

## OPPORTUNITIES FOR PRIVATE INVESTMENT IN TRANSPORT AND COMMUNICATION SECTOR OF PAKISTAN

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### ABSTRACT

This paper empirically analyzed the opportunities of investment for the private sector in transport and communication sector of Pakistan using annual time series data for the period of 1981 to 2014. Before going to the regression analysis the data used in this research study were tested by Augmented Dicky-Fuller (ADF) test to check the stationarity and spurious relation in the data. For the regression analysis of the variables included in the study the “Investment Accelerator” model are developed and regressed through NLS and ARIMA model. The results of the study found the positive and significant effect of Value-Added in Transport and Communication Sector, Lagged Public Investment in Transport and Communication Sector, Lagged Private Investment in Transport and Communication Sector, Remittances, Population Growth Rate of Pakistan, Capital Stock in Transport and Communication Sector and total government revenue (TGR) on transport and communication sector. The study also found significant and inverse relation between Index of Price of Capital, Weighted Rate of Interest and transport and communication sector in case of Pakistan. The study also suggests that transport and communication sector of Pakistan facing a problem of inefficient management and budgetary constraints. Government should need to tackle the problem of management and also to allocate funds for this sector to improve its efficiency and performance.

**KEYWORDS:** Private Investment, Transport and Communication Sector of Pakistan, Investment Accelerator, Augmented Dicky-Fuller and NLS and ARIMA Model

### INTRODUCTION

#### Background of the Study

Like many other important economic sector, Transport and Communication Sector also plays an important and significant role in the economic and social development of the country. The well developed transport and communication system that consist of roads, high ways, railways, seaports, aviations, rivers, canals, infrastructures, well developed and modern traffic system etc are considered as an economic factor of production of the transport and communication sector. Though, the basic infrastructure, following policies and its implementations regarding to the transport and communication sector are the sole responsibility of the public sector but this sector is mostly contributed by the private sector too. This sector added significantly not only to the sustainable development and sound economic growth of the country but also connecting people to people, to places, working areas, to host and resident country and to required and necessities of daily life. It is also in a supplementary to the economic growth through the mobility and flow of goods and services from area to area, from farmers to markets and industries and also from country to country as exports and imports.

The private investment in transport and communication sector in Pakistan includes passenger and freight transport

by interurban railways and related activities such as shunting and switching, transport of passenger and freight by land, and over water, whether schedule or not, other than transport by interurban railways. Transport of gases, liquid, slurry and other commodities via pipelines, operations of pump stations and maintenance of the pipelines is included in this sector. Transport of passenger or freight via rivers, canals and other inland water ways such as harbors and ports, overseas and coast wise, transport via great lakes, via air or via space, air or regular routes and on regular schedules is included. Also included are the operations of towing or pushing boats excursion, cruise or sightseeing boats, ferries, water taxis etc. Railways, roads, highways and bridges are considered in this sector. There are also the motor vehicles and non mechanized vehicles (including animals) acquired for the transportation of goods and passengers.

The organizations engaged in the big and important provisions of transport and communication services include Pakistan International Airlines Corporation (PIAC), Civil Aviation Authority (CAA), Karachi Port Trust (KPT), Port Qasim Authority (PQA), Pakistan National Shipping Corporation (PNSC), National Logistic Cell (NLC), Pakistan Telecommunication Corporation Limited (PTCL), Pakistan Television Corporation (PTV), Pakistan Broadcasting Corporation (PBC), National Highway Authority (NHA) and Pakistan Railways.

In the private investment in transport and communication there are private shipping and others investment by private sector. Except for motor vehicles and transport services (travel, clearing, forwarding, couriers and internet), the role of private sector as an investor, in transport and communication sector is limited. The CIF (Cost, Insurance and Freight) values of imports of transport machinery and equipment and value of domestic production such as trucks, buses, trailers. LCVs (Light commercial vehicles) are taken into account. The summation of the above items and value of domestic productions gives total value of gross fixed formation in this sector.

Investment transport and communication plays an important role in economic growth of a country as it raises the productive capacity of the economy, affects the employment level and promotes technical progress through embodiment of new techniques. Investment is considered as a key factor in determining the level and fluctuation in national income and overall economic activity in a country. When expenditure on goods and services falls during a recession, much of the decline is usually due to a drop in investment spending. Of course, the return to capital is lower in recession and higher during booms. Consequently, all the countries particularly the developing countries, desire such an economy in which investment increases smoothly over time. Thus, investment plays a dual role; affecting short-run output through its impact on aggregate demand and influencing long-run growth through the impact of capital formation on potential output and aggregate supply (Herzer 2011).

For private investment in transport and communication, theoretical models focus on the rate of return and the cost of finance to the investor. However, investor's expectations of future sales may well dominate their rate-of-return calculation. Investor confidence and expectations generally contain a large element of judgment that is difficult to quantify. It may be possible to proxy investor's expectations with past changes in actual output. The hypothesis that the desired output and profit from transport and communication may be ambiguous and therefore investment spending in this sector, tend to vary with changes in output is sometimes referred to as the "accelerator model". Besides past changes in output profit obtained, real investment is likely to respond to some measure of the cost of funds, such as real interest rate. The inflation may discourage investors because it is symptomatic of an uncertain business environment; investors may prefer to weight to risk their funds until probability of an attractive return is higher. A high rate of inflation or a large increase in the interest rate is likely to be associated with lower investment spending. Finally, investments projects will be

more profitable if real exchange rate is lower (other things being equal or constant). This means that a lower rate will tend to be associated with a higher level of capital formation. This is logical, however, only if investor think that a change in the exchange rate is likely to be lasting; if they are accustomed to recurring fluctuations in the real rates, it is rational for investor to discount or ignore changes.

Some studies have emphasized that the availability rather than the cost of finance represents a major constraint on private investment. This may reflect the maintenance of real interest rates at below market levels and the rationing of financial resources by non-price means. In this case, bank credit, foreign capital inflows and retained profits represent the major determinants of private investment. The availability of bank credit reflects the stance of monetary policy. Fiscal policy is also important to the extent that there is a possibility of financial crowding out, when there is a large demand by the government for credit from the banking system, limiting its availability to the private sector.

Although the transport and communication sector is one of the most important and popular sector of economy, but still there are very limited literature exists on this sector. The researchers didn't focus on this sector it is needed, may be they didn't realize the importance of this sector yet. Like many other developing countries, Pakistan too have a rare scope of literature and research on the cited issue.

Shumaila and Akhtar (2008) using quarterly data from 2001 to 2006 to analyzed the impact of Foreign Direct Investment on the transport and communication sector of Pakistan. Zahir and Malik (2011) using time series data to find out the influence and contribution of transport and communication sector on the economic growth of Pakistan. Boopan (2006) using the cross-sectional and panel data for the African Countries to find out the impact of transport and communication sector on the labor force, employment, output and investment to GDP. Tella and et al (2007) using time series data to assessed the relation between transport and communication sector and economic growth for Nigeria. Zehra (2008) had empirically investigated the relationship between transport and communication sector and economic growth for the selected low, middle and high income countries. Snieska and simkuine (2009) empirically analyzed the impact of transport and communication sector and economic development for the European countries (Lithuania, Lativa, Baltic States and Estonia) using annual time series data for the period of 1995 to 2007. Hashim et al (2007) empirically investigated the impact of transport and communication sector on the economic development and growth of Pakistan using time series data from 1968 to 2007. Most important finding of the study that investment in transport and communication sector has high positive and significant effect on the economic growth and development of Pakistan. Sahoo et al (2010) investigated the impact of physical infrastructure, index of capital stock, transport and communication sector infrastructure on the economic growth and development of China using time series data from 1975 to 2007.

### **Objective of the Study**

The main and basic objective of this research study is to analyze the opportunities and encouraging factor for the private sector to invest in the transport and communication sector of Pakistan. This research study emphasized on the outcome and profit obtained by the private sector while investing in the transport and communication sector.

Transport and communication is one of the important sectors of the economy in a country. In order to improve the efficiency of the transport and communication sector of Pakistan, the central government as well as provincial government has take a number of steps to increase their capability and outcome. The government not only increases the allocation of funds for this sector but also bringing improving in the infrastructures, establishing research institutions for this sector,

bringing different reforms and especially launching different projects.

## **DATA AND DESCRIPTION OF INVESTMENT ACCELERATOR MODEL**

### **Data Analysis**

The data used in this research study is based on annual figures because quarterly data for most of the variables are not available from any source in case of Pakistan. The time period of the study data is from 1981 to 2014, because data prior to 1981 at constant price are unavailable. There is no one direct source to complete data; therefore data are collected from Board of Revenue and Investment of Pakistan, National Transport Research Centre (NTRC) of Pakistan, National Highway Authority (NHA), Ministry of Transport and Communications (Islamabad) Pakistan, National HW & Motorway Police (NH&MP), Planning & Development Division, Ministry of Commerce and Industry, Civil Aviation Authority (CAA), Ministry of Finance Division (Islamabad) Pakistan, Pakistan Railway & Railways Passenger Traffic and Freight, Pakistan International Air Lines (PIA), Karachi Port, Karachi Shipyard & Engineering Works (KSEW), Ministry of Telecommunication, Pakistan Electronic Media Regulatory Authority (PEMRA), Economic Surveys, Federal Bureau of Statistics, Cooperatives and Commercial Banks, International Financial Statistics (IFS), Pakistan Institute of Development Economics (PIDE), World Development Report (WDR), National Accounts of Pakistan and from different surveys and reports.

All the variables used in the estimation for all investment function are taken as real and at constant prices. The price index of capital good has been calculated by dividing the value of gross fixed capital formation at current price by corresponding value at constant prices.

### **Description of INVESTMENT MODEL for this Research Study**

White (September, 1956) has worked on this approach, which is more or less an extension of Keynes work. The optimal level of capital is determined and then the actual Infrastructure and capital stock adjusted according to that stock. The demand for capital would depend on the present value and the internal rate of return. Lower rate of interest would imply greater levels of investment and vice versa. Hence the demand for capital is negatively associated with the rate of interest.

A natural starting point of discussion of private investment in Transport and Communication Sector is the rationale of the Present Value (PV) criterion and its implication for the determinants of output (that are profit which are earned by investor). Thus, by reducing current income, the owners can increase future income by investing that retained earnings. The investment rule, that the investor should maximize its present value by investing in any projects with positive returns. In order to maximize its present value the investor should invest in all projects that have present value greater than zero ( $PV > 0$ ). The present value ranking depends on the market rate of the interest – the rate at which earning can be reinvested.

Keynes also stressed the importance of expectations in determining investment since it is the expectation that determines the rate of return and thereby any change in expectation would shift the Marginal Efficiency of Capital (MEC). Due to frequent changes in expectation the investment behavior shows wide fluctuations. The Keynesian theory explains investment function with respect to the marginal efficiency of capital (m). The marginal efficiency of capital is defined as that rate of discount which equates the present value of net returns to the cost of capital. It declines with an increase in the price of capital and increases with the price of output as well as the quantity of output.

$$m = m (P_k, K, PQ, Q) \tag{2.1}$$

m = marginal efficiency of capital

P<sub>k</sub> = price of capital

K = capital

PQ = price of output or profit

Q = output or profit

The optimal capital stock can be expressed as a function of (r), (P<sub>k</sub>), (PQ) and Q

$$K^* = K (r, P_k, PQ, Q) \tag{2.2}$$

Hence

$$PQ = f (Q)$$

So the optimal capital stock function equation becomes

$$K^* = K (r, P_k, f (Q), Q) \tag{2.2(a)}$$

Increase in output/profit leads to increase in the level of desired capital stock, hence the partial derivative of (K\*) with respect to (Q) shall be positive. However the partial derivative of (K\*) with to the price of output shall be negative. The combined effect of these two variables shall be indeterminate. Hence

$$dK^* / dQ = (\partial k^* / \partial Q) + (\partial K^* / \partial P_k)(\partial P_k / \partial Q) \tag{2.3}$$

$$dK^* / dQ = (\partial k^* / \partial Q) + (\partial K^* / \partial P_k) f'(Q) \tag{2.3(a)}$$

This equation can be rewritten as

$$K^* = h (r, P_k, Q) \tag{2.3(b)}$$

Expressing the function in linear form gives

$$K^* = \alpha_0 + \alpha_1 r_t + \alpha_2 P_{kt} + \alpha_3 Q_t \tag{2.3(c)}$$

Where,

$$\alpha_1 < 0, \alpha_2 < 0, \alpha_3 > 0$$

Net investment can be written as

$$NI_t = \alpha_1 r_t + \alpha_2 P_{kt} + \alpha_3 Q_t - \alpha_1 r_{t-1} + \alpha_2 P_{kt-1} + \alpha_3 Q_{t-1} \tag{2.4}$$

Depreciation is proportional to the capital stock in the previous period

$$D_t = \delta K_{t-1} = \delta \alpha_0 + \delta \alpha_1 r_{t-1} + \delta \alpha_2 P_{kt-1} + \delta \alpha_3 Q_{t-1} \tag{2.5}$$

Gross investment equals net investment and depreciation therefore

$$I_t = \delta\alpha_0 + \alpha_1 r_t + \alpha_2 P_{kt} - \alpha_1(1-\delta)r_{t-1} - \alpha_2(1-\delta)P_{kt-1} + \alpha_3(Q_t - Q_{t-1})$$

$$I_t = \alpha_0 + \alpha_1 r_t + \beta_1 r_{t-1} + \beta_2 P_{kt-1} + \alpha_3 \Delta Q_t \quad 2.7$$

$$\alpha_1 < 0, \beta_1 > 0, \beta_2 > 0, \alpha_3 > 0$$

It is an accelerator model as it shows the relationship between the level of net investment and growth rate of output.

### Private Investment in Transport and Communication

An efficient transport and communication network contributes to productivity improvement and reduction in production costs, whereas, inefficient network hinders economic growth and social development. Private investment in transport and communication consists of railways, post office, telecommunications and other related activities such as buildings, roads and airlines services etc. To analyzed private investment in transport and communications (Iptc), the estimated function contains the independent variables are Value-Added in Transport and Communication Sector (Vtc), Lagged Public Investment in Transport and Communication Sector (Igtc(-1)), Lagged Private Investment in Transport and Communication Sector (Iptc(-1)), Remittances (Rm), Population Growth Rate of Pakistan (Popg), Index of Price of Capital (Ipk), Weighted Rate of Interest (rw), Capital Stock in Transport and Communication Sector (Km) and total government revenue (TGR). The function of private investment in transport and communication derived from equation (3.7) is as follows:

$$Iptc = f(Vtc, Igtc(-1), Iptc(-1), (Rm), (Popg), (Ipk), (rw), (Km), (TGR)] \quad 2.8$$

The corresponding regression/econometric equation of the above given function is given below:

$$I_{pct} = \alpha_0 + \alpha_1 V_{tc} + \alpha_2 I_{gtc(-1)} + \alpha_3 I_{ptc(-1)} + \alpha_4 R_m + \alpha_5 Pop_g + \alpha_6 I_{pk} + \alpha_7 r_w + \alpha_8 K_m + \alpha_9 TGR + \varepsilon_{gtct} \quad 2.9$$

Whereas the sign of the co-efficient are expected as;

$$\alpha_1 > 0, \alpha_2 > 0, \alpha_3 > 0, \alpha_4 > 0, \alpha_5 > 0, \alpha_6 < 0, \alpha_7 < 0, \alpha_8 > 0, \alpha_9 > 0,$$

The linear specification is used for the functional forms of the model. The model is estimated by applying NLS and ARIMA Method (OLS) through advance econometric software E-Views. The annual time series data is used for the estimation of the model.

The random error term in all cases assumed to be normally distributed with the following restrictions,  $[E(\varepsilon_i) = 0], [E(\varepsilon_i)^2 = \sigma^2], [E(\varepsilon_i, \varepsilon_j) = 0]$  and this process is called "White noise process".

The details of the variables included in the study are;

(Iptc) = Private Investment in Transport and Communications Sector

(Vtc) = Value-Added in Transport and Communication Sector

(Igtc(-1)) = Lagged Public Investment in Transport and Communication Sector

(Iptc(-1)) = Lagged Private Investment in Transport and Communication Sector

(Rm) = Remittances

(Popg) = Population Growth Rate of Pakistan

(Ipk) = Index of Price of Capital

(rw) = Weighted Rate of Interest

(Km) = Capital Stock in Transport and Communication Sector and

(TGR) = Total Government Revenue

### ESTIMATION TECHNIQUES AND RESULTS

The specification of behavioral equations given in equation (2.9) is based on sound theoretical reasoning of the investment accelerator theories. In time-series analysis there always remains a suspicion about spurious relationship. As this research paper study is also based on time-series data, that is why before going to estimate the model, the data are tested applying Augmented Dicku-Fuller (ADF) test for the stationarity of the variables data. The variables used in the model are stationary at level because they are real and at constant price. This has been confirmed via, unit root and ADF test. The best estimate chosen on the basis of t-statistics and probability (F-statistics) of the parameters, which did not suffer from standard econometric problems such as auto-correlation, multicollinearity etc. and the estimated coefficient are statistically significant with true expected signs and economically plausible (the ADF results are shown in table (3.1). Furthermore, an R-squared value indicates that the current specification of the individual equations explains more than (90) percent of variation.

The accelerator model developed from Keynesian Approach to investment (extension of Keynes work) is applied. The econometric equation (2.7) developed for behavioral equation is regressed through advance econometric software E-views (Econometric Views) and by applying the NLS and Arima Model Method (OLS). The results are discussed for this category is explained in the table (4.2) respectively.

**Table 1: The ADF Test Results for the Stationarity of the Data**

Variables	At Level with Intercept		At Level with Trends & Intercept	
	T-Statistics	Prob. (F-Statistics)	T-Statistics	Prob. (F-Statistics)
Iptc	-2.066064	0.0493	-3.079590	0.0051
V <sub>tc</sub>	-3.632387	0.0013	-3.756009	0.0010
I <sub>gtc</sub>	-2.066064	0.0493	-3.079590	0.0051
I <sub>ptc</sub>	-2.1402130	0.427	-2.235845	0.0349
R <sub>m</sub>	-2.394692	0.0245	-2.014111	0.0564
P <sub>opg</sub>	-3.122761	0.0045	-2.536567	0.0192
I <sub>pk</sub>	-2.468468	0.0208	-2.949253	0.0070
r <sub>w</sub>	-4.054002	0.0004	-4.191631	0.0003
K <sub>m</sub>	-3.831656	0.0008	-4.319735	0.0003
TGR	-4.895736	0.0000	-6.228194	0.0000

The above table shows the ADF test results applied on the variables data to check the stationarity of the data.

The variables are significant at the level didn't showing any spurious relation or behavior in the data used in this research study.

**Table 2: Regression Results of Private Investment in Transport and Communication Sectors as Dependent Variable are**

Variables	Coefficient	Std.Error	T-Statistics	Prob.
Constant	0.212162	0.047287	4.486685	0.0000
$V_{tc}$	0.235077	0.041547	5.657996	0.0000
$I_{gtc(-1)}$	0.125824	0.052859	2.380361	0.0006
$I_{ptc(-1)}$	0.468455	0.116178	4.032186	0.0000
$R_m$	0.351023	0.042554	8.248776	0.0000
$P_{opg}$	0.782987	0.066662	11.74562	0.0000
$I_{pk}$	-0.066982	0.026676	-2.510930	0.0002
$r_w$	-0.310231	0.099259	-3.125461	0.0001
$K_m$	0.563215	0.099873	5.639258	0.0000
TGR	0.081147	0.037658	2.154808	0.0004
R-squared	0.923318		Durbin-Watson stat	1.891901
Adjusted R-squared	0.902116		Prob(F-statistic)	0.000000

The overall performance of the model is very well as the results showing in above table 3.2. The value of R-squared value is (0.92), where as Durban-Watson value is close to two (2) which is (1.89) and Prob(F-statistic)0.000000. Value-Added in Transport and Communication Sector, Lagged Public Investment in Transport and Communication Sector and Lagged Private Investment in Transport and Communication Sector are the most important and turned out to be the major determinants of investment. Their coefficient values are (0.23), (0.12) and (0.46). These all variables are statistically significant having positive impact on Public Investment in Transport and Communication Sector. One percent increase in these variables will bring an increase of (23), (12) and (46) percent in public sector investment in Transport and Communication. On the basis of these coefficient results it is concluded that private investment in Transport and Communication is effected by the budgetary position of the government i.e. funds availability and by the previous decision.

The two most significant and effective variables of private investment in Transport and Communication are the Remittances and population growth rate. It is evident from the results in table 3.2 Remittances and Population Growth Rate of Pakistan have high significant positive impact on Private investment in Transport and Communication sector and the coefficients (0.38) and (0.78) respectively. This explains that one percents increase in these variables will bring an increase from of (38) and (78) percent on average in Private investment in Transport and Communication sector of Pakistan. Increase in population will enhance demand for transportation vehicles and other related goods, which will ultimately raise overall investment level in Transport and Communication sector.

There is negative and significant effect of Weighted Rate of Interest and Index of Price of Capital on Private investment in Transport and Communication sector, but it is quite consistent with the theory and the coefficients of these two variables have correct signs as expected. The coefficient of Weighted Rate of Interest is (-0.31) and (-0.06), which indicates that one percent increase in Weighted Rate of Interest and Index of Price of Capital will bring (31) and (06) percent decrease in overall Private investment in Transport and Communication. Some of the economist, researchers and policy makers considered and used these two variables as opportunity cost of capital. So, the key factors which seem to have a strong role in determining the private investment in this sector include the price level of capital goods, capital stock and the output level.

The regression results obtained from the study also showing the strong effect of capital stock in the transport and communication sector. The coefficient Capital Stock and Total Government Revenue are (0.56) and (0.08), which means that one percent increase in these variables will bring fifty six (56) and eight (8) percent increase in private investment in Transport and Communication Sector. The results also suggest that the variable Capital Stock included in the model has highly significant value showing their towering influence on private investment Transport and Communication Sector. The result also shows that the contribution of private investment Transport and Communication Sector towards the revenue of government sector is not that much as it is expected.

The autonomous private investment Transport and Communication Sector is statistically significant having positive value showing that autonomous investment has also an important and contributing role private investment Transport and Communication Sector.

## CONCLUSIONS

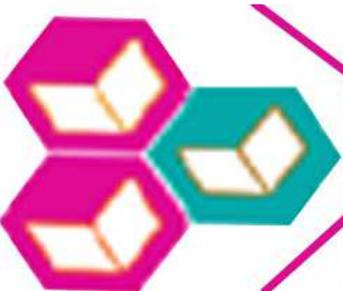
The transport and communication sector plays a crucial role not only in the economic growth and development of the country, but also providing an easy access for connecting institutions, peoples and market oriented supply of goods and services. This research paper analyzed the opportunities and encouraged private sector to invest in the transport and communication sector of Pakistan. The “Investment Accelerator” theory applied in this research paper essentially explained the investment behavior for the private sector in transport and communication sector of Pakistan. Accessibility and availability of the and sufficient satisfactory transport services a also playing key role for domestic as well as for foreign investor too and encouraging foreign direct investment. The transport and communication sector also an important source for providing employment opportunities for the people.

The transport and communication sector Pakistan has suffered a lot especially after 2001 due to the destruction and loss of the infrastructure of this sector. The government should need to establish and reconstruct the infrastructure. Mostly this sector is running by the private sector, some big projects and plans needed that the public sector to implement and start. This sector is also facing a problem of inefficient management and budgetary constraints. Government should need to tackle the problem of management and also to allocate funds for this sector to improve its efficiency and performance. As the transport and communication sector is frequently runs by private sector, so the government should need to fill the gap between private and public sector, provide opportunities and facilities to the private sector, providing easy loans for investment in transport and communication sector, improves the infrastructures and make the simple and principles of rules and regulation regarding to transport and communication sector of Pakistan.

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