A juxtaposition of Tax Expenditures and Direct Expenditures: Case Study of Pakistan

Shabbar, Shagufta and Ahmed, Qazi Masood and Pasha, Farooq

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Shagufta Shabbar[1], Qazi Masood Ahmed[2], and Farooq Pasha[3]

Abstract

One of the objectives of the government is to boost the level of investment in the economy. With limited fiscal space little attention is paid to the effective usage of tax expenditures. This paper evaluates government's options of tax expenditures and direct expenditures to augment private investment in Pakistan. The data from the Manufacturing Sector of Pakistan for a period of 1972 to 2013 is used in a bounds testing approach of Autoregressive Distributed Lag model. The empirical evidence shows a strong role of direct expenditure in influencing both short-run and long-run behavior of investment in the economy. The results further demonstrate that under low inflation the tax expenditure policy is more important determinant of private investment, however, in high inflation periods, direct expenditure is found to be more potent.

Keywords: Investment, cost of capital, tax expenditure, ARDL, Pakistan.

JEL: E220, H250, H540

Introduction

Different investment incentives in the form of tax expenditures and direct expenditures have been offered by the government of Pakistan so as to entice investors The taxation policy is perceived to be a significantly leading factor in ascertaining the level of investment through the cost of capital. The cost of capital hinges on the rate of return, the price of the capital good and the corporate tax

[1] Shagufta Shabbar is a M.S. Economics student at Institute of Business Administration, Pakistan. (sshabbar@iba.edu.pk) (C-95 Block C, North Nazimabad, Karachi, Pakistan). +923452405297

[2] Dr. Qazi Masood Ahmed is Director of Centre for Business and Economic Research, at Institute of Business Administration, Pakistan. (qmasood@iba.edu.pk) (KU Circular Road، Karachi, Pakistan). +923002352239

[3] Dr. Farooq Pasha is Senior Economist at State Bank of Pakistan. (farooq.pasha.bc@gmail.com) (I.I Chundrigar Rd, Lalazar, Karachi, Pakistan)

rate. The current paper uses the Jorgenson's (1963, 1967) Neo-Classical Investment model to evaluate the importance of cost of capital in determining the level of investment. Direct expenditures, on the other hand, seem to be generating sensitivity in the level of investment, both in the short and long run, in the case of Pakistan. The current study; therefore, tries to analyze which expenditure demonstrates more potency, and thus suggest the increase in the usage of the superior expenditure to attain the goal of higher growth rates through escalation of investment level.

The tax expenditures decrease the tax liabilities of the investors. While Surrey (1973, 1985) established tax expenditure as a separate branch of Public Finance, the superiority of tax expenditures over direct expenditures was established in 1980 by Martin Feldstein in his paper. Tax expenditures, given to a specific group, are provisions by the government that allow exemptions, credit, deferrals, deductions and preferential rates. There is a fervent belief in Pakistan that one of the cardinal causes of low tax to GDP ratio in the country, is huge amount of tax expenditure. According to the Pakistan Economic Survey 2014-15, it was Rs. 665.0 billion. This is thus 2.4 percent of the total GDP of Pakistan. Pasha and Ghaus-Pasha (2015), present an estimate of the tax expenditure which they claim to be nearly three times higher than the official reported figure in the FY 2011. The tax expenditure, currently under study, is accelerated depreciation allowance, and this too is not included in the PES estimates.[4]

The focus of the current study is on the manufacturing sector. The main objectives being exploration of the main determinants of private investment and to find which expenditure demonstrates more potency. This is tested using time series data from 1972 to 2013, employing ARDL as proposed by Pesaran and Shin (1995) and Pesaran, Shin, and Smith (2001).

Review of Literature

The neoclassical theory is based on the premise that whenever it is profitable, the investors borrow so that they can invest in capital. It analyzes how the investment is reliant on the marginal productivity of capital, interest rate and economic policies related to taxes. Economic policies, such as corporate income tax and investment tax credit, vary the motivations to invest. When Johansson, Heady, Arnold, Brys, and Vartia (2008) analyzed the impact of taxes as an increase in

[4] Please see Annexure II "Tax Expenditure" Pakistan Economic Survey 2015-2016.

the cost of capital, the result was in favor of the economists' notion. Taxes are a source of excess burden, and causes input and employment effects (Musgrave & Musgrave, 1989). Investment tax credit decreases the tax entirely and is advantageous for short term assets. In the case for Pakistan it is zero. The investment behavior stimulus given through the tax policy of the government is based on the notion that investors find investment appealing when it costs them less (Hall & Jorgenson, 1967). Both accelerated depreciation allowance and investment tax credit are tools for providing incentives to the investors. Hall and Jorgenson (1967), measure the cost of capital, comprising of the tax treatment and the interest rate; and then determine its effect on investment using the flexible accelerator theory of investment. They deduced that the level of investment is highly dependent on the tax policy working through the cost of capital.

Tax expenditures are tools for attaining governmental objectives of both fiscal and social (Ahmed and Ather 2014) considered a kind of respite for the investor. Particularly considering the accelerated depreciation allowance, Zee, Stotsky, and Ley (2002), avow that this has the least defects and most benefits. Musgrave and Musgrave (1989), consider the tax expenditures equal to the dereliction to collect taxes. It is problematic to evaluate tax expenditures and there are few beneficiaries of the exemptions (A. M. Ahmed & Ather, 2014). They enunciate that Pakistan's weak buoyancy of tax structure is associated with the large exemptions given to certain segments in the economy. The tax expenditure currently under study is not even mentioned in the Pakistan Economic Survey. Tax expenditure is considered to have a prominent deficiency in the shape of its ability to allow tax evasion and tax avoidance (Q. M. Ahmed, 2001). (Altshuler & Dietz, 2008; Surrey, 1970; Thuronyi, 1988) also asserted that tax expenditures breed inequity and cause distortion in the marketplace. Fuest and Riedel (2009) and Kahn (1979) labelled them as hidden expenditures as they are not visible in the tax system and thus escape inspection unlike their counterpart. Although in 1970, Surrey contended that regarding ways to achieve social goals the tax expenditures scored less than direct expenditures, Q. M. Ahmed (2001) argued and presented evidence showing that tax expenditures showed better efficacy. Similarly, Feldstein (1982, as cited in Chirinko, 1993) too advocated that under specific circumstances the tax expenditure surpassed the direct expenditure.

There is constant debate between the Classicals and the Keynesians about the effect of direct expenditure. The latter arguing that there is a crowding in effect for investment due to the

expenditure; however, the former have propounded the impact to be a crowding out effect. Although Akkina and Celebi (2002) concluded that there was a crowding out effect in the country of their study, Hussain, Muhammad, Akram, and Lal (2009) determined that since Pakistan being a developing country, the Classical's theory is not applicable here.

The neo-classical school of thought expounded by Jorgenson stated that investment theory was based on the "optimal capital accumulation." The seminal paper by Jorgenson (1967) stressed on the importance of the user cost of capital as being an important determinant of the capital stock. He described the cost of capital as being made up of the interest rate, depreciation rate, corporate tax rate, and the depreciation for tax purposes. The neo-classical model has been used by multitude of economists (Jorgenson and Siebert, 1968; Auberach, 1983; Chirinko 1993; Ahmed 2001). Jorgenson (1971) juxtaposed surrogate stipulations of investment models, which included demand for capital determinants, investment gestation lags relevance and replacement investment modelling. The assimilation of the tax structure in the cost of capital has facilitated providing a link between the factors determining investment and the economic policy (Bischoff, Bosworth, & Hall, 1971).

Hyder and Ahmed (2003) assert that interest rate act as a prominent determinant of investment in the manufacturing sector of Pakistan. Kemal (2006), analyzed that due to the high degree of taxation in Pakistan, among other factors, the level of investment is low. Stability of government, exchange rate policy, rate of interest and the tax structure are identified by Amjad (2008) as the determinants. However; both internal and external shocks impact the level of investment in the manufacturing sector, including but not limited to sanctions post the nuclear blast, military coup, event of 9-11, exchange rates and so on (Hyder and Ahmed, 2003; Ahmad and Qayyum (2008); Zaidi, 2015). Disturbances could include a sudden surge in foreign direct investment or switching of managed exchange rate to a floating exchange rate. Since there is an inability to quantify such uncertainties, the usage of crude proxies, in order to capture these uncertainties, is a common practice Ahmad and Qayyum (2008). Thus the current study tries to account for these factors by creating dummies and uses them in the estimation.

Theoretical framework & Methodology

To compute investment is a daunting task and to ascertain its main determinants is labyrinthine (Amjad, 2008). The "neo-classical theory of investment" (Hall & Jorgenson, 1967) is the basis for the function of investment used for this paper. The theory necessitate for the specification of equations for the net investment and for the cost of capital. The investment equation relies on the stock adjustment model. Profit (π) maximization is the main objective of the producer. The producer makes adjustments and chooses that level of stock where marginal revenue of the additional machine will be equal to the marginal cost of hiring that machine. The cost is a function of the capital stock. The cost of the capital is estimated through neo-classical investment model as expounded by Jorgenson (1967). It is made up of the interest rate, depreciation, tax rate and the price of capital. Hall and Jorgenson (1967) deduce the cost of capital as

$$\mathrm{c} = \mathrm{q}(\mathrm{r} + \delta)\ \frac{(1-\mathrm{k})(1-\mathrm{uz})}{(1-\mathrm{u})}$$

The cost of capital is the expected cost incurred by the firm by using a unit of the capital. The interest rate, r, is the opportunity cost of using money. The depreciation cost of capital usage is the loss in value as the capital wears out over time. Investment tax credit is denoted by k. The tax rate, u, is the corporate tax rate determined by the government. The depreciation deduction present value, z, is calculated as per the income tax ordinance of Pakistan legal provision. To calculate z the procedure indicated by Ahmed (2001) is utilized. The depreciation deduction, for the method of straight line depreciation, is constant over the period τ. Where τ is the life time of capital good. Assuming that there is no salvage value of the asset, and following Hall and Jorgenson (1967), "the present value of the depreciation deduction is"

$$z = \frac{1}{r\tau}\ (1 - e^{-r\tau})$$

"The present value of the depreciation of a unit of investment in Pakistan is computed on the basis of 10% of the value of machinery and plant as normal depreciation, and 25% as initial allowance. This implies that 35% of the total value of machinery will be charged in the first year and the remaining 65% in 6.5 years (straight-line method)" (Ahmed, 2001). This means that in 7.5 years the total value of plant and machinery will be charged. The cost of capital is

$$c = q(r + \delta)\frac{(1-k)}{(1-u)}\{1 - u\left[0.25 + \frac{1}{r\tau}(1 - e^{-r\tau})\right]\}$$

Here c is the yearly cost of using one unit of capital good. It comprises of the interest rate, depreciation rate, investment tax credit, tax rate, depreciation allowances and the life time of capital goods.

The desired capital stock is the level at which the tax adjusted cost of capital is equal to the "expected future marginal product of capital." Net investment is the change in the capital stock.

$$NI = \Delta K$$

Following Jorgenson (1967), the production function is assumed to be Cobb-Douglas and strictly convex where K^* is the desired level of capital stock, α the elasticity of output and c as the cost of capital.

$$K^* = \alpha\frac{pQ}{c}$$

In order to obtain a regression function ε_t an independent and identically distributed random error term is added, $\varepsilon_t \sim iid\ (0, \sigma^2)$. And using the marginal productivity of capital condition the equation becomes

$$NI_s = \alpha\lambda_0\Delta K_s^* + \alpha\lambda_1\Delta K_{s-1}^* - \omega NI_{s-1} + \varepsilon_s$$

Replacing K^*, the function becomes

$$NI_s = \alpha\lambda_0\Delta\frac{p_s Q_s}{c_s} + \alpha\lambda_1\Delta\frac{p_{s-1}Q_{s-1}}{c_{s-1}} - \omega NI_{s-1} + \varepsilon_s$$

The net investment equation is adapted to the specification of the Pakistan's economy keeping in mind that different variables may work differently in different countries. Output and the cost of capital determine the desired capital stock, and via this desired capital stock the investment function is effected by a change in the tax policy of the government. This model makes the assumption that a change in the level of output is deliberated as an essential barometer to determine the resolve of the investors to invest. The tax expenditure policy of the government influences the investment through the cost of capital. While the impact, on net private investment, of the direct expenditure policy of the government is captured through the governmental investments i.e. PSDP.

The reason to include it is this that if the government does not invest in enabling infrastructures than investment is shunned. This is of high relevance in Pakistan which is still a developing country. Next, dummies are included in order to capture other factors impacting investment i.e. political situation of the country, exchange rate regime and level of foreign direct investment.

$$(investment)_t = \alpha_0 + \beta_1(output)_t + \beta_2(PSDP)_t + \beta_3(cost\ of\ capital)_t + dummies + \varepsilon_t$$

The accelerator theory model takes into account the past variations in output while ascertaining investment. However, Clark (1979) and others recently have used the level of output in order to estimate investment. The problem of simultaneity between investment and output does not exists because nonresidential investment, which is being estimated, is only part of the total investment (Clark, 1979). Clark further asserted that as per his Sims test the problem of simultaneity was not grave.

The regression uses time series data and using simple OLS may give spurious results. If the series is non-stationary than it might give the problem of autocorrelation. Upon testing the order of integration using the Augmented Dickey-Fuller test, Phillips-Perron, and the Ng-Perron test on the log of the variables, it is confirmed that except one of the time series all others contains a unit root. Since it is found that except one all other variables are I (1); thus models such as Engle Granger (1987), Johansen (1988) and Stock and Watson (1993) cannot be used. Therefore, the bounds testing procedure is used. Another benefit of using bounds testing, is that the estimators, of both long run as well as short run, are found to be consistent even in small sample size. Since the current study has a sample size of 41 observations, this approach is found to be quite appropriate.

Autoregressive distributed lag model, suggested by Pesaran and Shin in 1999, can be applied to estimate the ECM. Pesaran and Shin (1998), find that Schwarz Criterion (SC) is a more consistent model when compared to Akaike Information Criterion (AIC). (Li & Lin, 2015;Shahbaz, Ahmad, & Chaudhary, 2008; Waliullah, Kakar, Kakar, & Khan, 2010), state that to get the optimum lag length, the ARDL model evaluates $(k+1)^p$ number of regressions. The presence of a long run relationship is scrutinized by the ARDL approach to cointegration using the unrestricted error correction model which is as follows:

$$\Delta\ln(investment)_t = \alpha_0 + \sum_{i-1}^{n} \gamma_i \Delta\ln(invstment)_{t-i} + \sum_{i-0}^{n} \delta_i \Delta\ln(output)_{t-i} + \sum_{i-0}^{n} \varphi_i \Delta\ln(PSDP)_{t-i} + \sum_{i=0}^{n} \omega_i \Delta(cost\ of\ capital)_{t-i} + \beta_1 \ln(investment)_{t-1} + \beta_2 \ln(output)_{t-1} + \beta_3 \ln(PSDP)_{t-1} + \beta_4 (cost\ of\ capital)_{t-1} + \zeta_1 Dummy_1 + \zeta_2 Dummy_2 + \zeta_3 Dummy_3 + \varepsilon_i$$

The former part of the equation having coefficients $\gamma_i, \delta_i, \varphi_i, and\ \omega_i$ symbolizes the short run dynamics of the model. The long run relationship is depicted by the latter part of the equation having coefficients $\beta_1, \beta_2, \beta_3, and\ \beta_4$, α_0 is the constant. ln is the natural logarithm and ε_i is the random error term. The Wald test (F-statistic) estimates the long run coefficients. Bounds test is run and the null hypothesis is rejected. The significance of error correction term proofs the presence of causality in at least one direction. The negative value of the error term and its level of significance show the rate of convergence to the long-run equilibrium, after a shock in the short-run.

Data & Estimation Technique

For the current study, Pakistan's large scale manufacturing sector annual data is used for the period 1972 to 2013. The data are taken from the Handbook of Statistics on Pakistan Economy (State Bank of Pakistan), FBR, and various issues of Economic Survey of Pakistan. The variables used are large-scale manufacturing output deflated using the GDP deflator; gross fixed capital formation as investment in plant and machinery; user cost of capital capturing the tax expenditure; the public sector development plan, as a proxy for direct expenditure, deflated using the GDP deflator; a dummy, to capture the prevailing political situation in the country; a dummy, to account for the fixed, managed and floating exchange rate periods; and a dummy for foreign direct investment, to account for greater and less than 1 billion Rs FDI. The justification for using these dummies is that firstly, A. R. Kemal (2006), avers that foreign exchange rate in Pakistan is a determinant of investment. The lower value of dollar helps intensification of investment. Gross fixed capital formation comprises of several expenditures such as buildings, furniture and fixtures, and plant

and machinery etc. But due to the lack of data availability, this proxy was used on the justification that "the share of plant and machinery was around 70%" as assumed by Ahmed (2001). Following Ahmed, "net investment is calculated by subtracting 10% value of depreciation from the corresponding gross fixed capital formation." The figures obtained are deflated using the machinery import value index, assuming that all plant and machinery is imported. To avoid the heteroskedasticity issue and linearize the variables, the natural log of the variables; investment, output and PSDP, is taken.

The cost of capital variable includes the interest rate which is the weighted average rates of return on advances less the inflation. As mentioned in the third schedule of the Income Tax Ordinance, for plant and machinery the normal depreciation is 10%; initial depreciation allowance is 25%. Therefore, this means that in the first year "35% of the total value of machinery will be charged." Taking 7.5 years as the total life time of the asset, the rest of the depreciation that is 65% is apportioned over the next 6.5 years using straight-line method. The salvage value is taken as zero. Since the data for depreciation of plant and machinery is not available, it was taken as the difference of gross national product and net national product divided by gross national product. Following Ahmed (2001), the cost of capital is calculated in accordance with the legal provisions which grant exemption from the income tax to the capital gain and "the face value of the bonus share" but not to the interest payments. Another assumption carried here is that the loan is the only source through which the investment has been financed.

The table below shows the present value of the depreciation allowance which is deducted from the total cost in order to get the cost of capital incurred by the investors. It is listed along with the nominal interest rate. In periods of high inflation, the real interest becomes very low. In eight years out of the total period of study, the inflation was so high that the real interest rate was negative. This affects the present value of accelerated depreciation calculated needed for tax purposes. The depreciation allowance is deducted from the total unit cost of capital, to get cost of capital.

Table 1: Present Value of Accelerated Depreciation Allowance and calculated values of Cost of Capital

Year	Nominal Interest Rate	Present Value of Accelerated Depreciation Allowance	Cost of Capital
1972	0.084	0.613	0.093
1973	0.081	0.905	-0.003
1974	0.089	1.711	0.279
1975	0.101	1.048	0.007
1976	0.098	0.613	0.085

1977	0.106	0.655	0.058
1978	0.114	0.591	0.101
1979	0.115	0.655	0.056
1980	0.115	0.694	0.037
1981	0.120	0.754	0.016
1982	0.118	0.624	0.077
1983	0.119	0.573	0.118
1984	0.122	0.597	0.099
1985	0.121	0.589	0.106
1986	0.128	0.513	0.185
1987	0.126	0.563	0.130
1988	0.130	0.587	0.109
1989	0.136	0.481	0.110
1990	0.131	0.501	0.093
1991	0.126	0.624	0.049
1992	0.141	0.546	0.105
1993	0.143	0.593	0.112
1994	0.145	0.603	0.081
1995	0.145	0.570	0.080
1996	0.152	0.524	0.091
1997	0.140	0.550	0.073
1998	0.163	0.412	0.177
1999	0.156	0.392	0.202
2000	0.142	0.341	0.185
2001	0.144	0.388	0.228
2002	0.137	0.339	0.177
2003	0.103	0.347	0.169
2004	0.069	0.459	0.053
2005	0.076	0.452	0.057
2006	0.091	0.418	0.082
2007	0.108	0.392	0.105
2008	0.123	0.591	-0.013
2009	0.140	0.425	0.067
2010	0.136	0.425	0.062
2011	0.136	0.414	0.064
2012	0.124	0.406	0.072
2013	0.115	0.375	0.101

Source: Author's Estimation

Results and Discussion

The descriptive statistics show normal distribution of the variables. It is observed that Manufacturing output and PSDP seem to be correlated. One way to resolve this issue is to drop any one of the variables; however this may cause specification bias. Upon testing the variance inflation factor, it is observed that the values are less than 10 and so the multicollinearity problem is not considered grave. The results of the unit root tests are presented in the table below. The first difference of the three variables; investment, manufacturing output, and PSDP, reject the null hypothesis and it is concluded that the variables are stationary at first difference.

Table 2: Unit Root Estimation[5]

Variables	ADF Unit Root Test		PP Unit Root Test		Ng-Perron Unit Root Test			
	T-statistic	Prob. value	T-statistic	Prob. value	MZ_α	MZ_t	MSB	MPT
Uc	-5.138*(0)	0.0008	-5.288*(3)	0.0005	-19.834**(0)	-3.149**	0.159**	4.595**
lnniL	-2.943(0)	0.1605	-3.174(1)	0.1037	-9.647(0)	-2.168	0.225	9.565
lnoml	-2.048(0)	0.5586	-2.338(2)	0.4050	-6.829(0)	-1.821	0.267	13.367
lnpsdp	-1.376(0)	0.5844	-1.376(0)	0.5844	-1.869(0)	-0.658	0.352	9.736
dlnniL	-6.364*(0)	0.0000	-7.836*(10)	0.0000	-16.14***(0)	-2.84***	0.176***	5.65**
dlnoml	-2.187**(1)	0.0293	-3.804*(3)	0.0003	-19.831*(0)	-3.101*	0.156*	1.404*
dlnpsdp	-7.574*(0)	0.0000	-7.505*(2)	0.0000	-19.255*(0)	-3.103*	0.161*	1.273*

Note: The level of significance at 1%, 5% and 10% is indicated respectively by *, **, and ***. The optimal lag order in the case of ADF and the bandwidth for PP test is regulated by the Schwarz Information Criteria.

Source: Author's Estimation

After selection of lag order based on Schwarz criteria, the F-statistic is calculated. The results of the bounds test show that the F-statistics is 4.86.[6] This value is higher than the upper bound value of 4.35 (lower bound is 3.23) at 5% level of significance. This infers a rejection of the null hypothesis of no long run relationship existence at the 5% level of significance and the presence of cointegration. The presence of the long run relationship is proof of Granger-causality (at least in one direction).

Table 3: ARDL Bounds Test

Optimal lag structure	(1,0,0,0)	
F-statistics	4.86*	
Critical Value Bounds		
Significance	Lower Bounds, I (0)	Upper Bounds, I (1)
1 percent	4.29	5.61
2.5 percent	3.69	4.89
5 percent	3.23	4.35
Note: * significant at 5 percent level		

Source: Author's Estimation

[5] LNNIL, LNOML, LNPSDP, and UC are log of Net Investment, log of manufacturing output, log of Public Sector Development Plan and cost of capital respectively. The usage of 'd' in front of the variables indicate that the variables are in differenced form.

[6] Please see Appendix 3 for the output of Bounds Test.

Table 4: ARDL Cointegrating and Long run relationship[7]

Dependent variable is Log of Net Investment				
Regressors	Coefficient	Standard errors	T-statistics	Probability
Output	1.02	0.28	3.65	0.000
PSDP	1.22	0.52	2.32	0.026
Cost of Capital	-2.72	1.75	-1.55	0.129

Source: Author's Estimation

Manufacturing output and PSDP are found to be significant at 1 percent and 5 percent respectively in the long-run; however, the cost of capital though having the correct sign is not found to be significant. The long-run elasticities of manufacturing output and PSDP contributing to investment are 1.02 and 1.22 respectively. Both the variables have a positive impact on investment in the long run. The user cost of capital negatively effects the investment, though the results are not considered as significant. There is minimal significance of the dummies except the one which captures the political environment of the economy. Therefore, in the long run only the political environment dummy effects investment level. Besides the dummies, out of the other regressors, manufacturing output is the only variable which is highly significant depicting that investment is very sensitive to it in the long run. To find the short run impact of the variables on investment the error correction mechanism is used. The residual using the long run coefficients is calculated.

Table 5: Error correction representation of the selected ARDL model

Dependent variable is Δ ln (Net Investment)				
Regressors	Coefficient	Standard errors	T-statistics	Probability
Δ ln (Output)	-0.081	0.85	-0.095	0.93
Δ ln (PSDP)	0.662	0.307	2.15	0.039
Δ ln (Cost of capital)	-2.358	0.642	-3.669	0.0009
ecm(-1)	-0.799	0.236	-3.387	0.0019
R-squared	0.56		Durbin-Watson statistics	2.278
Adjusted R-squared	0.44		F-statistic	4.894 (0.000)

Source: Author's Estimation

The Durbin-Watson Statistic is 2.278 indicating no autocorrelation of the error terms. The F-statistic is found to be highly significant. In the long-run, the cost of capital was not found to be significant, whereas in the short-run it is. Cost of capital and PSDP are found to be significant at 1% and 5% respectively; however, manufacturing output has the wrong sign and is highly

[7] Please see Appendix 3 for complete output.

insignificant. The short-run elasticities of cost of capital and PSDP implies that while cost of capital pulls investment down, the PSDP has a positive influence on investment in the short-run.

The equilibrium error correction term has a coefficient of -0.80, and it has the expected negative sign. The t ratio is -3.39 and it is highly significant, i.e. 0.00. This indicates that nonconformity from the long run equilibrium is corrected by 79.9% over each year. Thus when there is a shock it takes approximately two years to reach back to the equilibrium. The results indicate that causality runs reciprocatively from PSDP and user cost of capital to investment, through the error correction term.

The results of the diagnostic test run on the ECM show that the residuals are normally distributed indicating that the model is internally consistent. The test for misspecification gives the p-value greater than 0.05; therefore, there is a failure to reject the null hypothesis. Ramsey Regressions Specification Error Test (RESET) show that the p-value is greater than the 0.05 level of significance and thus there is a failure to reject the null hypothesis of correct specification. The diagnostics of the short run model also show that there is an absence of autocorrelation and heteroskedasticity.[8] The Breusch-Godfrey LM test is used to detect presence of serial correlation. Since the p-value is greater than the 5 percent significance level, therefore, there is a failure to reject the null hypothesis. Autoregressives conditional heteroskedasticity (ARCH) model is used to show that there are no ARCH effects.

kTable 6: Short Run Diagnostic tests[9]

	Statistics	Probability
Serial Correlation LM Test	2.82	0.076
ARCH Test	0.534	0.465
Heteroscedacticity Test	0.384	0.921
Jarque-Bera Test	0.479	0.787
Ramsey RESET Test	0.127	0.724

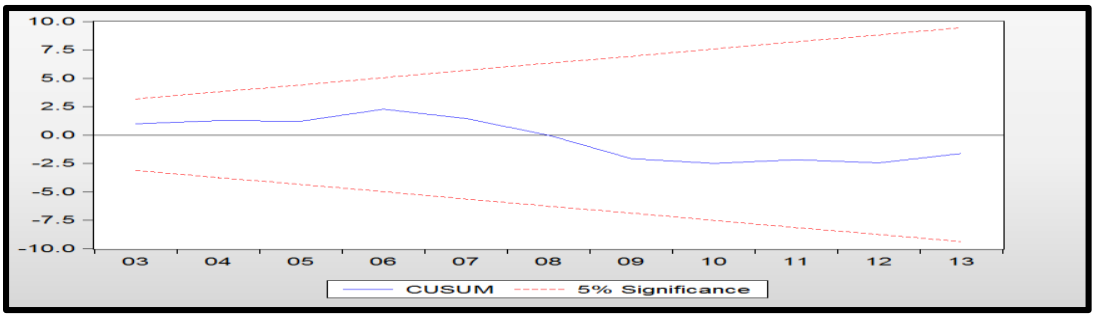
Source: Author's Estimation

To investigate the constancy of the long run coefficients and the short run dynamics, the stability diagnostics i.e. CUSUM (cumulative sum) and the CUSUMsq (cumulative sum of squares) are

[8] Please see Appendix 4 for complete tables/figures of each test.
[9] Please see Appendix 4 for complete tables/figures of each test.

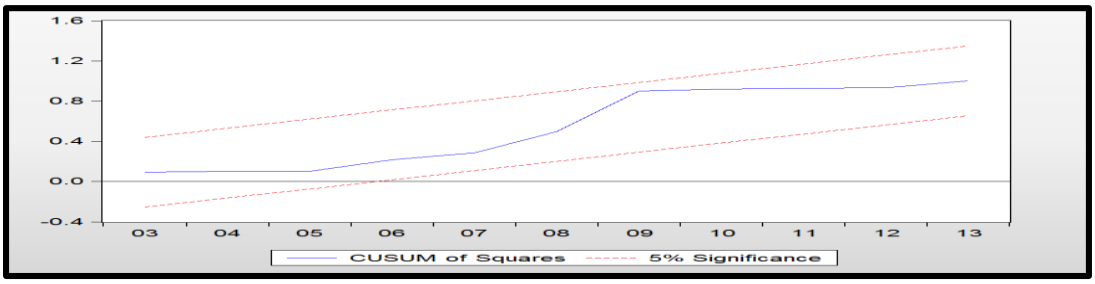
done. The plots show that they are within the critical bounds, and there is a failure to reject the null hypothesis, the regression equation is correctly specified and has stable recursive residuals.[10]

Figure 1: Plot of Cumulative Sum of Recursive Residuals (CUSUM)



Source: Author's Estimation

Figure 2: Plot of Cumulative Sum of squares of Recursive Residuals (CUSUMsq)



Source: Author's Estimation

Simulation of Investment

Finally, to see the potency of both the expenditures to enhance investment level, a simulation of investment is conducted. PSDP was found significant in both the short and the long run. PSDP encompasses all governmental investments such as infrastructure. On the other hand the tax expenditure, working through the cost of capital, was found highly significant in the short run. It is assumed in the analysis of testing the relative potency of the two expenditures that the cost associated with either of them is same for the government. Also, it should be kept in mind that this

[10] It can be observed in the figures that they start from 2003 onwards. In order to test the stability of the model from the beginning of the series, the stability diagnostics were forced to omit all the dummies. Omission of dummies had a small effect on the short run coefficients and their significance level whereas the CUSUM and CUSUMsq figures were obtained from 1980 onwards. The results of this manipulation still kept the plots within the critical bounds thus assuring of model stability. Please see appendix 5.

is not a Walrasian general equilibrium analysis but a partial equilibrium analysis. Thus impact on other factors being absent from the current study limits the findings of the current study.

It should also be noted here that tax expenditure is attained by the interaction of the initial depreciation allowance, tax rate, and the predicted level of investment. All these variables effect the value of the tax expenditure. The tax expenditure, that is the accelerated depreciation allowance given to the firms, is removed from the cost of capital. After it is removed the new cost of capital is calculated. The tax expenditure amount which now the government is receiving in the form of tax revenue is added to the PSDP. It is assumed that the government is using the increased tax revenue, due to the reduction of the tax expenditure, completely to finance more of PSDP. This new level of PSDP and the new value of cost of capital is now used in the earlier regression to get the simulated investment series. The new series generated gives a new level of investment referred here as simulated investment. Please see the table below to observe the new series. The table displays the actual level of investment; the predicted investment, attained through the first regression; the tax expenditures amount, which now the government is acquiring; and the simulated investment, attained through the second regression.

Table 7: Simulation Results (in million Rs)

	Actual Investment	Predicted Investment	Tax Expenditures	Simulated Investment
1972	11378	13445	1849	12539
1973	26999	17961	2470	18724
1974	8171	8998	1237	10569
1975	19447	26175	3599	28451
1976	34839	19289	2652	18178
1977	30182	23041	3168	22199
1978	19626	38732	5326	37086
1979	27855	55669	7655	55689
1980	48695	70540	9699	72459
1981	58754	82495	11343	87046
1982	58830	71382	9815	71056
1983	79196	73255	10073	70901
1984	96083	73810	10149	72971
1985	133909	86279	11863	85203
1986	144727	89526	12310	83740
1987	86700	94743	13027	92825
1988	79699	133019	18290	134286
1989	106090	126046	14180	129092
1990	129558	79661	8962	79255
1991	137199	98773	12347	101245

1992	101052	120000	15000	118491
1993	108803	85595	11769	82636
1994	120977	79788	10372	79773
1995	59245	83612	10242	84241
1996	72542	34112	3923	32977
1997	72019	70813	8144	71942
1998	68404	65554	7047	63135
1999	34942	54500	5859	51856
2000	87082	115506	10107	117582
2001	92294	97466	10478	96595
2002	117352	69050	5956	67655
2003	114112	75102	6571	74081
2004	118462	148084	12957	156789
2005	138769	94855	8300	96287
2006	198635	155817	13634	157561
2007	194490	177204	15505	178037
2008	167662	251664	22021	272033
2009	100798	146471	12816	149285
2010	94123	95175	8328	95272
2011	66556	59646	5219	59527
2012	57843	89362	7819	89133
2013	69699	80251	7022	79091

Source: Author's Estimation

The investment elasticity with respect to the change in the cost of capital, due to the depreciation allowance, depicts the potency of the tax expenditure. Interest rate and the tax rate determine the cost of capital. Thus, there is a direct relation of tax expenditure with the tax rate. On the other hand, the elasticity of investment with respect to the new level of PSDP depicts the potency of the direct expenditure. When the simulated investment is subtracted from the predicted investment, it is found that for some years it is less than the predicted level. This leads us to conclude that tax expenditure serves to boost investment more than the PSDP. With the removal of the tax expenditure, the investment level is not as high as the level predicted with the tax expenditure. Thus tax expenditure has more influence to alter the level of investment in the economy in those years. However; for the other years, it is observed that simulated investment is more than the predicted investment. This concludes, that in these years, direct expenditure is more effective in boosting investment.

Upon closer scrutiny, it is observed that in periods of high inflation the simulated investment tends to be more than the predicted level of investment. This leads to the premise that PSDP is more

effective in periods of high inflation as compared to the tax expenditure. Similarly, in periods of low inflation, the trend communicates that because simulated investment is less than the predicted level of investment, tax expenditure is more effective to boost investment. Exploring this further, the higher inflation rate affects the depreciation allowance value by making it have a lower present value, because the real interest rate is decreased. Thus, the high inflation rate affects cost of capital via the "tax saving depreciation" and increases the cost of capital. Tax expenditure has been able to impact the investment powerfully in the years when the tax rates are high and the real interest rates have been high too. However, when the tax rate is already minimal, the tax expenditure is less effective because the decrease in the rate is also low. When either the tax rate or the interest rate have decreased, the gap between the simulated and the predicted investment has been found to decrease too.

In the period of the study, when the inflation is low, the tax expenditure has a more profound effect on the cost of capital and the elasticity of the cost of capital is greater. Due its direct impact on the cost of capital, tax expenditure is able to boost investment rapidly. This is in line with the finding through the empirical analysis which showed that tax expenditure was highly efficacious in the short run.

Conclusion

This research aims to empirically evaluate the potency of the direct and the tax expenditure and deduce as to which fairs better in boosting the level of the much needed investment in the economy using the novelty of ascertaining not only their long run but also their short run relationships with investment. By means of this research, the government will be able to decide which expenditure is more effective.

The results indicated the presence of a strong role of direct expenditure in influencing both the short-run and the long-run behavior of investment in the economy. On the other hand, the cost of capital demonstrated the most dominating role in the short-run. It was assumed during this analysis that both the expenditures cost the government the same. On assessing which expenditure is able to boost investment the most, it was found that tax expenditure fares much better than the direct expenditure, when the rate of inflation is low. This is deduced by analyzing the cost of capital which encompasses the tax expenditure. In periods of low inflation, the tax expenditure influences

the level of investment strongly and the simulated investment is found to be less than the predicted investment. Recall that the simulated investment is one which does not contain tax expenditure and has the enhanced value of PSDP. Meanwhile, when the inflation is high, direct expenditure is generally more effective in boosting the level of the investment in the economy. In most of the periods, of high inflation, the simulated investment is mostly found to be greater than the predicted level of investment.

The result of the present study concludes that tax expenditure, working through the cost of capital, is a significant determinant of investment. This is in conformity with earlier findings on the importance of tax expenditures to enhance the level of investment by (Ahmed, 2001; Cummins, Hassett, & Hubbard, 1996; Hall & Jorgenson, 1967; Musgrave & Musgrave, 1989) as well as Bernstein and Shah (1995, as cited in Zee et al. (2002). On the pretext that there is transparency by the administration, tax expenditures are considered useful (Zee, Stotsky, & Ley, 2002). Though, (Clark, 1979; Jorgenson, 1967) deduces that tax expenditures' effect takes place in the long run, the current study finds that it impacts investment in the short run.

The current study's results also conform with the findings of Ahmad and Qayyum (2008) whereby they concluded that direct expenditures should be enhanced in order to boost investment in the economy. Both (Akkina & Celebi, 2002; Hussain, Muhammad, Akram, & Lal, 2009) too concluded that public sector infrastructure investment complemented private investment. However, Ahmad and Qayyum (2008) stressed that in order to reap the maximum benefit of increased government spending, the government should try to keep the rate of inflation low. This finding is not in conformity with the present study, whereby it was found that direct expenditure turned into a stronger determinant of investment in periods of high inflation.

The policy implication of this study is that when the government expects low inflation, the tax expenditure is a better option to boost the current dwindling level of investment. Especially in the short run, the government of Pakistan should continue and/or introduce such policies that support and enhance tax expenditures in order to decrease the cost of capital for the investors. However, when the government foresees high rates of inflation, the policy of more direct expenditures should be adopted by the government. Developing countries like Pakistan are always finding ways to boost investment, consequently; the policy makers of Pakistan will find the results helpful while devising the level of tax expenditure and direct expenditure.

As a future research scope, extension of this present study can be made. This can be done by incorporating, in the cost of capital calculation, the interest deductibility which is also used as a tool for tax expenditure. In different countries interest is also deductible, that augments the level of investment by the decrease of the cost of capital. Hence future study can be to see how interest deductibility, in Pakistan, will effect private investment.

References

Ahmad, Imtiaz, and Qayyum, Abdul (2008). Effect of government spending and macro-economic uncertainty on private investment in services sector: Evidence from Pakistan.

Ahmed, Ather Maqsood, and Ather, Robina (2014). Study on Tax Expenditures in Pakistan. *World Bank Policy Paper Series on Pakistan*

Ahmed, Qazi Masood (2001). A test of relative efficacy of tax expenditures and direct expenditures: A neo-classical approach. *Journal of Development Economics, 65*(2), 477-489.

Akkina, Krishna Rao, and Celebi, Mehmet Ali (2002). The determinants of private fixed investment and the relationship between public and private capital accumulation in Turkey. *The Pakistan Development Review*, 243-254.

Altshuler, Rosanne, and Dietz, Robert David (2008). Tax expenditure estimation and reporting: a critical review: National Bureau of Economic Research.

Amjad, Rashid (2008). Private Industrial Investment in Pakistan. *Cambridge Books*.

Auerbach, Alan J. (1983). Corporate taxation in the United States. *Brookings Papers on Economic Activity, 1983*(2), 451-513.

Bischoff, Charles W., Bosworth, Barry, and Hall, Robert (1971). Business investment in the 1970s: a comparison of models. *Brookings Papers on Economic Activity, 1971*(1), 13-63.

Chirinko, Robert S. (1993). Business fixed investment spending: Modeling strategies, empirical results, and policy implications. *Journal of Economic Literature, 31*(4), 1875-1911.

Clark, Peter K. (1979). Investment in the 1970s: Theory, performance, and prediction. *Brookings Papers on Economic Activity, 1979*(1), 73-124.

Fuest, Clemens, and Riedel, Nadine (2009). Tax evasion, tax avoidance and tax expenditures in developing countries: A review of the literature. *Report prepared for the UK Department for International Development (DFID)*.

Galindo, Arturo Jose, and Pombo, Cristina (2011). Corporate taxation, investment and productivity: A firm level estimation. *Journal of Accounting and Taxation, 3*(7), 158.

Hall, Robert E., and Jorgenson, Dale W. (1967). Tax Policy and Investment behavior. *American Economic Review, 57, No. 3 (June); 391-414*.

Hall, Robert E., and Jorgenson, Dale W. (1971). Application of the theory of optimum capital accumulation. *Tax incentives and capital spending*.

Hussain, Adnan, Muhammad, Sulaiman D., Akram, Kamran, and Lal, Irfan (2009). Effectiveness of government expenditure crowding-in or crowding-out: empirical evidence in case of Pakistan. *European Journal of Economics, Finance and Administrative Sciences*(16).

Hyder, Kalim, and Ahmed, Qazi Masood (2003). Why private investment in Pakistan has collapsed and how it can be restored.

Johansson, Åsa, Heady, Christopher, Arnold, Jens, Brys, Bert, and Vartia, Laura (2008). Taxation and economic growth. *OECD Economic Working Papers 620.*

Jorgenson, Dale (1967). The theory of investment behavior *Determinants of investment behavior* (pp. 129-175): NBER.

Jorgenson, Dale W. (1963). Capital theory and investment behavior. *The American Economic Review, 53*(2), 247-259.

Jorgenson, Dale W. (1971). Econometric studies of investment behavior: a survey. *Journal of Economic Literature, 9*(4), 1111-1147.

Jorgenson, Dale W. (1971). The economic impact of Investment Incentives. *In Joint Economic Committee, Long term implications of current tax and spending proposals.*

Jorgenson, Dale W., and Siebert, Calvin D. (1968a). A comparison of alternative theories of corporate investment behavior. *The American Economic Review, 58*(4), 681-712.

Jorgenson, Dale W., and Siebert, Calvin D. (1968b). Optimal capital accumulation and corporate investment behavior. *The Journal of Political Economy*, 1123-1151.

Kahn, Douglas A. (1979). Accelerated Depreciation: Tax Expenditure or Proper Allowance for Measuring Net Income? *Michigan Law Review, 78*(1), 1-58.

Kahn, Douglas A. (2013). Proposed Replacement of the Tax Expenditure Concept and a Different Perspective on Accelerated Depreciation, A. *Fla. St. UL Rev., 41*, 143.

Kemal, Abdul Razzaq (2006). Key issues in industrial growth in Pakistan. *Lahore Journal of Economics, 11*(Special Edition), 49-74.

Li, J., and Lin, Z. (2015). The impact of sales tax on economic growth in the United States: an ARDL bounds testing approach. *Applied Economics Letters, 22*(15), 1262-1266.

Musgrave, Richard Abel, and Musgrave, Peggy B. (1989). *Public finance in theory and practice*: McGraw-Hill Book Co.

Pasha, Hafiz A., and Ghaus-Pasha, Aisha (2015). The Future Path of Tax Reforms in Pakistan. *Pakistan*, 171.

Pakistan Economic Survey. Various issues.

Pesaran, Mohammad Hashem, and Shin, Yongcheol (1998). An autoregressive distributed-lag modelling approach to cointegration analysis. *Econometric Society Monographs, 31*, 371-413.

Pesaran, Mohammad Hashem, Shin, Yongcheol and Smith, Richard J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics, 16*(3), 289-326.

Shah, Zahir, Ahmed, Qazi Masood, and Siddiqui, Rehana (2003). The Determinants of Foreign Direct Investment in Pakistan: an Empirical Investigation [with Comments]. *The Pakistan Development Review*, 697-714.

Surrey, Stanley. S. (1970). Tax incentives as a device for implementing government policy: A comparison with direct government expenditures. *Harvard Law Review*, 705-738.

Thuronyi, Victor (1988). Tax Expenditures: A Reassessment. *Duke Law Journal, 1988*(6), 1155-1206.

Waliullah, Kakar, Mehmood Khan, Kakar, Rehmatullah, and Khan, Wakeel (2010). The Determinants of Pakistan's Trade Balance: An ARDL Cointegration Approach. *The Lahore Journal of Economics, 15*(1), 1.

Zaidi, Syed Akbar (2015). Issues in Pakistan's economy. *OUP Catalogue*.