level of productive capacity by acquiring more machinery, and second phase comprises the decision about the level of capital intensity of the additional capacity required by



the firm. Malinvaud says that the former decision depends on the level of profitability and the expected degree of capacity utilization in the economy which is an indicator of demand conditions, whereas the latter decision regarding the level of capital intensity in a firm is contingent upon the relative prices of capital and labour. Sneesens (1987) argues that private fixed investment decisions take place in a setting in which firms may be facing current and expected future sales constraints. However, the study contends that Sneesens's conclusion is likely to be flawed since it represents a major departure from the continuous market-clearing assumed by both neoclassical and  $q$  models. However, Schmidt-Hebbel Schmidt *et al* (1998) argue that if aggregate demand negatively depends on the profit share due to higher propensity to spend for labour than for fixed capital, then a redistribution of a firm's income towards fixed capital will depress aggregate demand and lower the rate of capital utilisation.

## DISCUSSIONS

Against the background and theoretical literature review, the paper attempts to present a critique of traditional investment theory especially, their applicability to developing economies. Keynes (1936) defined savings and investment to be essentially and continuously equal and therefore in this form, Keynes theory relies on the assumption that all private firms are organized and act as a single unit, or at least that the investment-goods and consumption-goods in industries are undertaken in some combination by the same firms. The central Keynesian solution for full employment output in developed economies is boosting aggregate demand through investment-driven growth. The extant paper argues that the major problem with boosting aggregate demand through monetary expansions in developing countries, is that stimulating aggregate demand might cause prices to rise before it produces full employment. Such a situation could cause price instability in developing economies. Furthermore, the paper posits that in developing economies, at near full employment the growth of aggregate demand is likely to create more unequal income distribution between capital and labour by favouring the latter, since factor inputs are deemed perfectly mobile. The paper argues that unlike Keynes who focussed on the goal of full employment output in the economy, modern monetary and fiscal policies in developing economies should sacrifice the goal of near full employment in the economy. Instead, the paper argues that it is crucial for the emerging countries to focus on critical variables such as price stability, reducing fiscal deficit, achieving low inflation and an equilibrium balance of payment position. This reason being that price instability in developing economies caused either by uncontrolled monetary expansion or growth in aggregate demand for imported products or high inflation or weak external position is likely to be more detrimental to both political and economic stability than the often hyped goal of full employment. The



Keynesian involuntary unemployment is not the kind of unemployment from which developing economies are exposed to. The primary problems facing many developing economies is financing huge fiscal deficits, strengthening fragile financial markets, achieving price stability in the economy, reducing inflation, and realising long-term economic development. Therefore, achieving full employment output as in Keynes theory must be treated as a secondary goal.

For instance, the Keynesian exemplar suggests that when the economy is not within the confines of the Walrasian general equilibrium, fiscal and monetary authorities may be able to improve on the country's actual performance by adopting policies that increase exports, aggregate demand, consumption and domestic investment. However, in the context of many developing countries, adopting Keynesian policies could even lead to more destabilised outcomes in the economies. The study argues though, that the assertion of productive activity is only correct if it is interpreted to include all activities that happened during the period in question which affects monetary values in any way, and more so, any reduction in general monetary values due to money saving not resulting in investment. Fixed investment in developing countries could also be determined by the interrelation among investment, corruption, uncertainty and investment irreversibility.

The simple accelerator theory assumes that firms respond to changes in the demand of their products such that business equipment spending is always sufficient to keep the desired capital stock equal to the actual capital stock. However, the paper argues that the simple accelerator model of investment behaviour fails to take into account the costs of making investment decisions in developing economies. Due to financial frictions that elongate inside investment decision lags in developing economies, complete and instantaneous adjustment of the capital stock is almost impossible, as implied by the simple accelerator. We suggest that the ratio of desired fixed investment stock to a firm's output in developing economies is likely to vary with the opportunity cost of capital and the nature of the technology being presently used in the production processes. Unlike in industrialised countries fixed investment often requires long gestation periods owing to numerous capital stock adjustment constraints such as; existence of high taxation regime, poorly developed capital and financial markets, credit rationing and foreign currency shortages. Firms in developing economies have high content of imported equipment and machinery. Consequently, there is high inflexibility in the timing of investment decisions. Another general difficulty with the simple accelerator model is its failure to recognize exogenous shifts in the user cost of fixed capital and its impact on the marginal profitability of investment. The flexible accelerator stresses on the relationship between business equipment stock and the flow of output and also indicate that the demand for business equipment by a firm is not derived from consumers' goods but originates from any direct demand on national output. This may

indeed apply in developed countries that have minimal delivery lags. We argue that the flexible accelerator theory does not sufficiently accentuate on the timing of investment decisions by domestic firms in developing economies that face enormous investment constraints. Because of economic uncertainties and informational inefficiencies most firms in developing economies time their investment decisions. By assuming a constant fixed capital-output ratio the flexible accelerator model appears to impose a zero substitution elasticity. We argue that a constant capital-output ratio is disproportionately restrictive in developing countries.

Of significance, the flexible accelerator theory assumes that changes in fixed capital stock towards the desired capital stock is a linear function of the rate of change in output. This assumption implies that there is no excess capacity utilisation that may exist in domestic firms. This may not be generally true in developing economies where domestic firms are frequently saddled with overcapacity due to foreign competition in host economies. The flexible accelerator investment theory ignores the cost of capital as an important variable of investment behaviour. However, the frequent volatility of interest and inflation rates and hence, the cost of capital in developing economies suggest that the variable is a major determinant of fixed investment. The flexible accelerator theory disregards the impact of fixed stock adjustment costs caused by uncertainty, profits, political instability, corruption, financial constraints among other important economic variables.

Whilst, the neoclassical model permits the demand by domestic firms for fixed investment to vary with both output and the cost of capital, nevertheless firms in developing economies may not react as quickly to changes in output as they do to variations in the cost of capital. This is explained by the limited availability of domestic and international lines of credit due to high business uncertainties and country risks. On the contrary, firms in developing economies are likely to respond more rapidly to recent changes in sales than they do to recent changes in the cost of capital. This is because the costs of adjusting production technology to changes in the cost of capital are relatively enormous and costly when compared to a responds related to recent changes in sales. Owing to demand and price uncertainties that exists in developing economies, forecasts of future firm's production are relatively sensitive to recent changes in sales. In the long run, when the MPC equals the cost of capital, the speed of adjustment toward the steady state is likely to depend on how quickly domestic firms adjust their business equipment stock after an increase in output or demand conditions.

The neoclassical and the modified neoclassical theory assume that if a firm is willing to pay borrowing costs as indicated by the interest rate in order to undertake a new investment, the financial markets that include commercial, merchant and microfinance banks are willing to make the funds available. However, the existence of financial constraints in developing

economies such as high intermediation spreads, foreign exchange and credit rationing, liquidity challenges in the financial markets, unavailability of long term credit lines, high business and country risks are likely to limit firm-level investment decisions. Moreover, interest rates are determined by monetary authorities through instruments like the discount rate or the bank rate and in most centralised security markets, and are therefore, are independent of the firm's financial structure.

The neoclassical theory of investment behaviour is grounded on the assumption of full employment in the economy where prices of labour and capital are perfectly flexible. This means that producers and consumers can anticipate changes in demand, supplies and prices of output and respond accordingly. Whilst this maybe partially true, undertaking new investment in developing economies is not an instantaneous event but might involve high adjustment costs. High adjustment costs limit the mobility of capital across key economic sectors such as manufacturing and agriculture, and hence, reducing the gains arising from the elimination of inter-sectoral tax wedges. The paper also argues that Jorgenson and Bischoff derived their investment functions from assumptions which do not clarify or explain how a firm's actual fixed capital stock actually adjusts to the optimal fixed capital stock in developing countries.

For instance, the strict convexity of the fixed capital stock adjustment cost function in Jorgenson's neoclassical investment theory implies that private firms always incur lower adjustment costs if they spread investment spending over several years instead of one year. However, firm-level fixed investments in developing economies are likely to be lumpy and epitomized by large intermittent movements rather than continuous adjustment as implied in both the neoclassical investment models. This suggests that the neoclassical models might be less suited to describing the dynamics of investment behaviour in developing economies where variables like prices, aggregate demand, inflation, interest and exchange rates, output among others fluctuate with higher capriciousness. The fundamental difficulty in applying the neoclassical theory in most developing countries is that the data used to estimate the elasticity may be far from the long-run steady state. This can lead to biases in the estimated long-run elasticity of substitution since it might fail to account for common supply shocks in developing economies such as sudden technological innovations that shift the marginal cost of capital. The neoclassical models also do not provide for sufficient mechanisms for the formation of business level expectations about future fixed investments. The paper posits that output prices, firms' expectations of anticipated future returns, likely changes in output demand and future technological progress are likely to have a significant impact on investment behaviour in developing economies. Although the  $q$  ratio theory explicitly connects fixed investment decisions to the objectives of the firm, the paper argues that the large number of simplifying assumptions

that are implicit in the  $q$  model, such as rational expectations on the part of firms, presence of efficient markets, and the possibility of generating different investment behaviour from different specifications of the firm's alternative objective and production function could bias the model in developing economies. Due to inaccurate financial data in developing economies, many measurement problems in the  $q$  ratio could be imbedded in some components of  $q$  such as return on capital, sales growth, net profit, rather than in stock prices. Furthermore, the paper argues that if the actual measured  $q$  is a poor proxy for the true measured marginal  $q$ , it could be that cash flows, profits and true marginal  $q$  are also multi-correlated, which can lead to simultaneity bias in the estimation process of the regression  $q$  model.

The paper also queries the role played by the stock market as a signal to managers with regard to fixed investment decisions. For instance, the  $q$  ratio indicates that firms listed on the stock exchange should retool when demand  $q$  ratio is greater than one or vice versa. The study posits that it is unlikely that managers of listed firms in developing countries to take cognisance of stock market signals while deciding on long term fixed capital expenditure plans. The observation is premised on the basis that stock market valuations based on stock exchanges in developing economies are likely not always be able to match managerial perceptions of business operating environment fundamentals like business risks, exchange rate volatility and political risks. Hence, it is possible that the prices of securities on developing countries' stock markets might not always fully reflect all available information about likely outcomes of firms' investment decisions. Furthermore, the presence of an informationally inefficient equity markets, combined with the absence of derivative markets for hedging business risks and the limited development of corporate bond and financial markets in many developing economies imply that the  $q$  theory may not be effectively applied without some major modifications. In recent years, stock market prices in developing countries have been showing signs of increasing volatilities when compared to the underlying fixed investment behaviour, hence, suggesting speculative activities by investors as they try to hedge business and country risks. Therefore, the  $q$  ratios are likely to be greater than one, hence, a result that is inconsistent with actual firm performance.

A major shortcoming of the liquidity/Cash flow theory of investment behaviour is that, the theory is clearly cast within the tandems of a neoclassical framework that assumes that managers of a firm act in the interests of shareholders and, hence, their ultimate motive is to maximize the firm's profits and future returns to business equipment spending. However, the paper argues that there is pervasive corruption in many developing economies, hence, suggesting that managers of private firms could have other ulterior objectives that are different from those of shareholders or owners of the firm. Hence, the study opines that investment

behaviour of firms in developing economies might not only driven by cash flows but also a result of concealed personal self-aggrandizement of managers. The liquidity and profitability models take as given that profitable firms should undertake fixed investment until the discounted net present value of future income streams is equal to zero. The composition of financing options affects the demand for fixed investment by altering the weighted cost of funds. However, most mainstream investment models assume that the demand for investment does not hinge explicitly on how firm investment decisions are financed.

## CONCLUSIONS

Business equipment investment by firms is important in both the short-run business cycles and in the long-run growth of developing economies as it explains much of the volatility and movement in the countries' GDP. The paper reviewed the main tradition theories of investment behaviour that include flexible accelerator, the Tobin  $q$  the neoclassical theory, the liquidity and profitability theories focusing on their applicability to firms operating in developing economies. Most traditional theories of investment behaviour have been developed for use in industrialised economies. However, developing economies have idiosyncratic socio-political and economic characteristics which are quite different from developed economies. This suggest the need to reformulate investment theories to suit the context of developing economies countries where factors like prices, aggregate demand, inflation, interest and exchange rates, firm-level investment behaviour and output fluctuate with higher unpredictability. Whilst most investment theories prescribe the attainment of full employment as the ultimate goal towards sustainable economic growth, the paper recommends that rather than aiming to achieve near or full employment by stimulating aggregate demand, developing economies should instead concentrate on critical domestic investment aspects such as achieving price stability, attracting adequate foreign direct investment, reducing fiscal deficit, eradicating corruption, achieving low inflation and equilibrium balance of payment positions. These factors have not been appropriately captured in traditional investment models hence, should be incorporated in models that investigate investment behaviour in developing economies.

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