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Taxation, Private Fixed Domestic investment Behaviour and Zimbabwe's Economic Growth

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ABSTRACT:
The paper examines the taxation, private fixed domestic investment and economic growth nexus in Zimbabwe for the period 1998 to 2015 using Ordinarily Least Square regression. Private fixed investment decisions undertaken by firms and other economic agents are very critical for the economic growth. Levels of taxation affect production, consumption, and distribution of wealth in an economy. Taxation revenues can be utilised as a vital tool to: raise government revenue, enhance price stability, optimally allocate and distribute available resources, boost domestic savings, increase domestic investment as well as to accelerate the pace of economic growth.Taxation, domestic savings, public corruption and lagged GDP were found to be significant. Our results suggest that taxation revenue that are channelled to productive public expenditure such as roads, bridges, rail, energy, transport and other communication systems are likely to stimulate the productivity of private fixed domestic investment. The primary challenge for policy makers is devise tax rules that lowers tax evasion, reduce corruption, enhance domestic savings yet adequately protect the tax base whilst lessening the current heavy excess burden on firms.
Key words: Taxation, Private fixed domestic investment, Economic Growth, Zimbabwe

I. INTRODUCTION AND BACKGROUND

Private fixed domestic investment (PDFI) a major contributor to overall investments, is the leading source of business cycle volatility, employment generation and economic growth.The effects of taxation on private fixed domestic investment and economic have long been a central emphasis of research in public finance and economics. In the long-term the taxation of income whilst providing the revenues needed to fund government expenditure, may also depress output, consumption and private fixed domestic investment. Higher taxes such as corporate and personal income, presumptive and capital gain taxes inhibit domestic investment rate and subsequently economic growth. Higher taxes encourage tax evasion and distort the efficient utilisation of human capital and slow down growth in labour supply as economic agents substitute labour choice in favour of leisure. In addition, suboptimal taxes can lead to a huge flow of resources from high productivity sectors such as manufacturing industries to informal sectors that may have lower productivity and multiplier effects.

The optimal long-run level of capital income taxation remains the subject of vigorous debate in both the theoretical economics literature and in public political discourse. The economic incidence of tax include micro effects on the distribution ofincome and efficient utilisation of resources as well as macro effect on the level of capacity, output, employment, prices and growth. Whilst taxes are the primary sources of government revenue in Sub-Saharan Africa accounting for between 15 and 20 percent of GDP in the past few years, in Zimbabwe it accounts for at least 75% of the GDP. The real tax burden on actual tax payers (firms and individuals) is very high in Zimbabwe since the country has enormous share of agricultural and informal sectors that often are underrated or/and untaxed. A major question in public finance is how variations in tax policy affect domestic and foreign investment, economic activity and social welfare. In theory, according toHarbinger (1879) and Ramsey (1947) taxes are negatively correlated with economic growth. Hence, higher taxes mean lower growth rates of both domestic investment and economic growth. All taxes, with the exception of lump taxes, introduce distortions to an economy by not having a neutral effect on the behaviour of economic agents. The distortionary effects of taxes on private fixed domestic investment result in loss of efficiency, often called dead weight loss or excess tax burden. Therefore, higher taxes mean higher rates of distortionary effects, which results in higher loss of efficiency and accordingly, the allocation of resources in an economy may not be Pareto optimal. The transmission channels of taxation revenue on domestic investment process and economic growth remains the subject of open debate.Understanding the relationship between taxation and private fixed domestic investment

behaviour and economic growth in developing countries such as Zimbabwe, is significant for the designing of efficient and equitable tax policies that minimises excess burden on firms and yet stimulating private domestic investment.

II. BACKGROUND

After independence in 1980, Zimbabwe experienced unprecedented economic growth of 10.8 of percent in 1982.The country introduced some redistributive strategies that compelled a large public sector and increased public spending on health and education infrastructure in order to address socio-economic inequalities associated with the colonial era. Most of the government expenditure in the first decade was funded through increased taxation revenue mainly from domestic firms and personal income. However, economic recession in the period leading to 1990 caused low export growth and weak competitiveness in international trade. Economic growth plummeted heavily from 10.8 percent in 1982 to 3% in 1987. Consequently, due to declining taxation revenue, resources required for wealth redistribution, public expenditure in roads, and health and education infrastructure dwindled to a halt.

Under pressure from the World Bank and International Monetary fund, the country adopted economic reforms in 1990. The major aims of the economic reforms were to liberalise interests and exchange rates,fostering trade openness, reduction of tariffs and import duties, and redirecting resources to the productive private sector.One of the major components of the economic reforms was fiscal policy and tax reforms whose objective was to reduce government expenditure, simplification of tax brackets, revision of excise taxes, reductions of import duties, eliminations of export taxes as well as broadening and flattening of tax base. The tax rate was reduced from 35 percent to 33 percent in 1991. A value added tax (VAT) of 12.5 percent was introduced as source of indirect taxation in order to compensate for possible loss of revenue that resulted from increased trade openness, reduced domestic savings and reduction of corporate taxes.However, the revenue neutral reduction of trade taxes increased the distortions between formal and informal sectors. Additional excess tax burden on the manufacturing sector drove many large firms into the informal sector where tax enforcement was low and the ability to evade taxes was high.The economic reforms failed and the country slid into a crisis that began in year 2000.

In 2001, Zimbabwe Revenue Authority (ZIMRA) was restructured inorder to improve the revenue administration, ensure efficient collection of taxes as well as to facilitate international trade.Since 2007 the contract has been in a long-drawn-out meltdown in terms of domestic investment and economic growth, in fact in all macroeconomic fundamentals. The level of unemployment is estimated to be around 90 percent hence severely dealing a major blow to tax revenue collection. Paradoxically, the level of high individual tax rate has gone up from 33 percent to 45 percent whilst the firms are taxed at 40 percent up from 35 percent. According to Hall and Jorgenson (1967), high levels of taxation do affect private fixed domestic investment and economic growth. Whilst taxes may not be ranked top in determining private domestic investment, uncontestably, it is one of the major issues both domestic and foreign investors often consider before undertaking new investment (Njuru et al., 2013; Vergara, 2004). The effect of taxes on private fixed domestic investment behaviour is important since it affects both the demand and supply-side factors. The majority of studies on taxation focus on the effect of taxation on economic growth rather on disaggregated assessment of taxation effects on domestic investment, the major conduit for economic growth. Formulating and implementing appropriate tax policies that encourage domestic investment by minimising efficiency losses, reducing excess burden on few firms and generating sufficient revenue for the public sector expenditure in order to guarantee equitable income and wealth distributions in the country is certainly an overwhelmingly enormous task.

Since the attainment of independence, tax-policies in Zimbabwe have often been unscrupulous, indiscriminate, and inconsiderate of the huge socio-economic, political, and institutional variations inherent in the country. Yet, taxation plays a very vital role in economic growth and development, through resources mobilization,reduction in inequalities of income, improvement in social welfare, foreign exchange earnings, facilitating international trade and stimulating private fixed domestic investment. Despite the overwhelming empirical evidence that taxes can be both efficient and equitable to all tax payers (see Leigbfritz, 1987; Hsieh and Parker, 2002; Engen and Skinner, 1992; Easterly and Rebelo, 1993a), the high taxation in Zimbabwe is fostering price instability, discouraging savings and fixed domestic investment. The country has adhocally experimented with tax reforms starting with the introduction of accelerated depreciation in 1982, the introduction of investment incentives in 1990/1991, the repeal of accelerated depreciation and investment credits and increase in statutory tax rate in 1997, and the current efforts to simplify the income tax act. Such regular manipulation of the tax policy since independence, suggest that policy makers believe taxation to be an optimal tool for altering the composition of private fixed domestic investment behaviour in order to stimulate economic growth. However, despite all these efforts there is little convincing empirical evidence to suggest that this perspective is correct (see Bustos et al., 2004; Kormendi and Koester, 1989).

Whilst Zimbabweans are the highest taxed people in the world, the majority of thetax revenues might be going to fund non-productive expenditure such as salaries, security and wages. The low tax revenue performance might also be the source of declining private fixed domestic investment andeconomic growth. The theoretical nexus between taxation and economic growth has been clearly demonstrated in Zimbabwe literature (for example, Munongo, 2012; Maraire and Sunde, 2012), and in other developed and developing economies (see Mullen et al, 1994; Easterly and Rebelo, 1992; Barro, 1991; DeLong and Lawrence H. Summers 1991; Baumol *et al.*, 2007). However, the taxation, private fixed domestic investment and economic growth relationship has not been extensively interrogated in developing countries.The main objective of the study is to examine the effects of taxation onprivate fixed domestic investment behaviour andeconomic growth. The study is significant for a variety of reasons: First, higher statutory corporate tax rates, value-added taxes, effective capitalgains tax rates as well aslow depreciationallowances, discourage the private fixed domestic investment growth rate and consequently the growth of the nation's capital stock. Second, high taxes diminish and distort labour supply growthby discouraginglabour force participation in market activities, preferring instead the informal sector. As a result, higher taxation distorts occupational choices and the efficient use of human capital by discouraging workers from employment in sectors with high social productivitybut a heavy tax burden. Third, higher taxes have the undesirable potential to inhibit productivity growth in private domestic firms by weakening human capital, research and development. In Zimbabwe higher taxes are likely also to deter the development of venture capital for high technology manufacturing industries whose positive spill-over effects can potentially enhance theproductivity of existing factor inputs such aslabour and capital. Fourth, tax policies also impact on the marginal productivity of private fixed capital by distorting domestic investment from heavily taxed sectors into more lightly taxed sectors with lower overall productivity (Harberger, 1962, 1966).

The composition of the tax system is probably as important for private fixed domestic investment and economic growth as is the absolute level of taxation. In developing countries such as Zimbabwe, with a large number of emerging small firms and replete with inefficient tax administration, high taxes encourage tax evasion and transition to unofficial economy. Furthermore, developing countries that are able to mobilize adequate tax resources through broad-basedtax structures that are efficientlyadministered and enforced are likely to enjoy faster domestic, foreign investment and economic growth rates. This paper extends the existing literature in several ways. By incorporating variables such as corruption, foreign direct investment and firm uncertainties, we provide a comprehensive analysis of the effect of taxation private fixed domestic investment, an approach that to our best of knowledge has never been tested in Zimbabwe studies. Most studies in developing countries have tended to use aggregate investment (that include inventory, foreign direct investment and rental investment) yet these are known to have insignificant roles in business cycle volatility. Our focus is on private fixed domestic investment, a major source of business volatility. The purpose of the study is to investigate the effect of taxation on private fixed domestic investment behaviour for the period 1997 to 2012.The article is made up of five sections: section one is the introduction and background section. Section two covers theoreticalconsideration and empirical literature on the effect of taxation on private fixed domestic investment; Section three presentsthe methodological framework. Findings and discussions are on section four whilst section five is concerned with the conclusions and recommendation.

2.2 Empirical review

Taxation is fundamental to economic growth and development in both developing and developed economies. According to Mendoza et al (1995), taxation revenue provides governments with financial resources required for economic growth hence enabling productive public expenditure such as water utilities and energy and expansion of communication networks that stimulate productivity of private fixed domestic investment. Domestic investment decisions undertaken by firms and other economic agents are very critical for the economy as a whole because private fixed business spending on capital equipment are one of the locomotives of long-term economic growth. According to the classical economist such as Harbenger (1879) and Ramsey (1947), the only objective of taxation was to raise government revenue. However, with changes in circumstances and both economic and political ideologies, the objectives of taxation have also been evolving. Levels of taxation affect production, consumption, and distribution of wealth in an economy. Taxation revenues can be utilised as an vital tool in raising government revenue, enhance price stability, to optimally allocate available resources, to boost savings and private fixed domestic investment as well as to accelerate the pace of economic growth.

Harberger (1947) indicated that changes in taxes could not increase the national income growth rate by more than 0.1 to 0.2 percentage points and hence in practice levels of taxes appear to be superneutral. Similarly Mendoza et al (1995) used the endogenous growth model and arrived at the same conclusion. Engen and Skinner (1992) studied the impact of fiscal policy on economic growth on a sample of 107 countries for the period 1970 to 1985. Their results established a strong negative effect of the fiscal activity of the state on growth rates, both long-term and short-term. Engen and Skinner observed that taxes of 10 percentage points led to a long-term reduction of growth rate of 1.4 percentage points. However in a later study that used the Solow's

growth model, Engen and Skinner (1996) shows that economic growth rate depends on available physical and human capital and on the changes in their productivity. Early studies like (Eisner, 1969; Summers, 1981; Bernanke et al, 1988; and Chirinko et al, 1999) implied small effects of tax variables on private fixed domestic investment and economic growth. In contrast, Auerbach and Hassett (1991), Cummins et al (1994), and Desaiand Goolsbee (2004) have estimated larger effects of taxation on private fixed domestic investment and economic growth.Beginning with Jorgenson (1963) and Hall and Jorgenson (1967), many studies have addressed this important topic using quantitative analysis. A small selection that includes Summers (1981), Feldstein et al (1983), Auerbach (1983, King and Fullerton (1984), Slemrod (1990), Auerbach and Hassett (1992), Hines Jr. and Rice (1994), Cummins et al (1996), Devereux et al (2002), and Desai and Hines (2004b). Auerbach (2002), Gordon and Hines (2002), Hasset and Hubbard (2002), and Hines (2007) used survey methodology. The findings of these studies find negative effects of corporate income taxes on investment and economic growth, even though they offer different estimates of magnitudes. Furceri and Karras (2009) investigated the effects of changes of taxes on economic growth by using an annual data from 1965 to 2007 for a panel of twenty-six economies. They used the growth rate of real GDP per capita as the main variable and found that 2 % increase in tax rate reduced real GDP per capita by a margin of between -0.5% to -1%. In recent empirical literature, the effect of taxation on private fixed domestic investment behaviour has become one of the leading issues in both public finance and development economics (see McBride, 2012; Arnold *et al.,* 2011; Keho, 2010; Hines, 2007; Mihir *et al.,* 2004b). According to Jorgenson (1963) the effects of tax policy on fixed investment demand are captured by the tax-adjusted user cost of capital. The tax-adjusted user cost of capital is the minimum pre-tax real rate of return needed for the marginal investment to generate a zero post-tax economic rent (Hall and Jorgenson, 1967). Stiglitz (1973), Sandmo (1974), King (1974) and Boadway (1979) have extended the Jorgenson's classical model of investment behaviour (1967) to determine the effects of taxation on investment decisions. A number of domestic investment literature found very small impacts of tax policy on private fixed domestic investment behaviour (Clark, 1993; Gravelle, 1992).

Higher taxes have the potential to reduce foreign direct investment (FDI).Dackehag and Hansson(2012)find that high levels of firm taxation discourages both domestic and foreign fixed investments and hence hinders economic growth. Kaldir (1963) postulate that availability of tax concessions and incentives affect the location of FDI.According to McBride (2012), tax policies impact on the decisions of domestic investors and foreign investors' decisions of where to invest suggesting a possible relationship between private fixed domestic investment and FDI. Hartman (2002) argued that the relevant source of financing for the additional private domestic investment growth are retained earnings of firms and foreign direct investment (FDI) inflows. According to Desai et al (2004), the sensitivity of FDI to tax depends on the host country's absorptive capacity such as presence of investment incentives. Taxes are likely to matter more in choosing an investment location when non-tax barriers are removed and as national economies converge (Dackehag and Hansson, 2012). However, according to Hsieh and Parker (2002) in the conditions of integration of international financial markets, domestic investments are not necessarily constrained by availability of domestic savings. In closed economies, investors will invest up to a point where the value of the output realized by an investment is equal to the costs of the investment (Musgrave and Musgrave, 1988).

Based on Scholes and Wolfson (1992) tax will affect the decision of foreign investors to invest in a country due to the changes in rates of return on assets. They argue that higher in tax will reduce the rates of return and discourage the FDI in-flow to a country. Hines (1999) found that FDI is sensitive with the tax rates and that a reduction of 10% on tax rates will increase FDI by a similar percentage. Hartman (184) reported that FDI is attracted to countries offering non-discriminatory regulatory tax framework, access to markets and profit opportunities; a predictable and stable business operating environment, skilled and responsive labour markets and well-developed public infrastructure. Studies examining cross-border flows suggest that on average, FDI decreases by 3.7% following a 1 percentage point increase in the tax rate on FDI (see Hartman, 1984). Some recent studies indicate that FDI is becoming increasingly sensitive to taxation, reflecting the increasing mobility of capital as non-tax barriers to FDI are removed (Boskin and Gale, 1987). Bosworth (1985) indicates that taxes are often outweighed as a determinant of the rental price of capital by changes in purchase prices and the cost of funds. This suggest that levels of taxation have little effect on private fixed domestic investment behaviour. Clark (1993) argues that changes in investment tax credits have had only a limited and delayed impact on equipment investment. The elimination of the investment tax credit has generally been found to imply substantial reductions in fixed business spending on machinery and long-run capital intensities, with relatively smaller effects on inter-sectoral efficiency (see Bovenberg and Goulder, 1989). However Goulder and Summers (1988) have argued in favour of re-introducing investment tax credits.

However, Pereira (1989) shows that the effects of introducing an investment tax credit depend on how it is financed. According to Auerbach (1983), measures of the excess tax burden on new fixed domestic investment

are based on the assumption that a single corporate tax rate applies to all firms. Whereas this may formally be true, in developing countries like Zimbabwe, additional tax provisions such as deferred andpresumptive taxes and low depreciation rates cause firms to be subjected to a different tax rate and different tax rules in certain years. King (1984) demonstrates that the possibility of being subject to an alternative tax regime, and of switching among tax regimes, alters the investment incentives that accrue to firms. For instance, as is prevalent in many developing economies, firms in Zimbabwe pay taxes on their income but do not receive tax refunds for their losses. The losses are carried forward as deferred assets without interest and are subject to expiration after three years. Thus firms that are not currently subject to any taxation may actually face a higher user cost of capital than its taxable counterpart, if the firms carry forward the right to receive the extra tax expenditures (deferred taxes).

Arnold *et al* (2011) submit that high taxes lead to an increase in the cost of capital and reduce incentives to invest in new business equipment. Similarly, Keho (2010) avers that taxes provide preferential incentives to specific sectors hence leading to distortions in capital allocation and reducing the overall investment productivity. Private domestic investment is usually influenced by the tax policy which directly influences the rate of return on fixed investment (Overesch and Wamser, 2010). Auerbach and Hassett (1991) found tax policy important in explaining the cross-section pattern of equipment investment in USA. Overesch and Wamser (2010) claim that firms' form their own conclusions about the stability of the tax system and policy credibility, taking into cognisance today's fiscal policy actions regardless of whether they are deemed permanent or temporary.Arnold *et al* (2011) claim that a permanent tax change has a permanent effect on the cost of capital and thus have an impact on the desired long-run capital stock and hence overall private domestic investment. They observed that a temporary tax change has no impact on the long-run desired capital stock but simply affect the timing of adjustment to the desired level of capital stock.

According to Auerbach (1983), whilst lack of policy credibility makes the effective tax policy change difficult, the uncertainty associated with frequent tax changes can, itself increase the business risks and reduce the attractiveness of long-term private domestic investment. Bosworth *et al* (1992) report that although irreversibility plays an important role on firms' investment behaviour, what has not been demonstrated is how it influences the impact of tax incentives. In contrast, Auerbach (1983 finds that taxes do not have a role in the irreversibility of private domestic investment. They maintain that by its nature, investment irreversibility is likely to matter relatively more in recessions, when the capital stock exceeds its desired level, and more generally in business environments of low capital stock growth in which assets are not easily marketed. Lyon (1990) concurs, firms that are not undertaking new fixed investments are likely not to respond to minor tax incentives that simply reduce the amount they wish to disinvest. Similarly, investigators of tax reforms in many countries such as UK (see Sumner, 1986, Devereux, 1989; Feldstein, 1982) andFrance (see Muet and Avouyi-Dovi, 1987) have also observed that a tax policy has a small effect on private domestic investment behaviour. Santoro and Wei (2012) disagree, taxation in general affects firm productivity by reducing investment and effectively increasing the cost of investment capital.

Menjo and Kotut (2012) report that tax rates through their effect on the net returns to labour, saving, investment, and aggregate demand influence both the magnitude and the allocation of productive capacity. With passage of time, the increase in aggregate demand further affects the allocation of productive capacity of an economy through its influence on the returns to factors of production, the development of human capital, the allocation of capital spending, and investment in technological innovations (Arnold *et al.,* 2011; Bustos *et al.,* 2004). Fatica (2013) finds that the structure of tax incentives for capital investment in advanced economies has led to a significantly higher share of investment in machinery and equipment. However, Engen and Skinner (1996) indicate that a distortionary tax policy may permanently reduce the level of technological growth and the growth of private domestic investment. Similarly, Vartia (2008) shows that corporate tax rates negatively affect total factor productivity (TFP) by reducing company profitability and cash flows. Arnold and Schwellnus (2008) also indicate a negative effect of corporate taxation on both firm-level TFP and investment, particularly in sectors with higher average profitability such as manufacturing and in firms that lag more behind the technological frontier (the food industry). The link between taxation and private fixed domestic investment through the crowding-out effect should also take into account the efficiency of public spending and preferences in public supply of good and services (Zwick and Mahon, 2017). Auerbach and Hines (2002) posit that taxes create distortions by affecting prices and the decision making of firms and households. Hence, taxes distort the allocation of inputs within and between firms, lower the efficiency in the use of production inputs and thereby affect the overall growth of private fixed domestic investment.

Hsieh and Parker (2002) present evidence that the reduction in tax on retained earnings increased the amount of funds available to credit constrained firms, hence producing a private domestic investment surge. They indicate that in developing countries characterised by ailing financial markets, the taxation of retained profits removes internal funds from firms where the marginal value of these funds exceeds the real interest rate. Thus tax has a significant adverse impact on private domestic investment growth. Medina and Valdés (1998) find that the availability of internal funds is a key determinant in the investment decisions of companies and hence tax on retained earnings would negatively affect private domestic investment. Higher taxes are a disincentive to private domestic investment since they eat into whatever profits that are made by firms and consequently scare away foreign direct investment (Azah, 2005). Dynamic models of taxation suggest that the combination of lower corporate income taxes and elimination of investment tax credit depresses long-run capital intensities and producer surplus (Bovenberg, 1988) and generate inter-sectoral efficiency gains (Bovenberg and Goulder, 1989; Jorgenson and Yun, 1989). Hence the net effect tends to be an increase in consumer welfare (Goulder and Summers, 1988; Jorgenson and Yun, 1989). However, Bustos *et al* (2004) used a panel of 83 publicly held firms during 1985-1995 to calculate the user's cost of capital and concluded that taxes have very little effect on the desired capital stock.They demonstrated that taxes have very little effect on the desired capital stock because they are offset by tax codes thatallow for the deduction of interest and depreciation. Bustos et al (2004) use a panel of 83 publicly held firms during 1985-1995 by calculating the user's cost of capital. On theoretical grounds, most models indicate that higher taxes should reduce private domestic investment (desired capital stock) through the cost of capital channel and also reduce internal funds available for investment through the liquidity constraint channel (Vergara,2003).

Bovenberg and Goulder (1989) claim that taxes are offset by tax codes that allow for the deduction of interest and depreciation. Zwick and Mahon (2017) examined the impact of tax policy on bonus depreciation of 120000 firms in US between 2008 and 2010. They found that bonus depreciation raises investment in eligible capital relative to ineligible capital by 10.4 percent between 2001 and 2004 and 16.9 percent. Tax breaks, such as accelerated depreciation and investment tax credits, reduce the cost of capital, which may later increase private domestic investment (Njuru *et al.,* 2013; OECD, 1991). The findings suggest that private fixed domestic investment respond strongly when the tax policy generates immediate cash flows in firms, but not when cash flows only come in the future. Acosta and Yoo (2012) in a cross-country study of 69 countries with proportional representation of low, middle and high income countries found income tax replaced for property and consumption taxes deterring long term private fixed domestic investment and economic growth prospects.Djankov et al (2010) estimated the relationship between corporate taxation and private domestic investment using a sample that comprised 85 developed and developing countries. Their findings suggested a consistent and large adverse effect of corporate taxation on private domestic investment. They indicated that a 10 percent increase in the effective corporate tax rate reduced the ratio of private domestic investment to GDP ratio by about 2 percent.

Similarly, a number of empirical studies have found significant effects of tax policy on private domestic investment behaviour, indicating a possible range for the investment elasticity for changes in the user cost of capital in the range of 0.25 to 1 (see Chirinko, *et al.*, 1996; Auerbach *et al.*, 1994; Cummins, *et al.*, 1994). However, other empirical studies that focus on the user cost of capital adjusted for taxation find an elasticity of investment with respect to the tax-adjusted user cost of capital of between -0.4 and -1.0 (Hassett and Hubbard, 2002). Hsieh and Parker (2002) present evidence that the reduction in tax on retained earnings increased the amount of funds available to constrained firms, hence producing a private domestic investment surge in these companies. Auerbach and Hassett (1992) and Cummins et al (1996) report significant negative effects of taxation on gross fixed capital formation and foreign capital inflows. According to Engen and Skinner (1996), one factor that could stifle tax-induced private fixed domestic investment expansion is a lack of new domestic savings due to higher tax rates. The finding indicate that in an economy without significant foreign capital flows (such as Zimbabwe), the increased demand for investment would be financed by the additional supply of domestic saving attracted by higher net interest and lower tax rates. However simulation models done by Engen (1996) and empirical studies by Skinner and Feenberg (1990) find little support for a strong responsiveness of domestic savings to the interest rate and rates of taxation. Similarly, Skinner and Feenberg (1990) observe that the investment elasticities gained from micro-level studies of firm investment behaviour already reflect the additional cost or difficulties incurred by firms in providing additional financing for their investments, suggesting that the pure demand elasticities are even larger. Mahadavi (2008) reports that high inflation rate will force the government to increase the taxes on goods and services by increasing the price and stabilizing the consumption and aggregate expenditure. Excise taxes on some domestic products may be affected with the change in inflation rate (Tanzi, 1989). Mahdavi (2008) revealed the effect of income, profit and capital gain tax due to change in inflation rate and investment plans. They demonstrate that when the inflation rates increase,

firms will protect their assets by substituting them with assets that attract lessdomestic tax (such as agricultural-related assets). Feldstein (1996) quantifies the relative importance of inflation-taxation interactions with economic growth and reports that even with relatively small price changes the effective tax burden for firms rises sharply as the rate of inflation rises and falls sharply as inflation declines

Cummins *et al* (1994) examine many corporate tax reforms with public company data and conclude that tax policy has a strong effect on private fixed domestic investment. In contrast, utilising similar data used by Cummins *et al* (1994) and a different empirical methodology, Chirinko *et al* (1999) argue that tax policy has a small effect on private fixed domestic investment behaviour. The relatively freer cross-border capital mobility makes it imperative to consider the effects of tax policy reform on private domestic investment (Keho, 2010). The frequent lead determinants of investment behaviour of firms that come before tax are infrastructure availability and quality, cost and quality of labour, and availability of good governance (Keen and Mansour, 2009).A priori, foreign investors consider tax policies of a destination nation when making their investment decisions (Ahiawodzi and Tsorhe, 2013). According to Fjeldstad and Rakner (2003), tax policies in Africa incongruously address private firms' incentive to invest productively, to create jobs, and to boost growth. Keho (2010) agrees that tax policies in Africa reduce labour supply growth in the economy. The findings suggest that incorrect tax rates reduce the marginal productivity of private fixed capital by distorting domestic investment from heavily taxed formal sectors into more lightly taxed informal sectors resulting in low private domestic investment.

According to Engen and Skinner (1992), heavily taxed countries may experience lower value of marginal productivity of capital, which will tend to retard economic growth, holding constant private domestic investment rates in both human and physical capital. A number of recent theoretical studies have used endogenous growth models to simulate the effects of a fundamental tax reform on private domestic investment and economic growth (see Ballard *et al.*, 1985; Auerbach and Kotlikoff, 1987; Fullerton and Rogers, 1993; Auerbach, 1996a; Engen and Gale, 1996). The studies conclude that reducing the distortionary effects of a current tax structure would permanently increase private domestic investment and economic growth. In contrast Lucas (1990), indicated that a revenue-neutral change that eliminated all capital income taxes while raising labour income taxes would negligibly increase private domestic investment and economic growth. Jones *et al* (1993) disagree, eliminating all distortionary taxes would raise average annual domestic investment growth rates by four to eight percentage points. However, Mendoza *et al* (1994) suggest relatively modest differences in economic growth of roughly 0.25 percentage points annually as the consequence of a 10 percentage point change in tax rates. A study by McKinsey (1996) points to the potential importance of the inter-sectoral allocation of capital in Japan and Germany due to different tax policy. McKinsey reported that whilst firms in Japan and Germany had much high higher rates of domestic investment, private fixed investment in US appeared to be allocated to higher productivity sectors such as the manufacturing sector. Hence, they observe that the net increment to the effective capital stock and economic growth, was considerably higher in the United States. Similarly, King and Fullerton (1984) investigated the tax systems in the UK, Sweden, Germany, and the US and found a strong negative correlation between economic growth and the inter-sectoral variability in private domestic investment tax rates. Likewise, Vergara (2004) modelled the link between corporate tax reform and private investment behaviour in Chile in the period 1975- 2003, and found that private domestic investment behaviour was negatively affected by high corporate tax rates. Karabegovic *et al* (2004) observe that high marginal tax rates reduce people's willingness to work up to their full potential, to take entrepreneurial risks, and to create and expand a new business. High and increasing marginal taxes have serious negative consequences on economic growth, labour supply and private fixed domestic investment (Njuru *et al.*, 2013; Reynolds, 2008). According to Pereira, with deficit financing, the boost in private domestic investment can be more than offset by the combination of financial crowding-out and inter-sectoral efficiency losses. Jorgenson and Yun (1989) argue that major benefits could be achieved by indexing the capital tax base and by shifting the tax burden from corporate capital to household capital.

According to Bhatia (1998), if customs taxes are imposed on inputs and business equipment used by domestic manufacturers, such taxes would increase firms' cost of production and discourages private business spending and economic growth. In the long run, the taxation of income from capital can provide the revenues needed to fund government, but may depress capital formation, output, and consumption (Jesse Edgerton, 2010).Tax induced corruption raises firms' operational costs, creates business uncertainty thereby deterring both domestic investment and FDI (Murphy, 2010; Shleifer and Vishny *et al.*, 1993; Wei, 1997 and Campo *et al.*, 1999). Zurawicki and Habib, 2010) confirm that corruption is a major source of concern on firms because it raises the costs of production and heightens uncertainty about the business operating environment.Corruption may negatively affect the country's ability to grow both domestic investment and foreign investment since it

works as a tax on profits (Aghion *et al.*, 2016). Corruption discourages private fixed domestic investment because the various forms of rents such as kickbacks, bribes, and other transactions costs due to corruption delays and distortions increase uncertainty over the returns to capital and raise the cost of production and reduces profitability (Mbaku, 2010; Murphy, 2010; Mauro, 1995). Corruption acts as a tax on capital, but unlike official taxes, corruption is uncertain and unpredictable, and therefore difficult for firms to internalize (Tanzi, 1988). Aghion and Cagé (2016) claims that reducing public corruption provides the largest potential impact for welfare gains through its impact on the uses of tax revenues.

III. MATERIALS AND METHODS

In Zimbabwe a number of studies on private domestic investment behaviour exists(forsee Manda, 2014; Malumisa, 2013; Muyambiri, 2013; Bayai *et al.*, 2013; Jecheche, 2010; Mutenyo, 2008; Jenkins, 1998; Dailami and Walton, 1992). The studies largely used common variables (exchange and interest rate and aggregate FDI inflows which have an effect on aggregate domestic investment behaviour. However, we extend the knowledge on domestic investment behaviour by considering the peculiar characteristics of the Zimbabwean economy. In particular, we interrogate peculiar characteristics of Zimbabwe economy by investigating other variables which have not been considered such as uncertainties, public corruption and effects of taxation. In addition, most studies on domestic investment behaviour in developing countries often adopt the neoclassical theory of investment (see Busari and Omoke, 2008; Chinyere sand Ugochukwu, 2013; Bakare, 2011; Orji and Mba, 2010; Sakr, 1993) and add on an ad-hoc distributed lag in attempt to capture the dynamics of the adjustment of the actual capital stock to the steady-state desired level based on current values of demand and prices. We argue that this application of the neoclassical model is less suited to describing the dynamics of private fixed domestic investment behaviour in Zimbabwe's manufacturing environment where variables FDI, tax rates, inflation, domestic savings and business uncertainty fluctuate with higher volatility. We therefore modified the flexible accelerator theory to determine private fixed domestic investment decisions. Hence, the flexible accelerator models allows us to consider both inside and outside lags in undertaking fixed investment particularly in an uncertain and corrupt business environment.

Starting from the accelerator principle that posits a linear relationship between output *Y* and increase in stock of current capital *K*:$K = \theta Y_t$ (1)

We assume that private fixed domestic investment in each period is a fraction$(1-\varphi)$ of the gap between the existing level of capital and the desired level leading to a set of lags that decline geometrically as *t* increases (Clark, 1917; Koyck, 1954; Knox, 1952; Chenery, 1952).

Hence $K_t = \alpha(1-\varphi)(Y_t + \varphi Y_{t-1} + \varphi^2 Y_{t-2} + \cdots \varphi^n Y_{t-n}$, where 0 <φ< 1 (2).

Due to the current economic meltdown it is unlikely that there has been a significant change in output and therefore we consider output to be constant and equal to $\bar{Y}$. If the expected volume of firm output remains unchanged then: $\acute{K} = \alpha(1-\varphi)(\bar{Y} + \varphi^2 + \varphi^2 \bar{Y} + \cdots \varphi^n \bar{Y}) = \alpha(1-\varphi)\bar{Y}(1 + \varphi + \theta\varphi^2 + \cdots \varphi^n)$, (3)

Where $1 + \varphi + \varphi^2 + \cdots \varphi^n$= 1/1 +$\varphi$are weights in geometric series. Therefore equation(3)

becomes: $\acute{K} = \alpha\bar{Y}(1-\varphi) * 1/(1 + \varphi)$ or $\acute{K} = \alpha Y_t$ (4)

Where $\acute{K}$ represents desired capital stock, Y_t current output, α accelerator constant and *t* time.

Once a decision to invest is made, the actual investment is not automatically done but involves fixed investment lags or delays common in landlocked country with high import content on machinery and equipment. The investment decision lag is also long as firms consider the possibility of investment irreversibility, uncertainties in securing foreign currency and negotiating tax incentives (e.g. tax holidays, special initial allowances etc.) we therefore lag equation (2) as follows: $K_{t-1} = \alpha(1-\varphi)(Y_t + \varphi Y_{t-1} + \varphi^2 Y_{t-2} + \cdots \varphi^n Y_{t-n}$(5)

Multiplying equation (5) by φ we obtain: $\theta K_{t-1} = \alpha(1-\varphi)\varphi (Y_{t-1} + \theta\varphi^2 Y_{t-2} + \theta\varphi^3 Y_{t-3} + \cdots \varphi^{n+1} Y_{t-n}$ (6)

Subtracting(6) from (2) we obtain;$K_t - K_{t-1} = \alpha(1-\varphi)(Y_t + \varphi^{n+1} Y_{t-n}$ (7)

Since the termφ^{n+1}tends to be zero in infinitely geometrical series, the equation becomes

$K_t - K_{t-1} = (1-\varphi)\alpha Y_t$ (8)

The equation can be written as$K_t = (1-\varphi)\alpha Y_t + \alpha K_{t-1}$ (9)

However, net fixed business spending in two periods is the change in the stock of capital,$K_t - K_{t-1}$therefore subtracting$K_{t-1}$from both sides of the equation we get net private fixed domestic investment:$K_t - K_{t-1}$ =$(1-\varphi)\alpha(Y_t + \varphi K_{t-1} - K_{t-1}$ or $I_{nt} = (1-\varphi)\alpha Y_t - (1-\varphi)K_{t-1}$ (10)

According to Chenery (1952) and Koyck (1954), the net investment $K_t - K_{t-1}$ is the distributed lag accelerator which is inversely related to the capital stock of the previous period and is positively related to the total output level. In our model we lag private sector gross fixed capital in the private sector in order to show the flexible accelerator. Due to low domestic savings we assume that private FDI inflows may be used to augment the domestic savings (S_t) as shown below (see Sikwila, 2015). $FDI_{t-1} - FDI_t + K_t - K_{t-1} + \{1 - \delta\}K_{t-1} = S_t$ (11)

Where δ represents depreciation rates. Since different processes of domestic investment financing plans overlap in different time-periods, and there is a path dependency that link past and future levels of accumulation (see Ford and Poret, 1991; Kopcke and Brauman, 2001; Orhangazi, 2008b; Arestis *et al.*, 2012), we include GDP as a lagged variable.

Model specification

Hence the model is specified as a linear ordinary least square (OLS) regression equation in the form:

$PFDI_{t-1} = GDP_{t-1} + FDI_t + CORR_t + lnTAX_t + DS_t + FIRMU_t + \varepsilon$ (12)

Where

$PFDI_{t-1}$ Lagged private fixed domesticinvestment
GDP_{t-1}= lagged Gross Domestic product
FDIt = Foreign direct investment inflows
CORRt = Corruption
LNTAXt = log of Tax Revenue
DS= Domestic Savings
ε = Error term

Description and justification of dependent variable andcovariates

Private fixed domestic investment ($PFDI_{t-1}$)

The dependent variable is lagged private fixed domestic investment, measured by the ratio of private sector gross domestic capital formation of the private sector to the GDP. We lag PFDI in order to account for partial adjustment in fixed business spending following Serven and Villanueva (1991).

Log of Tax revenue

GDP_{t-1}

The expected change in GDP reflects the accelerator element in private investment behaviour. The expected change in GDP has been lagged because; First, private fixed domestic investment is associated with economic growth through the accelerator effect which makes private investment a liner proportion of changes in GDP. (2) The current values of the real GDP growth rate may be affected by the private fixed investment rate (PDFI), and therefore lagged values of GDP reduces the possibility of the simultaneous equations bias in the coefficient estimates. Serven (1993) recommends the use of lagged GDP in order to reduce simultaneity. (3) Most studies in empirical literature have proxied for market size either with real or real lagged GDP (see Foster-McGregor *et al.*, 2013; Eddine *et al.*,2014); Nguyen and Dong, 2013; Magnus, 2010); Kim,2010; Faini and de Melo, 1990; Wheeler and Mody,1992; Jenkins, 1998; Aseidu, 2002; Agosin and Mayer, 2000; Tan *et al*., 2008); Li and Liu., 2005); Kim and Seo,2003). Assuming an accelerator effect, priori expectation sign of GDP is positive and significant implying that both resource-seeking foreign and domestic firms associate a large market size with high effective demand and profitability.

Corruption ($CORR_t$)

Corruption is widely defined to include collusion, theft, kickbacks, frequency of irregular payment to employees, the policy and the judiciary, improper practices in the public sphere, bribery, and other illegal rent seeking activities (Lambsdorff, 2003; Zouhaier, 2011;). The research measured corruption by the corruption perception index (PCI). The PCI ranges from 0 (most corrupt) to 10 (least corrupt). In this study we have recorded corruption in such a way that a high number represents high corruption in order to avoid the usual awkwardness in the interpretation of results. Corruption results in economic inefficiency and loss of manufacturer and consumer surplus, because of its adverse effect on the allocation of funds on production and on consumption. Numerous studies have established that corruption has significant impact on private fixed domestic investment behaviour (Mauro (1995, 1997), Brunetti and Weder (1998), Campos *et al* (1999), Rock and Bonnett 2004; Al-Marhubi, 2000; de Honlonkou, 2003; Ades and Di Tella, 1997; Tanzi and Davoodi, 1997; Murphy *et al.*, 1993). In contrast, recently Makochekanwa (2014) finds corruption as the grease that enhances efficiency in Zimbabwe. Therefore the expected sign of effects of corruption on private fixed investment in Zimbabwe's private sector cannot be determined a prior.

Firm uncertainty ($FIRMU_t$)

The research uses inflation is used as a measure of firm uncertainty in line with a number of empirical studies that indicate that a rise in inflation leads to growing uncertainty on firms' investment decisions and reduces their propensity to invest in long term projects (see e.g. Ben *et al.*, 2016; Fisher, 2009; Byrne and Davis, 2004; Tanzi and Davoodi, 2002; Kalckreuth, 2000; Mauro, 1995; Ferderer, 1993; Serven and Solimano, 1993; Pindyck and Solimano, 1993). The level of firm uncertainties increase firm's transaction and production costs, reduces business confidence over the returns to fixed capital, and thereby deters private fixed domestic investment (Shleifer and Vishny, 1993; Wei, 1997 and Campo *et al.*, 1999). Zimbabwe has been experiencing episodes of disinflation, deflation and creeping inflation during the period of study. We therefore expect a negative and significant relationship between firm uncertainty as proxied by inflation and private fixed domestic investment.

Private foreign fixed inflows (FDI_{t-1})

FDI_{t-1} is measured as the ratio of private FDI inflows to the GDP. We opted for this ratio rather than the log of FDI inflows since the latter measure is itself a component of private fixed investment and thus may be endogenous within the PFDI equation which may lead to biasedness (Herzer *et al.*, 2008). The inclusion of this variable is important because, not only do private FDI inflows ease the financing constraints of domestic firms, but they also generate crowding in effects by creating linkages and positive externalities. In earlier studies, questions have been raised, as to the extent to which private FDI inflows crowd-out of domestic firms due to the comparative advantages which large MNFs have over credit rationed domestic firms (see Balassa, 1967; Kravis, 1971; Caves, 1971; Dunning, 1977). However, in recent years with greater number of recent studies acknowledge the benefits of private FDI inflows to developing countries such as; upgrading of the capital stock, introduction of new technologies, and enhancement of competitiveness in the economy. (see for example Bjorvatn *et al.*, 2016; Bellos and Subasat, 2016; Miankhel *et al.*, 2016; Havranek and Irsova, 2015; Agrawal, 2015; Lengerts and Merlevede, 2014; Feeny *et al.*, 2014; Allen and Aldrid, 2013; Conconi *et al.*, 2013). Zimbabwe has been experiencing low private FDI inflows for the past two decades and therefore a negative but significant relationship between private FDI inflows and private fixed investment is anticipated. This variable was also used by other previous studies (see Trela and Whalley, (1992), Engen and Skinner, Page 247 (1996), Gordon and Li, (2002), Stoilova and Patonov, (2012), Veronika and Lenka, (2012), Nantob, (2014), and Hunady & Orviska, (2015).

Rate of domestic savings (Dsavingst)

Rate of domestic savings are measured as a percentage of GDP. Private fixed domestic investment in firms can be financed through both domestic and private FDI inflows. However, given the macroeconomic challenges bedevilling Zimbabwe that include low access to external lines of credit and low private FDI inflows, firms tend to rely more on domestic savings for fixed business spending. The classical and neo-classical growth models postulate that adequate mobilisation ofdomestic savings are vital for the growth of private fixed domestic investment (Solow-Swan, 1956; Domar, 1946; Frankel, 1962; Romer 1986; Harrod, 1939; Ramsey, 1928; Cass, 1965; Koopmans, 1965). However, Kendrick (1993 argues that domestic savings which are not properly intermediated and extended as credit to firms is unlikely to play a direct role in the growth of private dome sic investment. Savings rates in Zimbabwe are traditionally very low and therefore the study postulates that low savings rates means low private fixed domestic investment. The traditional low domestic savings rates and high lending rate levied by financial institutions in Zimbabwe is not conducive to the promotion of private fixed domestic investment. We therefore anticipate a negative coefficient sign indicating that a decrease in domestic savings is likely to affect PFDI in the same direction.

IV. RESULTS AND DISCUSSION

Stationarity

All the probability value of Augmented Dickey Fuller (ADF) statistic were compared to 0.01, 0.05 and 0.10. Any probability value of a variable below these three values was considered to be stationary. As per Appendix B, all variables except lagged GDP were stationery at 5% level of significance level. Other variables were stationery at 1 % level of significance. Inflation, a proxy for firm uncertainties and domestic savings were differenced twice and become stationary at 1% level of significance.As per table A, the highest relationship that is close to collinearity is that between corruption and domestic savings. The findings are shown in regression output as per appendix C. The R-squared was found to be 81% indicating a parsimonious model that is able to explain variations in the regressors. Before the interpretation of the results various model diagnostic tests such as; heteroscedasticity, tests for normality, multicollinearity and the Ramsey specification tests were carried out in order to test the robustness of the final model.

The lagged GDP was found to positive and statistically significant at 5 %. The coefficient is 0.53284 indicating that a 1% increase in the GDP will result in 53% increase in private fixed domestic investment. When private domestic firms decided to expand the level of productive capacity they consider the size of the market as earlier predicted by Hicks (1951 and Clark (1917). As the economy grows it induces the private sector to increase their output in anticipation of increasing aggregate demand. A number recent studies in most developing countries have confirmed a positive relationship between GDP and private fixed investment behaviour of firms (for example Nkurikiye and Uwizeyimana (2016), Eddine *et al*(2014), Atif and Ahmed (2014) Gabriel (2013), Kazeem and Olukena (2012), Bloom *et al (*2012), Bakare (2011)Harron and Naser (2011) and Buccirossi *et al*(2011). However our findings are not confirmed by studies done in OECD countries for the period 1980-1985, find a negative effect of taxation on economic growth. Leibfritz et al 1997).

The rate of domestic savings was found to be positive and significant at 10% even though the expected sign was negative. The result is not surprising since both the classical and neo-classical growth models postulate that domestic savings are indeed the nucleus for faster private fixed investment growth (Solow-Swan, 1956; Ramsey, 1928; Cass, 1965; Koopmans, 1965; Harrod, 1939; Domar, 1946; Frankel, 1962 and Romer, 1986). The findings are confirmed by a number of recent studies that find the relationship robust and significant (see Sakyi *et al.,* 2016; Kanu and Ozurumba, 2014; Nasiru and Haruna, 2013; Obi *et al.,* 2012; Bakare, 2011; Frimpong and Marbuah, 2010). Business uncertainties proxied by rate of inflation was found to be positive and significant at 5% level. The coefficient is 0.025467 indicating that low business uncertainty are expected to increase private fixed domestic investment by 3% (note according to PCI measure positive figure means low). Our findings are supported by a number of empirical studies that used inflation as a proxy for uncertainty (for example Aghion *et al* (2010), Fisher (2009), Khan, *et al* (2006); Byrne and Davis (2004); Rousseau and Wachtel, (2002), Solimano (1993), Serven and Solimano (1993) and Pindyck and Solimano (1993). Taxation revenue was found to be positive and significant at 10% level. The expected sign was negative.

Our findings do not confirm private foreign direct investments as factors that influence the level of private fixed domestic investment in Zimbabwe. In his PhD. thesis, Cashin (1994) examines the impact of public investment, public transfers and distorting taxes (all taxes except lump sum taxes) on the growth rate, by using an endogenous growth model. The model that the author uses indicates that distorting taxes have a strong negative impact on growth. Theoretical implications of the model were tested on a sample of 23 developed countries in the period from 1971 to 1988, where the share of current budget revenue in GDP was used as a tax variable. The econometric results confirmed the theoretical findings. Same as Xu, Cashin concluded that taxes reduce the marginal return on private capital, thus reducing the economic growth. On the other hand, a productive public spending in a form of public investments and transfer payments stimulates the growth. The author further concludes that, in countries with a small-scale state (low share of public spending in GDP), a positive impact of public investments on economic growth is predominant, whereas in the case of large-scale states a reducing impact of distorting taxes on growth is predominant

V. CONCLUSIONS AND RECOMMENDATIONS

The paper investigated the impact of taxation on private fixed domestic investment in Zimbabwe for the period 1998 to 2015 using domestic savings, taxation revenue, business uncertainty and FDI inflows as variables. The level of taxation revenue was found to be positive and significant. The results suggest that taxation revenue that are channelled to productive public expenditure such as roads, bridges, rail, energy, transport and other communication systems are likely to stimulate the productivity of private fixed domestic investment. Whilst the government harvests huge taxation revenue we recommend that policy makers introduce investment tax credits and accelerated depreciation allowances so as to lessen the heavy excess burden on a few firms. For instance, a reduction in capital gains taxes would lessen the distortionof new domestic savings by reducing the tax wedge imposed on some of thefuture income from that saving. A higher corporate tax burden should be matched by well-developed public infrastructure, public services and other host country attributes attractive to business, including market size.The primary challenge is to strike a balance in devising rules to adequately protect the tax base without imposing excessive compliance cost on firms. Conversely, rather than reducing the burden of general tax provisions on firms the policy makers must explicitly target tax relief to certain sectors or activities such as manufacturing and mining in order, to encourage investment at lower foreign revenue cost. In addition, the governments must improve the business friendliness of the tax administration by improving the transparency and certainty of tax treatment. But even without robust empirical results, most of the researchers will agree that tax reforms which stimulate neutrality in taxation by lowering tax rates, increasing tax base, decreasing tax exemptions and building such tax structure that distorts incentives for accumulation of labour and capital to the least extent, can stimulate the growth of output and employment.

APPENDICES

Appendix A: CORRELATION MATRIX

	LN_TAX	INF	GDPT_1	FDI	DS	CORR
LN_TAX	1.000000					
INF	0.306142	1.000000				
GDPT_1	0.355288	0.592961	1.000000			
FDI	0.397098	0.305019	0.504095	1.000000		
DS	0.420866	-0.449098	0.147748	0.184673	1.000000	0.788510
CORR	0.488765	-0.347748	0.228211	0.395102	0.848510	1.000000

Source: own computation

Appendix B: STATIONARITY TESTS USING ADF

Variables	t-ADF	Critical-1%	Critical-5%	Conclusion
DPFDI	-7.291754*	-4.057910	-3.119910	I(1)
DLn Tax	-4.170845*	-4.121990	-3.144920	I(2)
DGDPt-1	-3.373256**	-4.057910	-3.119910	I(1)
DFDI	-6.911760*	-4.057910	-3.119910	I(1)
DDS	-4.268035*	-4.297073	-3.212696	I(2)
DDINF	-6.242802*	-4.121990	-3.144920	I(2)
DCORR	-4.294142*	-3.200056	-3.175352	I(1)

Source: own computation

Appendix C: REGRESSION OUTPUT

Dependent Variable: DPFDI				
Method: Least Squares				
Date: 08/23/17 Time: 12:50				
Sample (adjusted): 2000 2012				
Included observations: 13 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DGDPT_1	0.53284	0.184253	2.891945	0.0276
DFDI	0.849085	0.809241	1.049236	0.3345
DDS	0.677247	0.173563	3.902015	0.0080
DDINF	0.025467	0.008926	2.853171	0.0291
DDLN_TAX	8.258724	2.071720	3.986409	0.0072
DCORR	-22.62545	5.606561	-4.035530	0.0068
C	-0.255706	1.177792	-0.217106	0.8353
R-squared	0.817921	Mean dependent variance		1.534305
Adjusted R-squared	0.635842	S.D. dependent variance		5.919969
S.E. of regression	3.572436	Akaike info criterion		5.688106
Sum squared resid	76.57380	Schwarz criterion		5.992309
Log likelihood	-29.97269	Hannan-Quinn criterion.		5.625578
F-statistic	4.492118	Durbin-Watson statistics		1.785948
Prob(F-statistic)	0.045078			

Source: own computation

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