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Enigma of Public Assistance to Private Investment through Infrastructure: Evidence from Pakistan

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ABSTRACT

Purpose: Public physical infrastructure development has fairly large impacts on private sector investment decisions and through this; it can affect economic performance (growth). The current study intends to explore the course in which public infrastructure affects private sector investment in Pakistan and whether there exist long run equilibrium between them or not. Time series annual data from 1972 to 2015 has been employed. Instead of using a single infrastructure indicator, the study has constructed a multidimensional composite index through principal component analysis (PCA). Real gross fixed capital formation is used as the proxy of private sector investment. The long run relationship is determined by Johansen's co-integration technique after checking for the order of integration. The empirical evidence shows that physical infrastructure availability is positively and significantly affecting private sector investment decisions. In addition, credit to private sector, per capita GDP, work force and inflation rate are positively and significantly affecting private investment. Further, private investment is sensitive to public physical infrastructure availability not only in long run but also in short run. A statistically significant and negative ECT (-1) term confirms the long run relationship and convergence towards equilibrium in case of Pakistan. Findings of the study show that public physical infrastructure services endorse the private investment both in the long run and the short run.

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1. Introduction

Achieving sustainable growth and development through public capital stock is a popular approach in economic literature. Lately, economists and policy makers are more concerned about inputs of growth rather than outputs. Public infrastructure is one of these inputs and considered as fixed investment for the economy. Besides, the importance of private sector towards growth is undeniable. A reasonable rate of both public (physical infrastructure) and private investment keep an economy on the track of sustained growth. These indicators of growth are somewhat interrelated and their relationship is yet to unveil in case
Public physical infrastructure affects the private sector both directly and indirectly. The direct effect is significant as firms consume physical infrastructure as an intermediate unit of consumption. That is, marginal product of the physical infrastructure in private sector is positive (Prud’homme, 2005; Fay and Morrison, 2007 and Li and Li, 2009). The indirect effect suggests that public physical infrastructure and private investments are complimentary goods that are why, public physical infrastructure services must be provided to boost the private investment (Asante, 2000). Provision of public physical infrastructure raises rate of return of private capital, at one hand and on the other hand, it acts as a substitute that crowds out private investment. Empirical evidence support both ends but public infrastructure supports private investments on equilibrium (Delgado and Alvarez, 2001).

Pakistan’s economy is characterized as a developing economy due to lower growth rates, high poverty levels, insufficient infrastructure, and low literacy rate, deficiency of capital inflow and capital formation and poor governance. Internal as well as external circumstances played crucial role over the short history of economy of Pakistan. Korean War in 1950s and bulk of foreign aid in 1960s helped Pakistan’s economy to grow faster. However, the decade of 1970s came up with the shock of separation of East Pakistan, followed by nationalization policy and an adverse oil price shock. Not only the growth rate of the economy but the private sector was also affected due to nationalization scheme. During this period, private investment contracted and public investment expended. The era of 1980s was contrary in polices. In this decade, private investment boosted due to policy of decentralization. Further, foreign inflows due to Afghan war also helped economy to grow on an average growth rate of 6.8 percent. Total investment as well as private investment also increased. The decade of 1990s was distinguished in history of economy of Pakistan because of the choice of rightful growth promoting polices. Most important were export led growth and import liberalization policies. A significant amount of foreign inflows was also attracted. But the result of these polices was not very urging. Instead, growth rates (export, investment and GDP) were low even negative. Many internal as well as external factors were responsible for it like, heterogeneity of interests, political imbalance, absence of necessary infrastructure, unstable exchange rate and global inflation. In addition, emergence of Pakistan as nuclear power was also responsible for falling investment (Khan, 2007). As a result, growth rate fell to 4 percent. Private investment also dropped to 3.8 percent.

Table-1: Shows the situation of private and public investment over the years in Pakistan.

<table>
<thead>
<tr>
<th>Average Growth Rates/Time Period</th>
<th>GDP Growth Rate (percentage)</th>
<th>Public Investment (percentage of GDP)</th>
<th>Private Investment (percentage of GDP)</th>
<th>Total Investment (percentage of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971-80</td>
<td>4.78</td>
<td>9.44</td>
<td>5.32</td>
<td>14.76</td>
</tr>
<tr>
<td>2001-12</td>
<td>4.70</td>
<td>20.28</td>
<td>10.0</td>
<td>30.28</td>
</tr>
</tbody>
</table>

Source: various issues of Pakistan Economic Survey

Last decade, 2000 has introduced the economy of Pakistan as an open economy in global market. Since, trade promoting polices as well as foreign investment especially in physical infrastructure (telecommunication and energy) helped to build a new image of Pakistan in community of foreign investors. The outcome of such growth friendly policies could be fairly large but adverse circumstances (like military takeover, incident of 9/11, food inflation and oil price shock) had left economy underdeveloped. Currently, Pakistan is facing the problems like food price escalation, poor law and order, inappropriate health and education facilities, high inflation rate, deficiency of capital investment, inadequate policies and poor infrastructure services. One of the major reasons of the lower growth rates in Pakistan was the inadequate supply of public physical infrastructure services (Faiz, 1992 and Jan et al., 2012).
The contribution of investment and physical infrastructure towards growth is discussed by numerous researchers. It is evident that both of above mentioned entities are growth promoting in both developing and developed countries. In empirical research, computing public physical infrastructure is very difficult because it is a multidimensional phenomenon. The conventional economic literature either consider a single infrastructure service as a measure of all or take the monetary measure like how much cost has been born to construct a road or a power house. In either case, situation is misleading (Easterly, 2001 and Loayza et al., 2005). In reality, physical infrastructure is a multidimensional approach which in aggregate is provision of different services (like transportation, power or energy and telecommunication). By considering these features of infrastructure, we have constructed a composite index of public physical infrastructure with multiple dimensions. These dimensions are measured with different variables and combined to a single indicator through principal component analysis (PCA).

The causal relationship of infrastructure provision and flow of private investment is not much explored. Particularly, the case of Pakistan is not yet unfolded. The current study seeks the dynamic and complex relation of how public infrastructure pertains to private investment and resolves the bottle necks. The dataset used is 1972-2015 for Pakistan’s economy. The study is consisting of four sections. Section two briefly represents the literature review. Model specifications and empirical results are discussed in section three. Section four summarizes the concluding remarks with policy implications.

2. Review of Literature
Many researchers including Aschauer (1987 and 1989), Looney (1997), Asante (2000) and Prud’homme (2005) have concluded that public infrastructure is an efficient input for output growth. Others (Mankiw et al., 1992; Benhabib and Spiegel, 1994 and Dutt and Ravallion, 1998) have included human capital as a productive input too. Where the importance and contribution of private investment towards economic growth needs no introduction in economic literature (Long and Summers, 1991; Nelson and Phelps, 1996 and Alfaro et al., 2006). This study aims to explore the complex relationship that how public capital (infrastructure) assists the private sector to grow and flourish.

Reinikka and Sevensson (1999) has examined the relationship of public infrastructure services provision and private investment for the economy of Uganda. They have found that the poor infrastructure services leads to lower productivity in private sector. Further, inappropriate public services also tend to increase the cost of private investment. They have called the basic public infrastructure services (roads, railways, telephones, sanitation and power) ‘complimentary capital’ as a necessity for higher returns of private investment in developing countries.

The discussion of public investment vs private investment often comes up with crowding in or crowding out effect. In former case, private investment is boosted as a result of raised government expenditure by encouraging demand for goods. As the demand for a good is high, private spending rises. Later is opposite. Crowding out causes the private spending to fall as a result of increased government spending. Aschauer (1988) has analyzed the enigma of crowding in and crowding out in case of public capital stock. The results suggested that increased public capital drives down the private investment. Besides, public capital raises the rate of return of private investment leads to private capital formation. The net effect of these forces is positive on private investment.

Erenburg (1993) conducted an analysis to check the effects of public capital on private investment. The main concern of the study is that whether public capital drives down or drives up the private investment by improved supply of public infrastructure services. Also, this study investigates the consequences of previous government investment along with the government deficit expenditures on private sector investment behavior. This has been done by taking into account the method of maximum likelihood. The results reveals a positive and statistically significant relationship between public capital and private investment behavior. The results further showed that government deficit expenditures are statically
inexs insignificant and have no impact on private investment spending.

Sakr (1993) seeks for the determinants of investment in private sector for the economy of Pakistan with particular stress on public investment. Public investment is divided into expenditures on infrastructural investment and expenditures on non-infrastructural investment. The results of the study indicates that private investment is significantly and positively affected by GDP growth and infrastructural investment. However, the effect of non-infrastructural investment is found negative on private investment.

Looney (1997) has conducted an analysis of public physical infrastructure provision on private investment for economy of Pakistan. The study focuses to explore the existence of long run equilibrium between infrastructure facilities, private investment and GDP growth. The findings of this study suggest that at first it appears improved infrastructure has not contributed much towards the growth of Pakistan’s economy. But at the same time, infrastructure services has supported the private investment to grow faster by accomplishing the needs of private sector at one hand, on the other hand, infrastructure has taken out the economy from sever bottlenecks. The study concludes that overall impact of public physical infrastructure on private investment is positive in case of Pakistan’s economy.

Delgado and Alvarez (2001) have analyzed the effects of public infrastructure services on private investment in 17 different regions of Spain. They have used multiple indicators for infrastructure by using each indicator as a regressor. Also, they have investigated the process that how infrastructure services act as an input in production process. They have used a modified production function with the data set from 1980 to 1995. The empirical results supported the view that provision of public infrastructure is positively affecting private investment.

Erden and Holcombe (2005) have used a panel of developing countries from 1980-97 to check whether public infrastructure spending crowds in or crowds out private investment. The study also investigates the credit facilities to private sector by banks the empirical results of the study states that on average, ten percent increase in public infrastructure spending leads to two percent increase in private investment in developing economies. The study also checked the same for developed economies and finds that public spendings on infrastructure crowds out the private investment in developed economies and supports private sector in developing economies.

Dash (2016) has investigated for the relationship of public infrastructure and private investment for Indian economy. The data has been used from 1970 to 2013 and ARDL procedures have been adopted. The empirical result finds that public infrastructure investment which is measured by length of roads is negatively related to private investment in the long run. Whereas, in the short run, the effects of public infrastructure on private investment are positive.

The critical analysis of existing literature shows that impact of infrastructure provision on private investment is not much explored in case of Pakistan. The present study focuses to resolve the enigma of whether public investment through infrastructure supports private investment in Pakistan or not. Some studies are there which are using either a single indicator as a summary measure of all infrastructure services. Others are measuring the infrastructure by the extent of public expenditures in an economy. In both cases, the conclusions can be deceptive. For instance, in an economy, there can be an excellent
transportation infrastructure but inefficient energy sector or considering how many dollars has been spent on infrastructure development instead of considering how many bridges, kilometers of roads or power houses has been constructed. The present study focuses to resolve these issues by developing a composite infrastructure indicator, index of public physical infrastructure. This has been done by incorporating different indicators of public infrastructure which are measured by different variables. These variables are then combined through PCA.

3. Model Specification and Empirical Analysis

There are numerous factors that are affecting private investment in Pakistan’s economy. Based on previous studies (Greene and Villanueva, 1991 and Sakr, 1993), we have constructed our model as follows:

\[ GFCF_{pvt} = f (Z, DC_{pvt}, ELF, GDP, INF) \]

Where \( GFCF_{pvt} \) is real gross fixed capital formation in private sector as proxy of private investment. \( Z \) is indicator of index of public physical infrastructure. \( DC_{pvt} \) is domestic credit extended to private sector by banks as percentage of GDP measures the financing constraints in private sector. GDP is per capita GDP represents the accelerator component determining private investment. INF is inflation rate as a measure of investment environment in the economy (Beaudry et al., 2001). Time series annual data from 1972 to 2015 has been used for the empirical analysis. Data has been collected from various issues of Pakistan Economic Survey and World Development Indicators (WDI) (2016).

3.1 Principal Component Analysis (PCA)

Principal Component Analysis (PCA) is a suitable method while dealing with multivariate procedures. The common name for PCA is data reduction method. In a certain study, if for instance, ten or more variables indicate an economic measure, then there are more chances of correlation among these variables. In such a case, PCA helps us by providing us uncorrelated principal components from these multiple variables which are supposed to be correlated before.

A composite indicator of public physical infrastructure \( Z \) has been constructed. It is based on multiple indicators of infrastructure like transportation measured by length of roads (RDS), communication measured by number of post offices (POST) and number of telephone lines (TELE) and energy by oil (OIL) and electricity consumption (ELC). The correlation matrix shows that above mentioned indicators of infrastructure are highly correlated as reported in Table-2.

| Table-2: Correlations Matrix of Infrastructure Indicators |
|---------------------------------|----------------|----------------|----------------|----------------|
| Indicators | RDS | POST | TELE | OIL | EC |
| RDS | 1.000000 | | | | |
| POST | 0.714858 | 1.000000 | | | |
| TELE | 0.933784 | 0.532187 | 1.000000 | | |
| OIL | 0.977749 | 0.734198 | 0.875796 | 1.000000 | |
| ELC | 0.956529 | 0.612493 | 0.924769 | 0.922103 | 1.000000 |

Since, the infrastructure indicators are highly correlated, to overcome the problem of multi-collinearity and to reduce the number of explanatory variables we have employed Principal Component Analysis (PCA). Because correlation matrix instead of the covariance matrix is utilized in the PCA (Chatfield and Collins, 1980), therefore, Eigenvalues and Eigenvectors are reported in Table-3. Eigenvalues and Eigenvectors are computed by using ordinary correlations.
Table-3: Eigenvalues and Eigenvectors of Infrastructure Indicators

<table>
<thead>
<tr>
<th>Principle Component</th>
<th>Eigenvalue Values</th>
<th>Proportion</th>
<th>Cumulative Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.306485</td>
<td>0.8613</td>
<td>0.8613</td>
</tr>
<tr>
<td>2</td>
<td>0.539357</td>
<td>0.1079</td>
<td>0.9692</td>
</tr>
<tr>
<td>3</td>
<td>0.084947</td>
<td>0.0170</td>
<td>0.9862</td>
</tr>
<tr>
<td>4</td>
<td>0.060233</td>
<td>0.0121</td>
<td>0.9982</td>
</tr>
<tr>
<td>5</td>
<td>0.008956</td>
<td>0.0018</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Eigenvectors (loadings)

<table>
<thead>
<tr>
<th>Variable</th>
<th>PC 1</th>
<th>PC 2</th>
<th>PC 3</th>
<th>PC 4</th>
<th>PC 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDS</td>
<td>0.478823</td>
<td>-0.074036</td>
<td>-0.127200</td>
<td>-0.176840</td>
<td>-0.847227</td>
</tr>
<tr>
<td>POST</td>
<td>0.365943</td>
<td>0.878041</td>
<td>0.282386</td>
<td>0.105199</td>
<td>0.065735</td>
</tr>
<tr>
<td>TELE</td>
<td>0.448274</td>
<td>-0.400624</td>
<td>0.711440</td>
<td>-0.274514</td>
<td>0.238843</td>
</tr>
<tr>
<td>OIL</td>
<td>0.470688</td>
<td>0.020392</td>
<td>-0.610136</td>
<td>-0.450902</td>
<td>0.449954</td>
</tr>
<tr>
<td>ELC</td>
<td>0.462944</td>
<td>-0.250293</td>
<td>-0.160207</td>
<td>0.824009</td>
<td>0.135571</td>
</tr>
</tbody>
</table>

The first principal component (PC1) explains the maximum variance (86%) in all the individual indicators (eigenvalue of 4.3). The scree plot of order eigenvalues and eigenvalue difference against principle component are shown in Figure-1 and Figure-2, respectively.

In Figure-1 and Figure-2, scree plots of ordered eigenvalues and eigenvalue difference, against principle component, showed a sharp decline from first principle component (PC1) to second principle component (PC2) which indicates the suitable use of PCA for constructing a composite indicator. Then data of infrastructure indicators is normalized by subtracting the minimum value and dividing by the range of the indicator values. These normalized values are weighted by multiplying with their respective PC1 and finally aggregated into single composite index of public physical infrastructure ($Z_t$).
3.2 Long Run and Short Run Analysis

The problem of non-stationarity or unit root exists in time series data. If series are non-stationary then regression would be spurious. To avoid this, we have conducted the test for unit root by employing ADF test. The results are reported in Table-4.

The results reported in Table-4 shows that all variables are non-stationary at level. However, these variables are stationary at first difference. As the level of integration is same we can apply Johansen co-integration to determine the existence of long run relationship. But before moving towards long run relationship, it is important to determine the optimal lag length first. The results of multiple lag selection criteria have been presented in Table-5.

Table-4: Test for Unit Root (ADF Test Statistics)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Without Trend</th>
<th>Prob. Values</th>
<th>Trend and Intercept</th>
<th>Prob. Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnGFCFpvt</td>
<td>-1.002488</td>
<td>0.7438</td>
<td>-2.252656</td>
<td>0.4494</td>
</tr>
<tr>
<td>lnZt</td>
<td>-2.157297</td>
<td>0.2248</td>
<td>-2.034355</td>
<td>0.5623</td>
</tr>
<tr>
<td>lnELF</td>
<td>-0.641123</td>
<td>0.8502</td>
<td>-1.899698</td>
<td>0.6370</td>
</tr>
<tr>
<td>DCpvt</td>
<td>-2.410525</td>
<td>0.1452</td>
<td>-2.367530</td>
<td>0.3902</td>
</tr>
<tr>
<td>PCGDPG</td>
<td>-2.544670</td>
<td>0.1134</td>
<td>-2.855709</td>
<td>0.1876</td>
</tr>
<tr>
<td>INFt</td>
<td>-2.180714</td>
<td>0.2163</td>
<td>-2.145264</td>
<td>0.5047</td>
</tr>
</tbody>
</table>

First Difference

<table>
<thead>
<tr>
<th>Variables</th>
<th>Without Trend</th>
<th>Prob. Values</th>
<th>Trend and Intercept</th>
<th>Prob. Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>∆lnGFCFpvt</td>
<td>-6.789297* **</td>
<td>0.0000</td>
<td>-6.777345* **</td>
<td>0.0000</td>
</tr>
<tr>
<td>∆lnZt</td>
<td>-4.690897* **</td>
<td>0.0006</td>
<td>-4.203823*</td>
<td>0.0108</td>
</tr>
<tr>
<td>∆lnELF</td>
<td>-5.973156* **</td>
<td>0.0000</td>
<td>-5.911166* **</td>
<td>0.0001</td>
</tr>
<tr>
<td>∆DCpvt</td>
<td>-4.903509* **</td>
<td>0.0003</td>
<td>-4.891361* **</td>
<td>0.0016</td>
</tr>
<tr>
<td>∆PCGDPG</td>
<td>-4.191647* **</td>
<td>0.0022</td>
<td>-4.776524* **</td>
<td>0.0023</td>
</tr>
<tr>
<td>ΔINFt</td>
<td>-5.216983* **</td>
<td>0.0001</td>
<td>-5.338049* **</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

Note: * denotes 1% significance level and ** stands for 5% significance level

Table-5: Criteria for VAR Lag Order

<table>
<thead>
<tr>
<th>Lag</th>
<th>Log L</th>
<th>SC</th>
<th>AIC</th>
<th>HQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-309.0096</td>
<td>16.00381</td>
<td>15.75048</td>
<td>15.84208</td>
</tr>
<tr>
<td>1</td>
<td>-109.0830</td>
<td>9.327475*</td>
<td>7.554152*</td>
<td>8.195329*</td>
</tr>
<tr>
<td>2</td>
<td>-75.21728</td>
<td>10.95418</td>
<td>7.660864</td>
<td>8.851623</td>
</tr>
</tbody>
</table>

* indicates lag order selected by the criterion, SC: Schwarz information criterion, AIC: Akaike information criterion, HQ: Hannan-Quinn information criterion
According to the results reported in Table-5, optimal lag length by different criterion is 1. After determining the lag length, we can go for the co-integration to determine the long run relationship among the variables. The results of Trace Statistics and Maximum Eigen Statistics have been reported in Table-6 and Table-7 respectively.

### Table-6: Unrestricted Co-integration Rank Test (Trace)

<table>
<thead>
<tr>
<th>H_0</th>
<th>H_1</th>
<th>Trace Statistics</th>
<th>Critical Value At 5% level</th>
<th>Probability **</th>
</tr>
</thead>
<tbody>
<tr>
<td>r = 0*</td>
<td>r ≥ 1</td>
<td>140.8386</td>
<td>95.75366</td>
<td>0.0000</td>
</tr>
<tr>
<td>r ≤ 1*</td>
<td>r ≥ 2</td>
<td>80.40633</td>
<td>69.81889</td>
<td>0.0056</td>
</tr>
<tr>
<td>r ≤ 2</td>
<td>r ≥ 3</td>
<td>45.07757</td>
<td>47.85613</td>
<td>0.0891</td>
</tr>
<tr>
<td>r ≤ 3</td>
<td>r ≥ 4</td>
<td>21.48529</td>
<td>29.79707</td>
<td>0.3281</td>
</tr>
<tr>
<td>r ≤ 4</td>
<td>r ≥ 5</td>
<td>11.06753</td>
<td>15.49471</td>
<td>0.2074</td>
</tr>
</tbody>
</table>

* denotes rejection of the hypothesis at the 0.05 level. ** p-values.

### Table-7: Unrestricted Co-integration Rank Test (Maximum Eigen Value)

<table>
<thead>
<tr>
<th>H_0</th>
<th>H_1</th>
<th>Max-Eigen Statistics</th>
<th>Critical Value At 5% level</th>
<th>Probability **</th>
</tr>
</thead>
<tbody>
<tr>
<td>r = 0*</td>
<td>r ≥ 1</td>
<td>60.43224</td>
<td>40.07757</td>
<td>0.0001</td>
</tr>
<tr>
<td>r ≤ 1*</td>
<td>r ≥ 2</td>
<td>35.32877</td>
<td>33.87687</td>
<td>0.0333</td>
</tr>
<tr>
<td>r ≤ 2</td>
<td>r ≥ 3</td>
<td>23.59227</td>
<td>27.58434</td>
<td>0.1496</td>
</tr>
<tr>
<td>r ≤ 3</td>
<td>r ≥ 4</td>
<td>10.41776</td>
<td>21.13162</td>
<td>0.7048</td>
</tr>
<tr>
<td>r ≤ 4</td>
<td>r ≥ 5</td>
<td>9.533331</td>
<td>14.26460</td>
<td>0.2444</td>
</tr>
</tbody>
</table>

* rejection of the hypothesis at the 5% level. ** p-values.

A close insight of the Table-6 and Table-7 has disclosed that there are two co-integrating vectors in each of them or there is co-integration among the variables. In other words, existence of long run relationship between public physical infrastructure and private investment is confirmed. This long run relationship is further supported by the normalized values presented in Table-8.

### Table-8: Normalized Co-integrating Coefficients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable: LRGFCF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LZ</td>
<td>0.766695 (0.05548)</td>
<td>-12.8</td>
</tr>
<tr>
<td>LELF</td>
<td>1.211244 (0.16748)</td>
<td>-7.06</td>
</tr>
<tr>
<td>DCpvt</td>
<td>0.037356 (0.01078)</td>
<td>-3.36</td>
</tr>
<tr>
<td>PCGDPG</td>
<td>0.048796 (0.01870)</td>
<td>-2.47</td>
</tr>
<tr>
<td>INF</td>
<td>0.046723 (0.00668)</td>
<td>-6.7</td>
</tr>
</tbody>
</table>

*(standard error in parentheses)

The results reported in Table-8 shows that all variables bare positive sign including index of public
physical infrastructure (Z). Also, all variables are significantly affecting the private investment. One percent increase in public physical infrastructure services (represented by physical infrastructure index Z) leads to 0.76 percent increase in private investment.

Since the co-integration among our concerned variables has been confirmed we would now check for the short run relationship. For short run analysis, we have employed VECM. According to (Egert et al., 2009), the short-run ECT must be significant and negative to assure the long run relationship as well as equilibrium reversion. Results for short run have been accounted in Table-9.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLZT</td>
<td>0.043371</td>
<td>0.486664</td>
</tr>
<tr>
<td>DLELF</td>
<td>1.701340</td>
<td>2.074893</td>
</tr>
<tr>
<td>DDCpvt</td>
<td>0.028742</td>
<td>2.629858</td>
</tr>
<tr>
<td>DPCGDPG</td>
<td>0.005405</td>
<td>0.535713</td>
</tr>
<tr>
<td>DINFLATION</td>
<td>0.007136</td>
<td>1.209261</td>
</tr>
<tr>
<td>ECT(-1)</td>
<td>-0.516409</td>
<td>-3.623510</td>
</tr>
</tbody>
</table>

The short run analysis shows that except work force and credit to private sector, all variables are statistically insignificant. As reported in Table-7, a negative as well as statistically significant ECT term supports the view that there is a long run relationship between Z and private investment. Where its coefficient shows the speed of convergence towards equilibrium. The speed of convergence is significantly high. Our results have confirmed that public physical infrastructure certainly improves the conditions for private investment in Pakistan economy. Some important diagnostic tests have been applied and results are reported in the Table-10.

<table>
<thead>
<tr>
<th>Diagnostic Tests</th>
<th>F-statistics</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breush-Godfrey LM Test For Serial Correlation</td>
<td>0.727974</td>
<td>0.3997</td>
</tr>
<tr>
<td>ARCH Test For Autoregressive Heteroskedasticity</td>
<td>0.191982</td>
<td>0.6638</td>
</tr>
<tr>
<td>Ramsey RESET Test For Model Specification</td>
<td>0.407733</td>
<td>0.5275</td>
</tr>
</tbody>
</table>

The results reported in Table-10 shows that our model is free from the problem of serial correlation. Also, there is no issue of heteroscedasticity. The Ramsey RESET test statistics shows that our model is correctly specified.
4. Conclusion and Policy Implications

The empirical results of the present study suggest that public physical infrastructure and private investment are highly correlated. Increased level of public infrastructure would enhance the level of private investment in Pakistan. Differing from other studies, the present study has constructed an index of public physical infrastructure by using multiple indicators (transportation, telecommunication and energy) combined through PCA. Private investment is measured by real gross fixed capital formation in private sector. After checking for stationarity, we have incorporated co-integration and ECM for long run and short run dynamics respectively. The existence of long run relationship has been confirmed through co-integration as well as through negative and significant ECM term.

The provision of basic physical infrastructure in Pakistan remained low in past 20 years. According to World Bank (2013), there is undersupply of infrastructure availability in Pakistan. In order to bridge the gap, Pakistan needs to spend 5.5 percent of GDP on electricity generation, 0.71 percent of GDP on telecommunication and 1.23 percent of GDP on transportation every year. On the other hand, private investment is not that much high in Pakistan. According to the White (2005), for sustainable development, the level of private investment should be 25 percent of GDP in developed economies and in transitional economies, it should not be less than 20 percent of GDP. Where according to Pakistan Economic Survey (2014-15), private investment in Pakistan is only 9.66 percent of GDP. That is, less than half of required level. By investing in productive physical capital, the level of private investment can be raised along with higher growth rates. In this regard, regional discrimination and political interest must be avoided for collective benefit of economy.

Both infrastructure and private investment are important drivers of growth and their sound interaction would lead to a prosperous economy. Further, the extension of credit to private sector is also positively and significantly affecting private investment. That is, besides improving investment environment by provision of necessary infrastructure, the access and availability of credit to private sector must also be improved. Other determinants of private investment like business confidence, sustained interest rate, law and order, short and long term credit availability, governance and political stability are also important to attract the private investment.

References


Electricity Generation and Real Output in Asia: A Panel Co-Integration Approach

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1. Introduction

Energy including electricity plays pivotal role in generation of real output, employment generation, price stability etc. Economic activity is also a source of increased consumption of energy remarkably in commercial energy like electricity (Jumbe, 2004). Industrial outputs are dependent upon available efficient energy resources and electricity production. Energy also promotes the productivity of labor, capital and real output as well. Cheaper supply of electric power may encourage the establishment of small industries and hence lead to higher economic growth.

The relationship between real output and electricity production in Central Asia, East Asia, South Asia and South East Asia are presented in table 1. It is evident from the table that the average growth rate of central Asia is very low as compared to other regions during the time period of study (1990 – 2015). While South Asian region is enjoying the highest growth rate and South East Asian region is at second number and East Asia is at 3rd. In the Asian block, East Asia is having the highest real GDP i.e. 1400 billion dollar
during the study period. Central Asia is again at the last number in this respect. The mean of real GDP is very low in Central Asia that is 10 billion dollars. Same situation of Asian regions is in case of electricity production East Asia is producing 652 billion KWh on the average while central Asia is producing 32.2 billion KWh on the average in a year. An Asian region having higher electricity production is having higher real GDP but growth rate is not higher in specific region (Central Asia). Growth rate is higher for the regions (South Asia and South East Asia) where electricity production is just near to real GDP. The large difference between electricity production and real GDP may not lead to higher growth rate as in East Asia.

Table-1: Some Indicators of Asian Regions

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Central Asia</th>
<th>East Asia</th>
<th>South Asia</th>
<th>South East Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth rate (Percentage)</td>
<td>2.56</td>
<td>4.84</td>
<td>5.19</td>
<td>5.00</td>
</tr>
<tr>
<td>Real GDP (Billion Dollars)</td>
<td>10</td>
<td>1400</td>
<td>140</td>
<td>92.9</td>
</tr>
<tr>
<td>Electricity Production (Billion KWh)</td>
<td>32.2</td>
<td>652</td>
<td>138</td>
<td>55.6</td>
</tr>
<tr>
<td>Total Labor force (Millions)</td>
<td>4.74</td>
<td>165</td>
<td>108</td>
<td>31.47</td>
</tr>
<tr>
<td>Gross Capital Formation (Billion Dollars)</td>
<td>4.59</td>
<td>452</td>
<td>52.1</td>
<td>32.7</td>
</tr>
<tr>
<td>Electricity Consumption (Billion KWh)</td>
<td>28.5</td>
<td>618</td>
<td>107</td>
<td>50.9</td>
</tr>
</tbody>
</table>

Note: The above values are Mean of variables from 1990 – 2015.

Table 1 also discusses the situation of total labor force, gross capital formation and electricity consumption. Central Asia is having lower growth rate also due to lower labor force and capital formation. East Asia has a huge amount of total labor force as well as gross capital formation on the average between the time periods of 1990 – 2015. Electricity consumption is also not much different from electricity production in East Asia. South Asia comprises with moderate situation in terms of electricity consumption, electricity production, total labor force, gross fixed capital formation and real GDP but still having higher GDP growth rate. On the other side, South East Asia contains total labor force of 31.47 million, gross capital formation of 32.7 billion dollars and electricity consumption of 50.9 billion KWh on the average during 1990 - 2015.

Table 2 explains about excess electricity production in central Asia, East Asia, South Asia and South East Asia during the study period. We can recognize that electricity excess production is having an upward trend in all the regions of Asia from 1990 to 2015. The highest excess production is correlated with higher real GDP and Electricity Production in East Asian region but with moderate growth rate. These values may explain that higher growth rate is not necessary to be achieved by higher production of electricity. As Excess electricity production and average electricity production is the highest for East Asia but growth rate is not highest. This evidence may conclude negative relationship among growth rate and electricity production for East Asian Region. With the lower excess production of electricity in Central Asia and lower real output, it is having lower growth rate and it shows direct association of real GDP with electricity output. Discussing South Asia and South East Asia, positive association can be also predicted among electricity production and growth rate.

Table 2: Excess Electricity Production (in Billion KWh)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Asia</td>
<td>2.6</td>
<td>3.50</td>
<td>4.42</td>
<td>4.61</td>
</tr>
<tr>
<td>East Asia</td>
<td>19.78</td>
<td>26.51</td>
<td>36.98</td>
<td>51.88</td>
</tr>
<tr>
<td>South Asia</td>
<td>15.56</td>
<td>27.56</td>
<td>38.97</td>
<td>42.69</td>
</tr>
<tr>
<td>South East Asia</td>
<td>2.78</td>
<td>4.43</td>
<td>5.66</td>
<td>5.76</td>
</tr>
</tbody>
</table>

Note: The values are averages in the specific years.
By considering the view Solow growth theories, the study is aimed to investigate the influence of Electricity on real output separately for all regions of Asia Continent like Central Asia, East Asia, South Asia and South East Asia during 1990 to 2015. Apart from introduction in Section 1, the study is composed of following sections. Section 2 presents summary of some past studies, Section 3 is dealing with panel data and estimation issues. In section 4, Panel results are discussed based upon Panel Co-integration technique and FM-OLS method. Last Section 5 finally concludes the whole research work and also gives some policy implications based upon estimated results.

2. Literature Review

Electricity, Energy and Growth relationships are investigated previously by several economists. These economists are belonging to either from Pakistan or from other Nations. This section summarizes few of those studies comprehensively.

Asafu-Adjaye (2000) has examined the energy income relationship for four energy-dependent Asian developing countries: India, Indonesia, the Philippines and Thailand. The series for India and Indonesia cover the period of 1973-1995, while those for Thailand and the Philippines cover the period of 1971-1995. The data has been obtained from World Development Indicators (WDI) 1998, published by the World Bank. The study utilizes Johansen Maximum Likelihood method and Temporal Granger Causality tests and concludes the positive association among energy consumption, prices and economic growth.

Soytas et al. (2001) investigate the causal relationship between energy consumption and GDP in Turkey. The results indicate a unidirectional causality running from energy consumption to GDP. This suggests that energy conservation may harm economic growth in the long run. Stern and Cleveland (2004) have reviewed the links between energy and growth. Time series analysis shows that energy and GDP is Co-integrated and energy use Granger causes GDP when additional variables such as energy prices or other production inputs are included. As a result, prospects for further large reductions in energy intensity seem limited.

Abdulnasser and Manuchehr (2005) examine the energy–income relationship for Sweden during the time period 1965 – 2000. The estimation results reveal that energy consumption does not cause economic activity but rather it is caused by economic activity. Mehrara (2007) examines the causality issue between energy consumption and economic growth for three typical oil-exporting countries: Iran, Kuwait and Saudi Arabia. The results are based on Causality analysis consistently show a unidirectional long-run causality from economic growth to energy consumption for Iran and Kuwait and unidirectional strong causality from energy consumption to economic growth for Saudi Arabia.

Aktas and Yilmaz (2008) investigate empirically the existence and direction of causal relationship between electricity consumption and economic growth in Turkey. By taking time series data for 1970 – 2004, Co-integration results suggest positive association between GDP and electricity consumption. Chebbi (2009) has understood long and short-run linkages between economic growth, energy consumption and carbon emission using Tunisian data based on time series data of 1971 – 2004. The results reveal a positive linkage between output and energy use. Other result indicates that carbon emission and energy consumption are positively related in the long-run. Pradhan (2010) explores the nexus between energy consumption (oil and electricity) and economic growth in the five SAARC countries over the period 1970-2006. Based on Co-integration and Error Correction Model, the paper finds a unidirectional short run and long run causality from oil consumption to economic growth in Bangladesh and Nepal. A unidirectional short run and long run causality from electricity consumption to economic growth in Pakistan and Sri Lanka is evident. A unidirectional short run and long run causality from economic growth to oil consumption in India and Sri Lanka is examined. It is analyzed that a unidirectional causality moves from economic growth to electricity consumption in India and Nepal. The bidirectional causality between electricity consumption and economic growth is also found in Bangladesh.
and between oil consumption and economic growth in Pakistan.

Noor and Siddiqi (2010) examine causal link between energy use and economic growth for five South Asian countries over period 1971-2006. Panel Co-integration, ECM and FMOLS are applied for short and long run estimates. In short run unidirectional causality from per capita GDP to per capita energy consumption is found, but not vice versa. In long run one percent increase in per capita energy consumption tend to decrease 0.13 percent per capita GDP i.e. Energy use discourages economic growth.


Binh (2011) investigates the energy consumption-growth nexus in Vietnam using time series data for the period 1976 – 2010. It is seen that per capital GDP is inversely affected by per capita energy consumption.

Magazzino (2011) has assessed the empirical evidence of the nexus between aggregate income and energy consumption for Italy during the period 1970-2009, using a time-series approach. The short-run dynamics of the variables show that the flow of causality runs from energy use to GDP, and there is a long-run bi-directional causal relationship (or feedback effect) between the two series. Consequently, we conclude that energy is a limiting factor to GDP growth in Italy.

Adom (2011) seeks to investigate the direction of causality between electricity consumption and economic growth using the Toda and Yamamoto Granger Causality Test from 1971 to 2008. The author reveals that there exists a unidirectional causality running from economic growth to electricity consumption. Thus, data on Ghana supports the Growth-led-Energy Hypothesis.

Hossain and Saeki (2011) empirically examine the dynamic causal relationships between electricity consumption and economic growth for the panel of south Asian countries using time series data from 1971 to 2007. The Granger causality test results support the existence of unidirectional causality from economic growth to electricity consumption in India, Nepal and Pakistan; and from electricity consumption to economic growth in Bangladesh. No causal relationship is found in Iran and Sri-Lanka.

Qazi et al. (2012) concentrate on the relationship between industrial output and disaggregate energy consumption in Pakistan. Utilizing time series data from 1972 to 2010 and Johansen maximum likelihood econometric technique, the study finalizes employment, oil consumption, electricity consumption, consumer price index and gas consumption as positively influencing industrial and real output in Pakistan.

Amiri and Zibae (2012) have introduced a new way for investigating linear and nonlinear Granger causality between energy use and economic growth in France over the period 1960 to 2005 using geostatistical models. Existence of long run unidirectional causality from energy consumption to economic growth is seen in the analysis.

Shahbaz and Ozturk (2012) reconsider the relationship between electricity consumption and economic growth by incorporating financial development, capital and labor as important factors of production using augmented production function in Turkey for the period of 1971-2009. The study reveals positive association of GDP per capita with electricity consumption per capita, real capital stock per capita, real domestic credit to private sector per capita and labor force participation using ARDL bound testing.
Jakovac (2013) indicated bi-directional short run causality and uni-directional long run causality running from total energy consumption to economic growth using annual data covering the period 1952 – 2010 for Croatian Economy. Kusuma and Muqorrobin (2013) indicated that granger causality was not running in both directions between output growth and energy consumption and confirmed the presence of neutral hypothesis theory. It implied that economic growth of Malaysia was not highly dependent upon energy consumption.

Nelson et al. (2013) indicated one way granger causality from electricity and petroleum consumption to manufacturing in the short run and long run and bi-directional causality between manufacturing and electricity consumption using time series data of Kenya from 1970 to 2010. Saatci and Dumrul (2013) took a structural breaks modeling approach to investigate the role of energy consumption in economic growth for Turkish economy from 1960 to 2008. The study concluded positive association of energy consumption concerning economic growth.

Muse (2014) employed the cointegration, ordinary least square analysis, error correction model and Pairwise granger causality tests to examine causal relationships between economic growth and energy consumption in Nigeria. Using time series data from 1980 to 2012, the study indicated energy consumption as enhancing factor for energy growth. Jebran (2014) revealed uni-directional causality flowing from electricity consumption to economic growth using time series data from 1971 to 2010 for Pakistan by applying granger causality test.

Chaudhry et al. (2015) discerned total labor force, capital formation, industrial output, government expenditure and energy consumption as rising factors for real Gross Domestic Product in South Asia while Real Gross Domestic Product was decreased by GDP Deflator in the long run.

Rehman and Bashir (2015) highlighted the involvement of energy consumption concerning Agricultural output. The study used Panel Autoregressive and Distributed lag model over panel data of middle income developing countries from 1990 to 2014. The long run results found energy consumption as significant and positive feature for agricultural output. GDP Deflator, broad Money and government expenditure were also improving agricultural output while capital formation and labor force were negative in the long run.

Ali et al. (2016) preferred biomass as a source of energy because it was more suitable for environmental protection as compared to fossil fuel as energy consumption. On the other side, biomass energy consumption was also revealed to be significant cause of higher growth in Sub – Saharan African countries. The findings of the study were based on pooled mean group (PMG), Dynamic OLS (DOLS), mean group (MG) and fully modified OLS (FMOLS) techniques.

Yap and Bekhet (2016) advocated that energy security had been highly required for rapid growth in Malaysia and energy security issues may be resolve by effective pricing policies. The authors analyzed that income, FDI, population and electricity prices were involved in affecting residential electricity consumption in the long run.

The above studies present the research conducted before this paper. Some studies have practiced time series data as well as Panel data in their analysis. And most of them have utilized granger causality approach for analyzing the causality. Few of them have made use of ARDL technique to examine the connection between electricity consumption and growth. Some panel studies are old enough and no one has analyzed the association with reference to Asia. The present study is different from previous studies and adds some additional points that are;

i). Existence of Solow growth model

iii). Estimation technique (Panel Co-integration)

iv). Segregated analysis of all regions of Asia continent (Central Asia, East Asia, South Asia and South East Asia)

v). No. of countries (22)

vi). Analysis of estimates (fully modified ordinary least square method)

vii). One additional variable that is electricity production.

3. Panel Data, Models and Estimation Issues

The collection of data, specification of models and estimation of results need serious attention to be taken. This section deals with the issues related to estimation of results, model specification and data collection.

3.1 Model Specification

The objective of the study is to examine the influence of electricity on real output for all regions of Asia i.e. Central Asia, East Asia, South Asia and South East Asia. The research follows Solow Growth model that’s why labor force and capital formation are included as proxy of labor and capital respectively. Considering linear form of equations, the study determines the following models independently for all regions.

3.1.1 Central Asia

\[ RGDP_{CA} = \alpha_0 + \alpha_1 TLF_{CA} + \alpha_2 GCF_{CA} + \alpha_3 ELPROD_{CA} + \varepsilon_{CA} \]

3.1.2 East Asia

\[ RGDP_{EA} = \beta_0 + \beta_1 TLF_{EA} + \beta_2 GCF_{EA} + \beta_3 ELPROD_{EA} + \varepsilon_{EA} \]

3.1.2 South Asia

\[ RGDP_{SA} = \gamma_0 + \gamma_1 TLF_{SA} + \gamma_2 GCF_{SA} + \gamma_3 ELPROD_{SA} + \varepsilon_{SA} \]

3.1.4 South East Asia

\[ RGDP_{SEA} = \delta_0 + \delta_1 TLF_{SEA} + \delta_2 GCF_{SEA} + \delta_3 ELPROD_{SEA} + \varepsilon_{SEA} \]

Where subscripts CA, EA, SA, and SEA respectively denote Central Asia, East Asia, South Asia and South East Asia; \( \alpha \)'s, \( \beta \)'s, \( \gamma \)'s and \( \delta \)'s show values of coefficients for Central Asia, East Asia, South Asia and South East Asia; and \( \varepsilon \)'s indicate error terms of regression models.

3.2 Definition of variables

In the above specified models, following variables are used as explained below.

3.2.1 Real Gross Domestic Product (RGDP)

The dependent variable, Real Gross domestic product is defined as total goods and services produced within the economy evaluated at constant market prices. We have taken the prices of year 2000 to calculate Real GDP. RGDP is taken in U.S. dollars for Central Asia, East Asia, South Asia and South East Asia.

3.2.2 Total Labor Force (TLF)

TLF denotes total labor force in these Asian regions i.e. Central Asia, East Asia, South Asia, South East Asia. In total labor force, all males and female are considered who fall in age group of 15 – 65. It is taken as a proxy of labor. Labor force is expected to be positively related to real output in these regions.

3.2.3 Gross Capital Formation (GCF)

GCF explains gross capital formation for all the regions of Asia. GCF is taken as a proxy of capital. The
unit of gross capital formation is current U.S dollars. Capital is hypothesized as positively influencing real gross domestic product of Asia Continent.

3.2.4 Electricity Production (ELPROD)
For energy production, we are including electricity production in KWh because electricity is considered as the major source of energy for producing goods and services in an economy. We suppose that more Electricity production may lead to higher real output in Asia. But excess production above the limits may decline real output as well due to unnecessary utilization.

3.3 Data Sources
To investigate the dimensions of electricity for real gross domestic product in Asia Continent, the research incorporates all regions of Asia like Central Asia, East Asia, South Asia and South East Asia. Moreover, the study is based upon segregated analysis of all the regions of the Continent. The research chooses some selected countries from each region according to availability of data. From central Asia, the paper considers Kazakhstan, Kyrgyz, Tajikistan, Turkmenistan, and Uzbekistan. In East Asia, we have taken China, Hong Kong, Japan, Korea and Mongolia. Among South Asia region, the study includes Bangladesh, India, Nepal, Pakistan, and Sri Lanka. Some countries are selected from South East Asia region those are Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam. The analysis selects time period from 1990 to 2015 for all countries regarding selected variables. Data is collected from website of World Bank, World Development Indicators, International Financial Statistics and Global Development Finance.

3.4 Estimation Issues
The current study analyses the influence of electricity on real output in Asia Continent. It is based upon segregated evaluation of all the regions of Asia (Central Asia, East Asia, South Asia and South East Asia) by forming panel of all regions individually. Whenever, we try to inspect panel of countries, we need to pay attention on several issues of panel data those are described step by step as follows;

1. To explore stationary of the panel variables.
2. To decide about an appropriate estimation approach (Fixed & Random Effects or Panel Co-integration or Generalized Method of Moments).
3. Apply Panel Co-integration test (Pedroni or Kao or Fisher) to investigate long run relationship (If Panel Co-integration is decided to apply on the basis of unit root test).
4. To evaluate coefficients for general specified model using Fully Modified Ordinary Least Square method (FM-OLS).
5. Then use the results for economic interpretation and policy making.
Based upon the above steps, econometric methodology is described in detail.

3.4.1 Im, Pesaran and Shin W-Stat (Unit Root Test)
The Im, Pesaran and Shin test (1997) provides separate estimation for each ‘i’ section, allowing different specifications of the parameter values, the residual variance and the lag lengths. Their model is given by:

\[
\Delta Y_{it} = a_i + \rho_i Y_{i,t-1} + \sum_{k=1}^{n} \phi_{ik} \Delta Y_{i,t-k} + \delta_i t + \theta_i + \mu_{it}
\]  

(a)

The null hypothesis of this test is that all series are non-stationary processes under the alternative that a fraction of the series in the panel are assumed to be stationary.

3.4.2 Kao (Engle – Granger based) Co-integration Test
The Kao test (1999) follows the same basic approach as the Pedroni tests, but specifies cross section specific intercepts and homogenous coefficients on the first stage regressors. Under the null of no Co-integration, Kao shows that following the statistics;
\[
ADF = \frac{t_p + \sqrt{6N}\hat{\sigma}_u/(2\hat{\sigma}_{ov})}{\sqrt{\frac{\hat{\sigma}_v^2}{2\hat{\sigma}_0^2} + \frac{2\hat{\sigma}_0^2}{10\hat{\sigma}_{0v}^2}}}
\]

3.4.3 Fully Modified Ordinary Least Square Method (FM-OLS)

After establishing Panel Co integration, the analysis requires estimates for macroeconomic variables to get the intensity of long run relationships. Kao and Chen (1995) notice that ordinary least square method gives asymptotically normal but asymptotically biased results in Panel Co-integrated models. Chen, McCoskey and Kao (1999) have investigated that generally, the bias – corrected ordinary least square coefficients do not improve over the OLS estimators. They suggest Fully Modified least square (FM-OLS) estimators or dynamic least square (DOLS) may be more appropriate for Panel Co-integrated regressors. Phillips and Moon (1999) and Pedroni (1996) also have proposed fully modified least square (FM-OLS) method for Co-integrated panel results. FM – OLS is a generalization of Phillips and Hansen (1990). Kao and Chang (2000) propose another approach that is based on a panel dynamic least squares (DOLS). On the basis of above discussion, the research has made use of Fully Modified least squares (FM-OLS) technique.

4. Panel Results and Discussions

This section describes Panel results on the basis of Graphical analysis and Econometric Analysis explained below.

4.1 Graphical Analysis

Figure 1 exhibits picture of central Asia about real growth rate of GDP and electricity production growth. There is decline in electricity production growth and growth rate up to 1993, after this year both have started increasing up to 2000. After 2000, a mixed behavior is seen among growth rate and energy growth but in all cases both are moving in same direction. So for Central Asia, we can conclude positive relationship between real GDP and Electricity production. Interestingly, in initial years of analysis from 1990 – 1998 and from 2007 – 2008, growth rate and electricity growth has remained negative as well.

**Figure-1: Growth and Electricity relationship in Central Asia**

Association among electricity growth and real growth rate of GDP is displayed in figure 2 for East Asia. For 1997, electricity production growth is negative, leading to lowest growth rate in East Asia; in 2008, it is near to 0 in East Asia. Electricity production growth is remained higher during 2001 – 2007. Despite lower excess production of electricity in East Asia on the average as compared to real GDP as it is remained higher i.e. 1400 billion dollars (Table 2). On the other side, most of the times, growth rate and
electricity production growth rate were moving side by side or may be in same direction. This evidence gives us confused direction of relationship among electricity production and economic real output. The relationship may be positive or negative among electricity production and real GDP.

**Figure 2: Energy and growth relationship in East Asia**

Relationship of economic growth with electricity growth is presented in figure 3 in South Asia for 1990 to 2011. The association among these variables is seem to be confused because the relationship may be explored as positive during 1990 to 1994. But these variables are oppositely related to each other during 1995 to 2000. Again positive connection between growth rate and electricity production growth is analyzed from 2002 to 2008. In 2009-2011, the correlation among them is again negative. We may not conclude that whether the link is positive or negative among them.

**Figure 3: Economic growth and Electricity growth in South Asia**
To interpret the correlation among real GDP growth rate and electricity production growth in South East Asia, we have drawn figure 4. This figure clearly presents that electricity growth is negative or low from 1996 to 1998; in the same years growth rate of GDP is also remained very low. But surprisingly, other than these years, growth rate and electricity growth are moving in same direction. We can conclude direct correlation among growth rate of GDP and electricity production growth.

4.2 Econometric Analysis
This section confers the panel results considering unit root test (Im, Pesaran and Shin W-Stat), Co-integration test (Kao Panel Co-integration test) and Fully Modified Ordinary least square methods. Table 3 displays the levels of stationary regarding dependent and explanatory variables included in the models with reference to all regions of Asia (Central Asia, East Asia, South Asia and South East Asia). The study incorporates only final conclusions concerning to all variables. We may successfully reject Null Hypothesis (variable is non-stationary) of unit root test on the basis of Probability value (should be less than 0.05) and may deduce that all the concerned variables (RGDP, GCF, ELPROD and TLF) are integrated of order 1. Fulfilling basic condition of Co-integration, we can apply Kao Panel Co-integration test on specified models.
The significance of variables may be examined by probability value in real output. The sign for the concerned variable is significantly positive in line with the economic theory. More capital formation and investment offers the economy and real output by 0.61, 0.57 and 0.76 dollars on the average in the long run. Positive relationship of capital is here in these regions. The values of coefficient suggest that 1 dollar increase in Gross capital formation leads to real output of East Asia on the average by 5.07 dollars in the long run. The progress of China, Japan, Korea and Hong Kong are evident in these regions. One dollar increase in Gross capital formation has much stronger and more elastic influence on real output as compared to other regions of Asia. In East Asia, gross capital formation has much stronger and more elastic influence on real output as compared to other regions of Asia. One dollar increase in Gross capital formation is a cause of increasing 5.07 dollars in real output of East Asia on the average in the long run. The progress of China, Japan, Korea and Hong Kong are evident due to optimally utilized capital in East Asia region. In Central Asia, South Asia and South East Asia; capital has less elastic influence means capital is less efficiently utilized here in these regions. The values of coefficient suggest that 1 dollar rise in gross capital formation leads to real output by 0.61, 0.57 and 0.76 dollars on the average in the long run. Positive relationship of capital is in line with the economic theory. More capital formation and investment offers the economy and

In table 4, results of Kao Residual Panel Co-integration test are provided. Null hypothesis (No Co-integration) may be rejected for Panel Co-integration test on the basis of Probability values and presence of Panel Co-integration is inferred. By selecting Bandwidth as Newey West Automatic at 1st lag, Panel Co-integration is found for Central Asia, East Asia and South Asia. Panel Co-integration also exists in South East Asian model by selecting Bandwidth as Newey West Fixed at 1st lag. After tracing out Panel Co-integration, we can apply fully modified ordinary least square test for values of coefficients.

Table 3: Im, Pesaran and Shin W-Stat

<table>
<thead>
<tr>
<th>Variables</th>
<th>Test in</th>
<th>By Including</th>
<th>Statistics</th>
<th>Prob.</th>
<th>Lag</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGDP</td>
<td>1st Difference</td>
<td>Trend and Intercept</td>
<td>-2.23</td>
<td>0.01</td>
<td>Auto</td>
<td>I(1)</td>
</tr>
<tr>
<td>GCF</td>
<td>1st Difference</td>
<td>Intercept</td>
<td>-2.25</td>
<td>0.01</td>
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<tr>
<td>ELPROD</td>
<td>1st Difference</td>
<td>Intercept</td>
<td>-4.89</td>
<td>0.00</td>
<td>Auto</td>
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<tr>
<td>TLF</td>
<td>1st Difference</td>
<td>Trend and Intercept</td>
<td>-4.52</td>
<td>0.00</td>
<td>Auto</td>
<td>I(1)</td>
</tr>
<tr>
<td>South Asia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>RGDP</td>
<td>1st Difference</td>
<td>Intercept</td>
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<td>Trend and Intercept</td>
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<td>1</td>
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<td>ELPROD</td>
<td>1st Difference</td>
<td>Intercept</td>
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<td>0.00</td>
<td>Auto</td>
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<tr>
<td>TLF</td>
<td>1st Difference</td>
<td>Intercept</td>
<td>-5.48</td>
<td>0.00</td>
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</tbody>
</table>

South East Asia

<table>
<thead>
<tr>
<th>Variables</th>
<th>Test in</th>
<th>By Including</th>
<th>Statistics</th>
<th>Prob.</th>
<th>Lag</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGDP</td>
<td>1st Difference</td>
<td>Intercept</td>
<td>-5.65</td>
<td>0.00</td>
<td>Auto</td>
<td>I(1)</td>
</tr>
<tr>
<td>GCF</td>
<td>1st Difference</td>
<td>Intercept</td>
<td>-7.61</td>
<td>0.00</td>
<td>Auto</td>
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</tr>
<tr>
<td>ELPROD</td>
<td>1st Difference</td>
<td>Intercept</td>
<td>-6.86</td>
<td>0.00</td>
<td>Auto</td>
<td>I(1)</td>
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<tr>
<td>TLF</td>
<td>1st Difference</td>
<td>Intercept</td>
<td>-5.12</td>
<td>0.00</td>
<td>Auto</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

Note: Null Hypothesis: No Co-integration among variables

Table 4: Kao Residual Panel Co-integration Test

<table>
<thead>
<tr>
<th>Region</th>
<th>t – Statistic</th>
<th>Prob.</th>
<th>Lag</th>
<th>Bandwidth Selection</th>
<th>Cointegration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Asia</td>
<td>-3.61</td>
<td>0.00</td>
<td>1</td>
<td>Newey West Automatic</td>
<td>Yes</td>
</tr>
<tr>
<td>East Asia</td>
<td>-3.32</td>
<td>0.00</td>
<td>1</td>
<td>Newey West Automatic</td>
<td>Yes</td>
</tr>
<tr>
<td>South Asia</td>
<td>-6.27</td>
<td>0.00</td>
<td>1</td>
<td>Newey West Automatic</td>
<td>Yes</td>
</tr>
<tr>
<td>South East Asia</td>
<td>1.68</td>
<td>0.04</td>
<td>1</td>
<td>Newey West Fixed</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 5 portrays the panel estimates provided by the fully modified ordinary least square method. First column shows the information about variables while second column displays the values of coefficients and probability values for Asia Continent. In 2nd column, estimates of all Asian regions are reported in relation to their individual columns. The significance of variables may be examined by probability value that should be less than 0.05.

Considering Gross Capital formation that is representative of Capital in Solow Growth model, the study analyzes it most important variable for real output. The sign for the concerned variable is significantly positive for all regions of Asia continent (Central Asia, East Asia, South Asia and South East Asia). In East Asia, gross capital formation has much stronger and more elastic influence on real output as compared to other regions of Asia. One dollar increase in Gross capital formation is a cause of increasing 5.07 dollars in real output of East Asia on the average in the long run. The progress of China, Japan, Korea and Hong Kong are evident due to optimally utilized capital in East Asia region. In Central Asia, South Asia and South East Asia; capital has less elastic influence means capital is less efficiently utilized here in these regions. The values of coefficient suggest that 1 dollar rise in gross capital formation leads to real output by 0.61, 0.57 and 0.76 dollars on the average in the long run. Positive relationship of capital is in line with the economic theory. More capital formation and investment offers the economy and
industrial sector to expand more to produce goods and services within the geographical location of country or to enhance GDP in real sense that is one of the macroeconomic goals. Our results are consistent with the study of Shahbaz and Ozturk (2012).

Coming towards the total labor force (proxy of labor), it is therefore concluded that labor force is a source of higher real output. In the short run as well as in the long run, labor plays its significant role in producing more goods and services. Normally, underdeveloped countries are more dependent upon labor force participation due to less availability of new technology. Skilled labor is also a blessing for any economy. In comparison with South Asia and South East Asia, the labor force of Central Asia seems to be extremely productive and skilled. Although Kazakhstan, Turkmenistan, Uzbekistan, and Tajikistan are less populated areas, the mean value of total labor force is 4.74 million for Central Asia; but labor force proves to be extremely productive in this region. It is also clear from the value of coefficient that is 1.21. For South Asia and South East Asia, values of labor force are correspondingly 0.19 and 0.12. Labor force of East Asia also looks extensively improved but it is associated with insignificant coefficient value. Real output will increase by 1.21, 0.19 and 0.12 thousand dollars on the average due to an additional unit of labor force in Central Asia, South Asia and South East Asia respectively in the long run. The analysis is in line with the Shahbaz and Ozturk (2012) and Qazi et al. (2012).

### Table 5: Panel Estimates of Fully Modified Ordinary Least Square

<table>
<thead>
<tr>
<th>Variables</th>
<th>Central Asia</th>
<th>East Asia</th>
<th>South Asia</th>
<th>South East Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient (Probability)</td>
<td>Coefficient (Probability)</td>
<td>Coefficient (Probability)</td>
<td>Coefficient (Probability)</td>
</tr>
<tr>
<td>Gross Capital Formation</td>
<td>0.61 (0.00)</td>
<td>5.07 (0.00)</td>
<td>0.57 (0.00)</td>
<td>0.76 (0.00)</td>
</tr>
<tr>
<td>Total Labor Force</td>
<td>1.21 (0.00)</td>
<td>0.76 (0.58)</td>
<td>0.19 (0.00)</td>
<td>0.12 (0.07)</td>
</tr>
<tr>
<td>Electricity Production</td>
<td>0.13 (0.00)</td>
<td>-2.01 (0.01)</td>
<td>0.55 (0.00)</td>
<td>0.76 (0.00)</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.59 (0.00)</td>
<td>3.23 (0.09)</td>
<td>1.25 (0.00)</td>
<td>2.17 (0.00)</td>
</tr>
<tr>
<td>Adj. R – Square</td>
<td>0.96</td>
<td>0.66</td>
<td>0.99</td>
<td>0.81</td>
</tr>
</tbody>
</table>

With regards to electricity production in Asia Continent, it is not incorrect to express that it is the major source of energy. Agriculture sector, Services sector, Manufacturing sector, Government sector as well as all sectors are dependent upon this important source of energy. The study notices significant relationships for Central Asia, East Asia, South Asia and South East Asia. The relationship of electricity production is positive with real output. The negative relationship is observed in case of only East Asia (China, Hong Kong, Japan, Korea, and Mongolia). It shows that real GDP is significantly expanded by efficient use of capital and labor force but electricity production is not essential for real output in East Asia. May be in this region, there is no shortage of electricity, real GDP is at maximum level as compared to all other regions having much sustained growth rate, labor force and capital are available in excess in contrast with other regions so electricity keeps no value among all these. Discussing electricity production for Central Asia, South Asia and South East Asia, outcome that is matched with the economic theory as energy production is playing vital role in real output expansion significantly. More electricity production enables the industrial sector to produce more at least cost and ultimately it will lead to higher real output. On the average, respectively in Central Asia, South Asia and South East Asia, one KWh more production of electricity raises real output by 0.13, 0.55 and 0.76 dollars in the long run.

### 5. Concluding Remarks and Policy Implications

The intention of the current paper is to investigate the influence of Electricity on real output of Asia Continent containing data from 1990 – 2015. Following Solow growth model, separate effect is traced out for each region of Asia. Graphical analysis suggests the positive association of real growth rate and
electricity production growth rate in all the regions. In some years, we get the negative relationship of real growth rate with electricity production growth rate in South Asia region, South East Asia region and Central Asia. This is happened either due to lag effect of electricity production growth rate on real growth rate or due to any inefficiency in electricity production.

For Econometric analysis; Im, Pesaran and Shin W – test (Unit root test) is pertained to analyze stationarity of panel variables. It implies that dependent and explanatory variables are integrated of order 1 that allows proceeding further for Co-integration analysis. Kao Panel Co-integration test is utilized to examine long run relationship among variables, and it infers the presence of Co-integration. Fully Modified Ordinary least square test is employed for values of long run coefficients. It advocates that in all regions of Asia Continent, real GDP is highly dependent upon total labor force in the long run. On the other side, regarding gross capital formation, the study indicates the same results. Gross capital formation is playing vital role in enhancing real output in all regions of Asia.

The findings of this paper investigate mixed results in terms of electricity generation. Electricity production is accomplished to significantly increase real output in various regions of Asia like Central Asia, South Asia and South East Asia. In East Asia, outcome is conflicting probably as a result of no dependence on electricity production of this region. There is no concept of electricity shortage there and their dependence is on skilled labor force and efficient capital investment.

On the basis of above findings, following policies may be recommended.

i. As labor force plays essential role in real output enhancement, still attention should be given for provision of skill development plans to the young labor specifically in underdeveloped countries of Asia.

ii. Gross capital formation has always active part in amplifying real output for any economy. In Asia Continent, it is also behaving like that but there should be cheap delivery of such finances in all the regions equally.

iii. On the basis of electricity production, it may be suggested that there should be keen emphasis on cheap electricity production through cheap resources in all the regions so that it may be supplied at lower rates.

References


Khan, M. A. and Ahmed, U. (----). Energy Demand in Pakistan: A Disaggregate Analysis.


Impact of China-Pakistan Economic Corridor (CPEC) on Pakistan’s Trade:
Empirical Evidence from Gravity Model

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ABSTRACT
Purpose: The China–Pakistan Economic Corridor (CPEC) is an enormous project for both economies. There are much potential remunerations for concerning frugalities in trade and industries of both countries. The study was specifically designed to examine the influence of CPEC on fruits export of Pakistan. The bilateral or regional trade was examined through Gravity approach. Data was taken from 2013 to 2015. Since distance plays a vital role in trade, the outcomes of gravity model are estimated with ordinary least square method. Pakistan China Economic Corridor is a mega project for both economies. It will make Pakistan and China, the major economic players in the region and further enhance economic conditions of both countries. Some of the basic determinations of Pak-China economic corridor are to boost business opportunities, efficient transport routes and expanding regional trade. The export target of Pakistan was $ US 20 billion in 2013-2015. As of April 2015, Pakistan exports stand at $ US 6,178 billion. Pakistan’s exports to Asia was amounted to $ US 1,649 billion which was 42 percent of its overall exports and the share of fruit and nuts markets in Pakistan’s export was $ US 1,017 billion. The paper analyses the CPEC’s impact on exports especially exports from fruit market of Pakistan using Gravity Approach for the evaluation of this bilateral trade. The results show that CPEC reduces the distance and it will be more beneficial for perishable goods trade like fruits.

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1. Introduction
Analysis of regional or bilateral trade agreements is an interesting research topic as it may lead concerning countries towards progress in different sectors of their economies. Many countries are experiencing trade liberalization and had made several trade agreements. A large number of countries
have preferential trade agreements. The purpose of these agreements is to lead direct and indirect trade ability (OECD, 2006). Pakistan has export relations with entire world particularly with Asia. The present research aims at analyzing the CPEC’s impact on Pakistan’s potential fruit trade between South Asian region and Middle East countries through gravity approach. We have analyzed the cross section data of three years from 2013 to 2015. CPEC is an important economic agreement between Pakistan and China. It will function as a primary gateway for trade between China, Africa and the Middle East. It will associate China to the Central Asia, South Asian region and Middle East and its major deep-sea port. China and Pakistan has developed a strong bilateral trade over the years. China is arising partner of Pakistan in both export and import terms. Bilateral trade between the two countries were established in January, 1963 and long term Free Trade Agreement (FTA) was signed on November 24, 2006 (IPCS, 2006). Hypothetical formulation of the study is whether CPEC will improve the Pakistan’s competitive position in china and south Asian countries for its fruit market or not.

The purpose of Pak china Free trade agreement was to enhance trade liberalization and create Pakistan’s sensitive product (fruits) market and increase its export in China and South Asian countries. For this bilateral trade analysis gravity approach is the precise tool for estimation. A bulk of research paper has used gravity approach for bilateral trade, gravity equation or method can simply determine the trade patterns and the effect of sensitive product export (Otsuki et al 2000).

The idea behind to use gravity model was that it can widely use data of past decades, regional trade pattern separately and also have ability to incorporate the characteristics of different countries’ units (Sandberg, 2004). In bilateral trades distance is an important indicator to stimulate trade between countries. Theoretically, it is also an indication that small distance can lead increasing flow of trade (Keith, Head, 2008).

Pakistan and china started its friendly relationship after 1950s but the beginning of smooth relationship among these countries was started after 1960s, Pak-India war and China-India war. At first, Pakistan was reluctant to accept China due to differences between communist and capitalism blocs (Chaudhri, 1987). Relations further enhanced after the two countries signed a trade agreement in 1953 (Dixit, 1987). As the further time passed, china realized the importance of its neighbor country’s demographic and economic value. Hence, trade liberalization agreement in the form of Gawader port was signed in 2006 at a cost of $ US 46 billion. There is one Belt, one road initiative. The importance of CPEC to China is reflected by its inclusion as part of China's 13th five-year development plan. This project will increase country’s annual economic growth from 2 to 2.5 percent. All the planned projects will eventually link the Gwader, a city of Pakistan situated in southwestern area to China's northwestern autonomous region of Xinjiang via a vast network of highways and railways (United Nations Economic and Social Commission for Asia and the Pacific, 2006).

There are there major trade routes, central, southern and northern which connect china to other countries. Pakistan is the vital partner of China because it links china with central, South Asian region, and Middle East (Pakistan vision vol, 16). The economic part of CPEC is to integrate the regional through, bilateral trade, free trade agreements, and increase trade flow between referring countries, Infrastructure development, business opportunities, efficient transport routes, expanding regional trade and raising per capita income. In short CPEC is a game changer or the name of economic stability for concerning units.

As far as bilateral trade in agriculture sector have slow pace. Pakistan is agrarian country and horticulture is an important sector of agriculture. The sustainable development program of Pakistan foresees to pursue the progressive liberalization of trade in agriculture. However, selected time will be chosen for selected aim systemically and ways will be adopted gradually to achieve agrarian goals (Government of Pakistan, 2006). Consequently, the CPEC route will have preferred challenges on agrarian trade.
2. Trade between Pakistan and CPEC concerning countries

CPEC basic agenda is to promote trade liberalization through these routes. China Pakistan economic corridor tends to be product specialization in bilateral trade. In fact Pakistan is the major partner of this corridor so it is a region which has direct impact. In case of fruit trade or especially on export side, the regions like Far East, Middle East and Central Asian States of Former Soviet Union are the major markets of Pakistani fruits. Even though a great scope is always there for export to more developed countries like Japan, Canada and Europe. Fruits are more risky to produce than other crops. The variability in yield of fruits is 2-3 times more than that in rice yield (Ranaweera and De Silva 2000). However, in case of perishable goods such as fruits and vegetables, regional trade appears to be quite more sensitive. Pakistan produces high quality oranges and mangoes exports to USA, UK and China. Pakistan is the 4th largest mangos and 11th largest orange producer i.e. Chounsa, Malta and Kenoes are product of Pakistan. Pakistan is 2nd largest exporter of rice to china and also gains sizeable share in the halal food market in china. Pakistan china imports of agriculture product increased worth $430 million and Pakistan exports of food such as fruits along with vegetable increased worth $320 million in 2013-14 (Govt. of Pakistan 2014).

Pakistan’s exports are estimated at about 69.2 billion rupees, which has roughly about 8 percent of agricultural value added in the year. Pakistan earned 5.4 billion rupees from fruit exports during 2014-2015, representing nearly 11 percent of total amount earned from the export of all raw agricultural commodities.

Figure 1:

During the year 2010-15, Pakistan exported 262 thousand metric tons of fruit valued at Rs. 5.394 billion. The citrus, mangoes, dates, and grapes accounted for 30 percent, 23 percent, 22 percent and 01 percent respectively in terms of foreign exchange earnings (Pakistan Economic Survey). In figure 1 describe the Pakistan’s exports and imports in period 2013 -2015, which shows a slightly increasing trend in export. On the other hand import ratio has sharp increase as compared to export. It means that there is absence of attention in export sector.
Pakistan export is based on different subdivision of economy. The food and agro sector has the second dominating rate in total export of Pakistan as shown in table 1.

**Figure 2: Region wise Pakistan Export Share**

![Region wise Pakistan Export share July-Sep 2014-15 Total export US$ 6,178 million](image)

Although yearly average change has low-slung respectively. But increasing trend in these sectors indicates that there are inordinate potential to enhance export.

**Table 1: division or sector wise export rate of pakistan during 2013-2015**

<table>
<thead>
<tr>
<th>COMMODITY SECTORS</th>
<th>SEPTEMBER 2014</th>
<th>SEPTEMBER 2013</th>
<th>% Change</th>
<th>JULY-SEPTEMBER 2014</th>
<th>JULY-SEPTEMBER 2013</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAND TOTAL</td>
<td>2,181</td>
<td>2,617</td>
<td>-16.67</td>
<td>6,915</td>
<td>6,695</td>
<td>-10.15</td>
</tr>
<tr>
<td>A TEXTILE &amp; GARMENTS CATEGORY</td>
<td>1,255</td>
<td>1,270</td>
<td>-1.16</td>
<td>3,417</td>
<td>3,559</td>
<td>-3.99</td>
</tr>
<tr>
<td>B AGRO &amp; FOOD</td>
<td>335</td>
<td>340</td>
<td>-1.23</td>
<td>904</td>
<td>1,017</td>
<td>-11.16</td>
</tr>
<tr>
<td>C MINERAL &amp; METAL</td>
<td>130</td>
<td>407</td>
<td>-67.95</td>
<td>330</td>
<td>591</td>
<td>-44.18</td>
</tr>
<tr>
<td>D ENGINEERING GOODS &amp; OTHER MANUFACTURES</td>
<td>211</td>
<td>347</td>
<td>-39.21</td>
<td>650</td>
<td>822</td>
<td>-20.84</td>
</tr>
<tr>
<td>E OTHER SECTORS</td>
<td>249</td>
<td>254</td>
<td>-2.12</td>
<td>714</td>
<td>706</td>
<td>1.06</td>
</tr>
</tbody>
</table>

*Source: Direction of trade statistics and economic survey of Pakistan, 2015.*
Pakistan’s export expands to all over the world but Asia is the major export region for Pakistan. As shown in figure 2, Pakistan bilateral trade in export side linked with Asia, Europe, America and Africa is 42 percent, 31 percent, 20 percent and 6 percent respectively. The figure 2 shows that Asia is the major region for Pakistan’s exports.

Table 3: Pakistan exports share in ASIAN countries.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Asian Countries</th>
<th>JULY-SEPTEMBER</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2014-15</td>
<td>2013-14</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>2,588,204</td>
<td>2,767,147</td>
</tr>
<tr>
<td>1</td>
<td>China</td>
<td>543,596</td>
<td>701,434</td>
</tr>
<tr>
<td>2</td>
<td>Afghanistan</td>
<td>397,345</td>
<td>249,605</td>
</tr>
<tr>
<td>3</td>
<td>U. A. E</td>
<td>338,526</td>
<td>416,628</td>
</tr>
<tr>
<td>4</td>
<td>Bangladesh</td>
<td>175,731</td>
<td>185,991</td>
</tr>
<tr>
<td>5</td>
<td>Singapore</td>
<td>152,046</td>
<td>89,300</td>
</tr>
<tr>
<td>6</td>
<td>Saudi Arabia</td>
<td>115,589</td>
<td>117,109</td>
</tr>
<tr>
<td>7</td>
<td>Hong Kong</td>
<td>113,764</td>
<td>126,478</td>
</tr>
<tr>
<td>8</td>
<td>South Korea</td>
<td>104,434</td>
<td>112,103</td>
</tr>
<tr>
<td>9</td>
<td>India</td>
<td>100,887</td>
<td>89,068</td>
</tr>
<tr>
<td>10</td>
<td>Turkey</td>
<td>87,720</td>
<td>99,153</td>
</tr>
</tbody>
</table>

Source: State Bank of Pakistan 2015.

According to the State Bank of Pakistan (2015), Asia is major export shareholder of Pakistan, central and southern countries also have leading exports value. Within Pakistan’s agriculture, the horticulture is an important sector, production of fruits is 6.2 metric tons, production of vegetables 5.0 metric tons, production of citrus is 2.0 metric tons, mangoes’ production is 1.0 metric tons, dates’ produce is 0.63 metric tons and apples 0.4 metric tons. Total values of exports of fruits and vegetables is $ US 120435000 and quantity is 471693 tons and 70 percent of Pakistan’s fruits export is toward Middle East and central Asia (Ministry of Food, 2015). History shows that Pakistan has a number of international trade agreements in order to boost up worldwide trade. Table 3 shows the impact of free trade agreements on Pakistan trade. We find that after the starting of free trade agreements with concerning countries Pakistan’s export as well as trade balance has a snowballing reaction.
Table 3: Overview of Pakistan’s Free Trade Agreements

<table>
<thead>
<tr>
<th>Country</th>
<th>Year Implemented</th>
<th>Pakistan’s Exports in year of implementation</th>
<th>Pakistan’s Trade Balance in year of implementation</th>
<th>Trade Exports in 2014</th>
<th>Pakistan’s Trade Balance in 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka</td>
<td>2005</td>
<td>$0.154B</td>
<td>$0.094B</td>
<td>$0.301B</td>
<td>$0.217B</td>
</tr>
<tr>
<td>China</td>
<td>2006</td>
<td>$0.507B</td>
<td>$(2.408)B</td>
<td>$2.253B</td>
<td>$(7.336)B</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2008</td>
<td>$0.136B</td>
<td>$(1.556)B</td>
<td>$0.234B</td>
<td>$(1.046)B</td>
</tr>
<tr>
<td>Indonesia</td>
<td>2013</td>
<td>$0.144B</td>
<td>$(1.064)B</td>
<td>$0.138B</td>
<td>$(1.969)B</td>
</tr>
<tr>
<td>Mauritius</td>
<td>2007</td>
<td>$0.036B</td>
<td>$0.035B</td>
<td>$0.028B</td>
<td>$0.006B</td>
</tr>
</tbody>
</table>


3. Data and Methodology

Basically gravity model of international trade, forecasts the bilateral trade. The bilateral trade is based on economic size and distance between two selected areas or units. The economic size is normally captured with GDP measures. In international trade the derivation of gravity model analysis is normally the attribute of Tinbergen (1962) and Pöyhönen (1963). On the other hand, the gravity model of migration in urban geography is specifically used to predict the degree of interaction between two places (Rodrigue et al., 2009). Such model has also been applied to other bilateral data as migration, traffic, remittances and foreign direct investment. It can also be used to test the effectiveness of trade agreements, organizations and to evaluate the impact of treaties and alliances on trade (Head and Mayer, 2014). The basic impression derived from this model is bilateral trade from one country to another. In this model the dependent variable is based on factors that capture the propensity of a country to import, potential of a country’s export (good and services) and also any other forces that either appeal or hinder bilateral trade. The following equation arrangement is going to express the gravity equation of international trade as:

\[ \ln X_{ijt} = \beta_0 + \beta_1 \ln (D_{ij}) + \beta_2 \ln(Y_{it}) + \beta_3 \ln(Y_{jt}) + \beta_4 \ln(Y_{it}/N_{it}) + \beta_5 \ln(Y_{jt}/N_{jt}) + \beta_6 \ln(Q_{it}/N_{it}) + \beta_7 \ln(Q_{jt}/N_{jt}) + \gamma W + u_{ijt} \]  

Where,

- \( X_{ijt} \): is the bilateral exports from country i to country j in period t.
- \( Y_{it} \): is the GDP of the exporter (country i) in time t.
- \( Y_{jt} \): is the GDP of the importer (country j) in time t.
- \( Y_{it}/N_{it} \): is the GDP per capita of the exporter in time t.
- \( Y_{jt}/N_{jt} \): is the GDP per capita of the importer in time t.
- \( Q_{it}/N_{it} \): is the production per capita of the exporter in time t.
- \( Q_{jt}/N_{jt} \): is the production per capita of the importer in time t.
- \( D_{ij} \): is the bilateral distance between the two capital’s countries.
- \( W \): is a vector of variables capturing any resistance to trade or binary variables to control the participation in any trade agreement.
- \( u_{ijt} \): normally distributed error component capturing any random influence.

According to the model formulation, the gravity model shows relationship between two countries and movements in trade depend on several economic indicators and geographical indicators. In practical or applied form of work, the model can be extended by including some variables for justification for language relationships, tariffs, contiguity, access to sea, colonial history, and exchange rate regimes (Anderson and van Wincoop, 2003).

For our model specification, some essential variables that encounter the required study units are included. So we are going to include production per capita as a core variable. Our concern of study focuses on fruit, vegetable and citric market (horticulture trade). It is evident that traditional gravity variables (as discus
above) shows statistically significant results on agricultural or horticultural trade. It is also evident that gravity model has clear influencing impact because of associated trade agreements (Baier and Bergstrand, 2009).

4. Theoretical Frame Work
Including variables, GDP for both exporting and importing country, GDP per capita and distance have some theoretical justifications. According to that, theoretically the effect of the distance between countries ($\beta_1$) must be negative and statistically significant. The distance between the countries has great impact on trade because the countries that are closely situated will focus on more trade to each other.

The coefficient of countries GDP ($\beta_2$ and $\beta_3$) on agriculture trade will have the statistically significant impact. Mostly poor countries have the specialization on agriculture export that leads to negative sign of $\beta_4$. It is also in advance that rich countries do more exports rather than poor countries because of infrastructural facilities, technical dimension and development. All this shows that the value of coefficient estimate for GDP per capita of the exporters ($\beta_4$) may have negatively or positively sign depending on whether the country exports less when it is relatively rich (absorption effect) or whether a richer country may exports more than a poorer country by taking advantage of developed tools (technical, infrastructure etc.). Similar reasons will approach the ambiguous signs for the coefficients of GDP per capita for the importers ($\beta_5$). Above justification can be particularly imposed on agricultural trade or fruits and vegetable trade. So in the simple technique we are introducing the production per capita of fruits and vegetables for the exporting and the importing countries ($\beta_6$ and $\beta_7$). Thus expected values of per capita production show that there will be positive sign for fruit and vegetable exporter country and negative sign for importer country (Martinez-Zarzoso and Nowak, 2003).

Some notes of caution must be needed when specific sectors are selected such as fruit and vegetable market, representation of gravity model and bilateral agreements. It is the beauty of gravity model that it can capture the effects of trade barriers like tariff and non-tariff. The coefficient of the binary variables and size of the trade can be reviewed to the implementation of (FTA) free trade agreements It also provide statistical significance test for trade preferences on bilateral fruit and vegetable (horticulture) trade between the two countries (Nilsson,2002).

A bulk of research material illustrates the above theoretically specification of coefficients estimate that can be stimulations for export and import preferences. In our study we are going to elaborate the effect and influence through the variable of associated agreements, plans and organization on fruit and vegetable (citric market) trade.

Above mention framework was constructed to elaborate bilateral trade flows between the two countries (Pakistan and china because of CPEC). The trade preference flows between these countries are justified with variables that explain the potential demand of importing country (AISA, Middle East) and potential supply from exporting country (Pakistan).

The following gravity approach model has ability to evaluate the separate trade effect on separate products (Fruit) and different level of production with associated agreements (free trade agreement). Our selected model referred to South and Far East Asia countries (China, UAE, Saudi Arabia, Singapore) as the importer country and Pakistan as fruit exporter country.

The bilateral trade data is obtained from State Bank of Pakistan in $ US million. Here share of fruit export trade is separately explained as a special concern.

Distance between these exporter and importer countries is in kilometers (It is evident that distance will be directly impacted and minimized because of CPEC).Taking into account the consumption and production across the exporting and importing countries will be spared. Production variables are obtained from
Agricultural Statistics of Pakistan 2013-2015. GDP and GDP per capita data is computed from World Bank data table. Few dummy variables are included in our gravity model that will represent bilateral trade more precisely. These dummies are follows,

**Table 4: OLS estimated coefficient for fresh fruits**

<table>
<thead>
<tr>
<th>Variables</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
<td>-1.55***</td>
<td>-1.83***</td>
<td>-1.82***</td>
</tr>
<tr>
<td>GDP importing countries</td>
<td>1.06**</td>
<td>0.97***</td>
<td>1.04***</td>
</tr>
<tr>
<td>GDP exporting countries</td>
<td>1.39***</td>
<td>1.33**</td>
<td>1.15***</td>
</tr>
<tr>
<td>IB/pop import</td>
<td>-0.46</td>
<td>-1.00*</td>
<td>-0.94*</td>
</tr>
<tr>
<td>PIB/pop export</td>
<td>-1.20*</td>
<td>-1.09*</td>
<td>-1.00</td>
</tr>
<tr>
<td>Production per capita export</td>
<td>1.31***</td>
<td>1.71**</td>
<td>1.41**</td>
</tr>
<tr>
<td>Production per capita import</td>
<td>-0.19</td>
<td>-0.47*</td>
<td>-0.35*</td>
</tr>
<tr>
<td>CHIEXP</td>
<td>-5.22**</td>
<td>-5.99**</td>
<td>-3.22**</td>
</tr>
<tr>
<td>UAEEXP</td>
<td>-3.22**</td>
<td>-2.79***</td>
<td>-2.63**</td>
</tr>
<tr>
<td>SINEXP</td>
<td>-4.82***</td>
<td>4.67***</td>
<td>4.32***</td>
</tr>
<tr>
<td>PAKFLW</td>
<td>-1.45***</td>
<td>-0.64**</td>
<td>-0.72**</td>
</tr>
<tr>
<td>CPEC</td>
<td>2.54**</td>
<td>2.86***</td>
<td>2.73***</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.67</td>
<td>0.71</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Note: ***, **, * denote 1%, 5% and 10% significance level

Finally, our gravity model has a number of dummy variables that represents:
CHIEXP: is equal to 1 if china and Afghanistan is import country, and 0 otherwise.
UAEEXP: is equal to 1 if UAE and Saudi Arabia is importer country and 0 otherwise.
SINEXP: is equal to 1 if Singapore is import country, and 0 otherwise.
PAKFLW: is equal to 1 for flows originating at this country and 0 otherwise.
CPEC: is equal to 1 if importer countries are associated with “CPEC” and 0 otherwise.

### 4. Results and Discussion

The estimated results of gravity model are presented in table 4 (fruit export, OLS result). Coefficient values in the results are based on the period from 2013-2015. Dummy variables are based on expected control group of importer countries, exporter trade inflow and CPEC agreement. \( R^2 \) value of estimated model is good that tends to be good fit approach of explanatory variables.

Explanation of estimated parameters signs and values of table 4 is given below. As mentioned above in The control group is defined by CPEC related ASIA countries, so the gravity model should capture the trade disadvantages of not being part of CPEC trade flow.

Theoretical justification, elasticity of GDP for both exporter and importer countries are positive but
parameter value of exporter is slightly greater than importer, it means trade flow is positively associated with exporting infrastructural variables. Coefficients of GDP per capita are showing the non-significant negative result. In theoretical point of view, Pakistan is a poor agrarian country and there is lack of interest in agricultural advancement in the sense of specialization and importer countries tends to show modernity in diet patterns.

Production per capita has negative parameter for importers and positive for exporter. Its leads the positive production flow for that product. The negative sign of importer shows that there is less attention of domestic production as compared to the other variables that affect the demand of fruits. Parameter of Distance has negative sign but significant value. Negative sign make a sense that unreserved goods like fruits are related with transportation cost. As distance will be reduced through technological changes and trade agreements (CPEC) it will have more significant value in trade flow. In our model including dummies are explaining importer countries group (control group), exporter trade flow (Pakistan) and countries associated with China Pak economic corridor. A significant result is computed in case of ASIA importing countries (control group) but parameter’s different expressions are for trade patterns, cultural values and taste habits.

The coefficient of the dummy variable of CPEC associated countries shows the positive sign. It means that any country that is connected with this corridor will lead to great potential of trade flow. It can also be justified with perishable goods trade because of lesser distance between exporter and importer. CPEC has contributed to increase the horticulture export to the ASIA as well as other related or linked countries. Results suggest that CPEC will integrate the Asian countries with all over the world and become the gate way for regional trade flow.

5. Conclusions and Policy Suggestions
This study is based on horticulture trade (particularly fruits) between Pakistan and Asian countries, with focus on possible influence of CPEC on bilateral trade. We find that fruits are perishable goods and have sensitive approach toward integration of Pakistan and Asia countries. Pakistan’s export of fruits have great significant. On the other hand, gravity approach indicates that in the presence of infrastructural instrument like CPEC the regional trade flow can be enhanced. The empirical analysis carried out through the use of a gravity approach suggests that horticultural trade flows are well explained by the distance, the size of the economies, and the production per capita of the involved countries. These results are quite as expected from economic theory. It is also evident that distance plays a vital role to stimulate trade. Results suggest that export with nearer regions has significant impact on GDP production and per capita rate. Results shows that CPEC will reduce the distance and it will be more beneficial for perishable goods trade like fruits. With the help of gravity approach present study concluded that CPEC has great effect on Pakistan’s fruit exports.

References


Zhao, W., Van Antwerp, S., Lim, J., & Chow, N. United Nations Economic and Social Commission for Asia and the Pacific.
Foreign Lending Dilemma and Poverty in Pakistan, India and Bhutan: A Panel Data Analysis

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ARTICLE DETAILS

ABSTRACT

Purpose: In developing countries foreign lending becomes a problem now a day instead of spend this lending for the development purposes. Ultimately this problem causes poverty in these countries where usage of foreign lending is not in proper ways. The purpose of this study is to investigate the impact of IMF and World Bank lending on poverty in Pakistan, India and Bhutan. In this study corruption, GDP, unemployment, secondary enrolment, and external debt are used as independent variables and poverty headcount ratio as dependent variable. Study finds out the relationship of corruption, unemployment and external debts with poverty and showing the positive relationship while secondary enrolment and GDP showing negative relation with poverty. Moreover study finds out that lending of IMF and WORLD BANK mostly causes poverty in these developing countries instead of reducing poverty because of corrupt government’s weak policies for the distribution of loans. It is examined that the countries with strong policies and non-corrupt government can take full advantage of these lending for poverty reduction. But it is noticed that the countries which are the members of IMF structural adjustment programs are facing more poverty problems as compare to those countries which are not involved in these programs or even have less numbers of lending. Those countries are much better than the countries involve in structural adjustment programs.

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1. Introduction

There are different definition of poverty but usually poverty is defines as the condition of having insufficient resources or income. Extreme form of poverty is a lack of basic human needs to sustain as useful and working efficiency such as adequate and nutritious food, clothing, and housing, clean water and health services. Poverty is considering very serious disease in developing countries which is very dangerous like HIV/AIDS. Due to poverty many deaths are occurs in poor countries every year.

Poverty actually caused by different reasons like in Pakistan illiteracy is a main issue. A series of studies have demonstrated that people who live in regions where there are disparities in income have poorer average health status than people who live in more economically homogeneous regions. All standard
indicators of social and economic exclusion and differential shows that poverty is quite severe in Pakistan. Yet such definitions are extremely insufficient to capture broader mean of poverty, which could include social justice, right, participation and equality, essentially all forms of social and economic exclusion, usually based on unequal material relation and their manifestation of inequality power.

Dilemma of IMF and WORLD BANK lending in developing countries is concerned with the poverty reduction. The association between IMF and World Bank programs and poverty is a relatively new area of study. Structural Adjustment programs are programs which make it possible for countries to get a loan from the IMF or the World Bank. But these loans are related with some serious types of conditionality’s like some significant policy reforms which have to be complied with before getting the loan. In many developing countries such types of conditionality’s raised the issue to find out either the link between these lending’s and poverty is positive or negative. Because in the beginning of the century, the International Monetary Fund (IMF) had proclaimed that one of the purposes of its lending activities was to help low-income debtors achieve poverty reduction.

Now the question is what role does the IMF play in exacerbating poverty and inequality in poor countries? The IMF tried to justify its preferred creditor status and advance the idea that low-income debtors had a temporary liquidity problem that could be solved through their financing arrangement that low-income debtors were not actually ruined. IMF thinking on poverty and inequality, particularly among Management, has evolved over the past twenty years. According to Easterly (2001) number of adjustment loans from IMF reduces the growth elasticity of poverty reduction. So that growth does reduce poverty but the study found no evidence for direct effect of these adjustment loans on growth. Fischer (2000) found that adjustment lending’s are also associated with currency devaluation in developing countries there is negative association. Using Heckman regression this study found evidence that participating in IMF lending programs is connected to higher poverty rates and more unequal distribution. And these results stayed strong after controlling for other economic variables. Easterly (2003) attempted to overlook the repetition of adjustment lending to the same country study said that repetition changes the nature of the selection problem. Radelet (2006) analyzed the role of IMF in well performing low-income countries. According to him IMF began to play very important role from 1970, s when many countries were facing many types of problems like high inflation low reserves and overvalued exchange rates but with the passage of time some well performing countries not much longer needed IMF program. It argued that IMF should use more non-funding programs in those countries and its role should be less dominant in overall conditionality so that those countries should be able to achieve their development goals that are outside the know-how of IMF like private sector and agriculture Bird (2004) attempted to provide more fundamental analysis of the IMF funds involvement in growth and poverty reduction. Although the IMF presents itself as a monetary institution it plays an important role in providing support to the poor countries via its poverty reduction facility. Granville and Mallick (2005) attempted to analyze the link between the poverty reduction and the debt sustainability in IMF and World Bank in context of developing countries this study was based on UK Development Studies Association Annual Conference. This study build a model on the basis of policy frameworks of IMF to show how demand growth effect the potential rate of growth and the study also linked the consumption deprivation to the key variables of the structural adjustment programs. Holden (2002) attempted to analyze the repositioning of IMF during the 1970 – 2002 one integral part of the institution was the ‘international financial structure’ the main motive of that integral part was to insure the sustainable growth of underdeveloped countries by reducing the poverty in those countries which had applied for the loans of IMF. Korankye (2014) attempted to analyze the causes of poverty in Africa, and study found the number of factors which were responsible for the poverty in Africa for example limited employment, poor infrastructure, poor usage of resources, wars and unending conflicts, and major reason was the poor policies of World Bank and IMF. Because of those poor policies the funds for Africa were always remained in the hands of corrupt people which caused unequal distribution of resources and money. Momani (2008) attempted to analyze the artificiality of IMF in reducing poverty and inequality. Study said that IMF had claimed that one of its motives of its lending
programs was to reduce poverty and inequality. Annand and Kumar (2014) attempted to analyze the inclusive growth and poverty reduction in India. This study was based on the IMF working paper. Waqas and Sarwar (2011) attempted to analyze the impact of education on poverty reduction. This study was based on the data of (HIES) survey from 1998-1999 and study used the logistic regression technique to analyze the impact of education. Study found that Education and health endowments of the individuals were the necessary and important components of human capital which make them productive and raise their standard of living.

1.1 Objective
➢ To find out relationship between IMF and World Bank Lending and Poverty in developing countries
➢ To find out IMF and World Bank lending dilemma related to poverty in developing countries
➢ To suggest some Policy Recommendations

1.2 Hypothesis
H0: There is no association between poverty and IMF and World Bank lending in developing countries
H1: There is association between poverty and IMF and World Bank lending in developing countries

1.3 Significance of Study
This study is based on the panel analysis, before it single country studies have been done to find out the relationship of Poverty and foreign lending. But in this study it is tried to find out the panel analysis. It’s a dilemma for developing countries to come out from the conditionality’s of borrowers. Due to this strict conditionality it becomes harder for developing countries to reduce poverty according to there on desire. This study will contribute to know about the relationship between lending and poverty in Pakistan, India and Bhutan. On the basis of findings some policy recommendations are suggested.

2. Data and methodology
The study is based on the panel data and the data has been collected from “world bank”, “economic survey” and “IMF” and data has been used since (1995-2014).

2.1 Selection of Variables
Study will complete different variables external debts, unemployment, secondary enrolment, GDP (per capita), and corruption as independent variables and poverty as dependent variable.

2.2 Model Specification
To find out the relationship between IMF and WORLD BANK lending and poverty reduction “poverty is taken as dependent variable and unemployment corruption, external debts, GDP, and secondary enrolment are as independent variables. For the regression “random effect model” is selected. Empirical study is performed by using PC Software of statistics E-View7.0 and Stata. In this study the panel data of at least 15 years from 1995 to 2014 has been used. The model is.

Model
Poverty = f(GDP, unemployment, secondary enrolment, corruption, external debt)

Dependent Variable
Pov = poverty

Independent Variable
SE = secondary enrolment
GDP = Gross domestic product (per capita)
Unemp = unemployment
Lending = external debts
Corruption = corruption index
2.3 Random Effect Model
The random effects model is a generalized linear model; if $\alpha_i$ is a group specific random disturbance with zero conditional mean and constant conditional variance, $\sigma_\alpha^2$, then

\[ \text{Cov}[e_{it}, e_{js} | x_{i1}, x_{i2}, ... , x_{iT(i)}] = \begin{cases} \sigma_\alpha^2 + 1(t = s)\sigma_\varepsilon^2 & \forall t, s \mid i \text{ and } \forall i. \\ 0 & \forall t, s \mid i \neq j \text{ and } \forall i \text{ and } j. \end{cases} \]

The random effects linear model can be estimated by two step, feasible GLS. Different combinations of the residual variances from the linear model with no effects, the group means regression and the dummy variables produce a variety of consistent estimators of the variance components. [See Baltagi (1995).] Thereafter, feasible GLS is carried out by using the variance estimators to mimic the generalized linear regression of $(y_{it} - \theta_i \bar{y}_i)$ on the same transformation of $x_{it}$ where $\theta_i = 1 - \{\sigma_\varepsilon^2/[T(i)\sigma_\alpha^2 + \sigma_\varepsilon^2]\}^{1/2}$. Once again, the literature contains vast discussion of alternative estimation approaches and extensions of this model, including dynamic models [see, e.g., Judson and Owen (1999)], instrumental variables [Arellano and Bover (1995)], and GMM estimation [Ahn and Schmidt (1995)]. The primary virtue of the random effects model is its parsimony; it adds only a single parameter to the model. Its major shortcoming is its failure to allow for the likely correlation of the latent effects with the included variables - a fact which motivated the fixed effects approach in the first place.

2.4 Random Equation

\[
pov = ai + \beta_1lending + \beta_2SE + \beta_3unemp + \beta_4corruption + \beta_5GDP + uit + \varepsilon_{it}
\]

Where as
\[
\beta \text{ is the coefficient for the Independent variables,}
\]
\[
Pov=poverty head count ratio
\]
\[
Lending=external debt
\]
\[
unemp=unemployment rate
\]
\[
Corruption=corruption index
\]
\[
SE=Secondary School enrolment
\]
\[
GDP=Gross Domestic Product
\]

2.5 Panel Unit root test
Checking stationary is necessary because during building models for time series the underlying stochastic process that generates the series must be invariant with respect to time. So the stationary of dependent variable poverty and independent variables, GDP, secondary enrolment, lending, unemployment, corruption are checked by applying the unit root test. Testing for this in data conventionally precedes co-integration analysis. Augmented Dickey Fuller (ADF) test is often used to determine degree of integration of variables. Following table shows the results of ADF test. Stationery of all variables has been achieved at 1st difference, this means all variables are integrated of order one (1) and stationary is achieved at none.
Table 1: Unit root Test

<table>
<thead>
<tr>
<th>Variables</th>
<th>t-statistics at level</th>
<th>Prob value at level</th>
<th>t-statistics at 1st difference</th>
<th>Prob value at first</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pov</td>
<td>3.52612</td>
<td>0.9998</td>
<td>-2.36628</td>
<td>0.0090</td>
</tr>
<tr>
<td>GDP</td>
<td>4.35999</td>
<td>1.0000</td>
<td>-1.68540</td>
<td>0.0460</td>
</tr>
<tr>
<td>Corruption</td>
<td>0.77354</td>
<td>0.7486</td>
<td>-7.66658</td>
<td>0.0000</td>
</tr>
<tr>
<td>Lending</td>
<td>-1.62334</td>
<td>0.623</td>
<td>-2.41151</td>
<td>0.0075</td>
</tr>
<tr>
<td>S.E</td>
<td>3.53364</td>
<td>0.9998</td>
<td>-4.18397</td>
<td>0.0000</td>
</tr>
<tr>
<td>unemp</td>
<td>-0.70338</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Results and Discussion
Poverty Headcount Ratio is used as dependent variable. GDP, unemployment, secondary enrolment, external debt, and corruption are used as independent variable in this study. The results of fixed random effect are given in table 2. Headcount Ratio is used for the measurement of poverty which is dependent variable GDP, unemployment; secondary enrolment, external debt, and corruption are independent variable. The independent variables are affecting the dependent variable Poverty Headcount Ratio. GDP and secondary enrolment are showing negative relationship with poverty. While other corruption; lending and unemployment are showing positive relationship. All variables are significant. Validity of random effect model is checked by Breusch and Pagan Lagrangian multiplier test and p value showed that random effect model is fit for this data. Serial Correlation is checked by Pesaran's test of cross sectional independence and p value indicate that there is no serial correlation in this model.

Table 2: Method: Panel GLS (Period random effects)

<table>
<thead>
<tr>
<th>Variables</th>
<th>coefficient</th>
<th>t-statistics</th>
<th>Prob value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>-46.84761</td>
<td>-11.67588</td>
<td>0.0000</td>
</tr>
<tr>
<td>SE</td>
<td>-9.889908</td>
<td>-8.642901</td>
<td>0.0000</td>
</tr>
<tr>
<td>Unemp</td>
<td>2.437818</td>
<td>3.226449</td>
<td>0.0024</td>
</tr>
<tr>
<td>Lending</td>
<td>0.206920</td>
<td>3.528211</td>
<td>0.0010</td>
</tr>
<tr>
<td>Corruption</td>
<td>2.113950</td>
<td>1.498601</td>
<td>0.0015</td>
</tr>
<tr>
<td>C</td>
<td>140.4042</td>
<td>9.422812</td>
<td>0.0000</td>
</tr>
<tr>
<td>Pesaran’s test of cross sectional independence</td>
<td></td>
<td></td>
<td>0.2271</td>
</tr>
<tr>
<td>Breusch and Pagan Lagrangian multiplier test for random effects</td>
<td></td>
<td></td>
<td>0.000</td>
</tr>
</tbody>
</table>

4. Conclusion
Poverty is the depressive topic in the developing economies. Many of the institutions NGO’s and the Government institutions are working for the elimination or decreasing the rate of the poverty. The situation is getting worse and worse in developing countries behind this many reasons are involve. Like week policies related to the use of loans by IMF and World Bank due to which whole money stays only in the hands of corrupt politician. And the loans becomes useless instead of welfare and development these loans become a burden at the countries and the people of that country these loans cause poverty
because when these loans got wasted and when the time comes of repayment of the loans then the government get another loan to reimburse the previous loan and this process keep on repeating itself every year and the loans which were taken for the development and prosperity of the country cause poverty problems in that country.

Moreover study concludes that poverty is the depressive topic in the developing economies. Any of the NGO’s and the Government institutions are working for the elimination or decreasing the rate of the poverty. IMF always used to play a rhetoric role in poverty reduction many studies shows that the role IMF is just artificial it actually does not play a prominent role in poverty reduction. While due to its lending many developing countries condition has become much worse due to week policies of both governments and the IMF and World Bank.

But there is always an other side of the picture and the other side of the picture is that the lending’s by IMF and World Bank could be prove helpful in the development and poverty reduction of the country but only at one condition that the government should not be corrupt, policies for the consumption of loans should be better so that the amount of loans may not stay in the hands of corrupt individuals. In this study unemployment, corruption, GDP, secondary enrolment and lending are taken as independent variables, GDP and secondary enrolment shows negative effect with poverty which means when GDP will increase poverty will decrease and same case is with the enrolment. While others unemployment, corruption, and lending have positive impact at poverty when any of these increase poverty will increase and when decrease poverty will decrease. Because poverty rates are much lesser in those countries which are not involved in any program of IMF or which have better policies and a non-corrupt government as compared to the countries which are involved in IMF programs with week policies and corrupt government.

5. Policy recommendation

- Policies of World Bank and IMF regarding to the loans must be improved.
- Individual and political corruption must be reduce so that amount of loans not stays in few hands.
- Enrolment of schools must be increase it will help a lot to reduce poverty.
- With fare distribution of income employment opportunities will increase and unemployment will decrease and as well as poverty.
- These loans should be used in development projects so that government repays the loan by the revenue of those projects instead of taking other loan for the repayment of first one.

6. Limitation of Study

The developing countries which have been chosen for this study are belong to those group who are regular lenders of World Bank and IMF programs. Pakistan India and Bhutan. These three developing countries have almost same income group and similar social and economic conditions. And all these three countries are the lenders of World Bank and IMF.

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Credibility of the Philippine Central Bank: Evidenced by the Interest Rate Pass-Through

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ABSTRACT

Purpose: This study investigates the Philippine interest rate pass-through over the December 2001 through January 2016 period. The empirical findings suggest that the Philippine Central Bank has not been very effective in formulating and implementing its countercyclical monetary policy. Specifically, the empirical results reveal very low short-run and long-run interest rate pass-through. The Bounds test results indicate no long-term relationship between countercyclical monetary policy and market rates. Notwithstanding the banking system’s remarkable performance in the recent years, amid lingering uncertainties in global financial markets, the Philippine Central Bank lacked the credibility in conducting its countercyclical monetary policy. This empirical finding may not be desirable but it forewarns the monetary policy makers of challenges in formulating and implementing their monetary policy.

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1. Introduction

As reported by the Bangko Sentral Ng Pilipinas (BSP), the Central Bank of the Philippines (2016), the banking system performed remarkably well in 2016 amid lingering uncertainties in global financial markets. Key statistics showed that commercial banks experienced double-digit growths in assets, loans, deposits and capital. Commercial banks maintained sufficient liquidity to meet their operational requirements and related funding needs. There was also notable rebalancing of banks' portfolios particularly in cash and credit related accounts as banks shored up liquidity to manage potential market volatilities at the onset of rising interest rates.

The emerging landscape of the banking sector also became more streamlined, technologically responsive and inclusive in 2016 as it expanded client reach to cater to the diverse needs of modern Filipino banking clients. The industry consolidation and digital transformation have banking services. The commercial banking system strived to provide efficient, reliable and affordable delivery of banking products and services to banking clients.

The BSP’s promotion of merger and consolidation in the industry resulted in reduction of the number of operating banks down from 996 in 1998 to 602 banks at the end of 2016. There were five recorded cases
of mergers, acquisitions, and consolidations in 2016. Main features of industry consolidation include the strategic partnership between foreign and domestic banks. Additionally, some large domestic banks acquired smaller banks in frontier areas to allow the former to explore growth opportunities and business synergies. In addition, the most common feature of industry consolidation is the merger of rural banks to improve their viability and leverage on each other’s branch network to reach a wider base of clientele. Overall, these types of industry consolidation activities influenced the structure of the banking system.

The BSP maintains its policy thrust on merger and consolidation by gradually lifting the moratorium on the grant of new banking licenses or establishment of new domestic banks. This is to provide parallel opportunities for domestic banks following the liberalization of foreign bank entry in 2014. Consequently, the overall branch network expanded by almost 1.6 times to 10,576 branches since 1998. These branches and offices are normally within shopping malls and other commercial places with heavy foot traffic. The growth was supported by the BSP’s rationalization of branching guidelines, which provide banks with more flexibility in expanding their network to strategic locations.

The rapid evolution of digital technology particularly the proliferation of smart phones at the turn of the new millennium revolutionized the way banking and financial products and services are delivered. Digital technology provides unprecedented financial services access to customers, allowing them to perform banking transactions and make payments at their own convenience. From a policy standpoint, these electronic service delivery channels provide a faster and more efficient alternative means to reach a wider base of clientele particularly those in rural communities.

Recognizing the upside from electronic banking in terms of expanding client reach and in improving financial access, the BSP allowed banks to engage in electronic banking as early as 2000. Since then, banks engaged in electronic banking grew from nine banks as of the end of the 2000 calendar year to one hundred and nineteen banks as of yearend 2016. Moreover, the banking system had 19,084 automated teller machines by the end of 2016.

Additionally, in 2009 the BSP’s rationalization of branching guidelines allowed electronic money as an instrument of efficient and affordable delivery of financial services to low-income households in non-urbanized and underbanked areas of the country. Electronic Money Issuers are encouraged to develop business models and explore outsourcing arrangements with qualified Electronic Money Network Service Providers to support the growth of e-banking and e-money. Two of the most popular forms of e-money today are SMART Money and Globe's G-Cash. BSP (2016) reported that as of end-December 2016, net inflow of e-money transactions reached 1.1 trillion pesos and 78.2 percent or 870.1 billion pesos of these transactions were e-money transactions coursed through banks.

Financial intermediation is a critical facilitator of investment and economic growth (Schumpeter 1912; Patrick 1966; McKinnon 1973). Commercial banks are an integral part of the monetary policy transmission mechanism since through their interest rate pass-through, commercial banks change the lending rates in the economy, which in turn transmit the countercyclical monetary policy measures to consumption and investment activities of the economy. Changes in these two macroeconomic variables will change the macroeconomic policy target variables: unemployment, inflation and GDP.

Illes and Lombardi (2013) further argued that over the last few decades, setting policy rates has been viewed as the standard tool of monetary policy. The implementation of the monetary policy stance via open market operations ensures that policy rates transmit to the interest rates at which financial institutions refinance themselves. In turn, competition in lending and funding markets should ensure that changes in the policy stance are also passed on to other interest rates. A reduction in the policy rate is thus expected to translate into a decline in lending rates for firms and households, which should stimulate consumption and investment. This is the interest rate channel of monetary policy transmission.
Given what has transpired since the early years of 2000s, it is very interesting to learn the nature of the interest rate pass-through. More specifically, the objective of this study is to investigate how commercial banks passed changes in their cost of funds due to countercyclical monetary policy, as reflected in changes in the Central Bank’s discount rate, to their customers through the short- and long-run interest rate pass-through processes in the post U.S. subprime mortgage crisis. The remainder of the paper is structured as follows: Section 2 briefly reviews the literature. Section 3 describes the data and specifies empirical findings. Section 4 presents estimation results. Section 5 briefly discusses the empirical findings. Finally, Section 6 summarizes and concludes the paper.

2. Review of Literature
As summarized by Nguyen (2017-a), many theoretical approaches and methodologies have been used to study interest rate setting behaviors of lending institutions around the globe. Espinosa-Vega and Rebucci (2003) applied a standard Error Correction Model to consider whether interest rate pass-through in Chile's experience was atypical compared to ten other countries, including the United States. These authors found that the adjustment in the Chilean banking sector was incomplete – like in other countries – but generally faster than those in the rest of their sample. In addition, Espinosa-Vega and Rebucci (2003) reported that the adjustment process was affected by institutional changes in the exchange rate regime and Chile's monetary policy targeting.

Hofmann and Mizen (2004) used seventeen years of monthly data for rates on thirteen deposit and mortgage products offered by U.K. financial institutions to empirically investigate the potential non-linearity in adjustment of retail rates to base rates, due to menu costs. They reported that the speed of adjustment responded non-linearly to the expected size of the gap between the base rate and retail rate in the near future. In other words, the perceived (expected) "aggressiveness" in base rate management was a significant factor in explaining the speed of pass-through effects.

Sørensen and Werner (2006) performed Euro-area cross-country comparisons and reported empirical evidence of high-degree heterogeneity in pass-through of base rates to bank interest rates. Among other cyclical and structural factors, Sørensen and Werner (2006) found different degrees of competition in the national banking sector to be the most significant determinants of pass-through speed.

Tonooka and Koyama (2003) searched for but found no relationship between interest rates on loans and market concentration in the Brazilian banking sector. Alencar (2003) estimated the speed of pass-through effects from changes in benchmark interest rates and compared them to those observed in retail banking. The revelation that the time lag for monthly-average retail rates to fully adjust to changes in the opportunity cost of money is less than 12 months was pointed out as evidence of a significant degree of competition, driving banks to operate efficiently.

Bernanke and Blinder (1992) investigated the response of credit aggregates to monetary policy shocks. Borio and Fritz (1995) and Cottarelli and Kourelis (1994) focused more specifically on the pass-through of policy rates to lending rates, which is also the focus of this investigation. Studies on the heterogeneity in the pass-through at the individual bank level are limited to a few country studies (Weth 2002; Gambacorta 2008). The bulk of the empirical literature has resorted to cointegrated time series models developed by Engle and Granger (1987) to account for co-movements of policy and lending rates. European Central Bank (2003) focuses on major euro area countries, reporting evidence of heterogeneity between core and peripheral countries. Additionally, Coelho, De Mello, and Garcia (2010) found that the pass-through is higher for larger banks using a sample from June 2000 to December 2006.

Moreover, the monetary policy regime can affect adjustments and volatility of retail rates. For example, one would expect nominal prices to adjust faster or the pass-through to be larger when inflation is higher (Mojon, 2000). The important factors of the country's financial structure are bank competition, development of financial markets and banking system ownership. If financial markets are
well developed, financially solid businesses tend to opt for alternative sources of financing when retail rates rise, increasing the overall risk to bank loan portfolios. In that case, banks increase lending rates to compensate for the higher risk instead of rationing credit (Sander and Kleimeier, 2004).

3. Methodology and Model Specification
   It is expected that long time series data and their relationships will experience structural breaks. Failure to account for structural break may result in model misspecification. To discern this possibility, this investigation utilizes the Perron’s (1997) endogenous unit root test to search endogenously for the possibility of any structural break in the relationship between the two time series. If the structural break is found, a dummy independent variable \( d_t \), with the value of 1 from the structural break date onward and 0 elsewhere, will be included in the model.

   The objective of this study investigates the reactions to or how the commercial banks responded to changes in countercyclical monetary policy measures by the Central Bank reflected in changes in the discount rate. To this end, this investigation follows Wickens and Breusch (1988) and Pereira and Maia-Filho (2013) to specify and estimate an Autoregressive Distributed Lag [ARDL(n,m,s)] model hypothesizing the relationship between the endogenous variable \( i_t \), the independent variables \( r_t \), and \( d_t \) (if the aforementioned structural break exists).

\[
i_t = \mu + \sum_{j=1}^{n} \beta_j i_{t-j} + \sum_{k=0}^{m} \delta_k r_{t-k} + \sum_{l=0}^{s} \rho_l d_{t-l} + \varepsilon_t
\]

where “\( i_t \)” is the lending interest rate and “\( r_t \)” is the Central Bank’s discount rate at time \( t \). As defined above, \( d_t \) is a dummy independent variable an independent variable accounting for the structural break in the relationship between the lending rate and Central bank’s discount rate. \( \delta_0 + \rho_0 \) is the short-run effect within the month after the Central Bank changes the discount rate. It is a priori expectation that \( 0 < \delta_0 + \rho_0 \leq 1 \). \( \delta_0 + \rho_0 < 1 \) indicates sluggish adjustment, also known as lending rate stickiness. \( \delta_0 + \rho_0 = 1 \) represents a complete pass-through in the short run.

Theoretically, the ARDL method proposed by Pesaran et al. (1997) has been a valuable tool for testing for the presence of long-run relationships between economic time-series. The advantage of the ARDL model is its ability to estimate both the long- and short-term model parameters without requiring a pre-testing to determine the order of the cointegration of the variables; thus, avoiding the problems posed by non-stationary time series. This pre-testing is particularly problematic in the unit-root- cointegration literature where the power of the unit-root tests is typically very low, and there is a switch in the distribution function of the test statistics as one or more roots of the right hand side variables process approach unity. Furthermore, the ARDL procedure is robust to small samples, allowing different optimal lags of variables.

As to the empirical estimation, Enders (2015) suggested that the process to estimate the coefficients for equation (1) is to utilize the Akaike information criterion to select the largest values of \( n, m \) and \( s \), deemed feasible; CUSUM test is used to test for model stability. Breusch-Pagan-Godfrey heteroskedasticity Test and Breusch-Godfrey Serial Correlation Lagrange Multiplier (LM) Test are then used as diagnostics to test the hypotheses that the residuals \{ \varepsilon_t \} \) are white noise and there is no correlation among independent variables.

As articulated by Pereira and Maia-Filho (2013), given the estimation results for equation (1), the long-run effect is calculated as:

\[
\Phi = \frac{\sum_{k=0}^{m} \delta_k + \sum_{l=0}^{s} \rho_l}{1 - \sum_{j=1}^{n} \beta_j}
\]

(2)
As articulated by Berstein and Fuentes (2003), $\Phi$ should be positive and close to 1. $\Phi=1$ implies a complete pass-through in the long run, which can be considered evidence of significant competition in the banking system. If $\Phi < 1$ or $\Phi > 1$, it implies either stickiness (less than perfect pass-through) or overshooting, respectively, of retail rates with respect to changes in the policy rate. Explanatory factors include monetary policy regime and the country’s financial structure (Sørensen and Werner, 2006).

It is therefore important to study the long-run relationship between countercyclical monetary policy and market rates. To this end, this investigation follows Pereira and Maia-Filho (2013) to use the bounds testing approach (Pesaran, Shin, and Smith, 2001) for the following error correction representation of the Autoregressive Distributed Lag model:

$$
\Delta i_t = \varphi + \sum_{j=1}^{n} \eta_j \Delta i_{t-j} + \sum_{k=0}^{\infty} \pi_k \Delta r_{t-k} + \sum_{l=0}^{s} \omega_l \Delta d_{t-l} + \lambda_1 i_{t-1} + \lambda_2 r_{t-1} + \lambda_3 d_{t-1} + \varepsilon_t \tag{3}
$$

where $\Delta$ is difference operator and the null hypothesis of “non-existing of the long-run relationship” is stated as $\lambda_1 = \lambda_2 = \lambda_3 = 0$. The relevant F-statistics for the joint significance of the $\lambda_3$ are calculated and compared with the critical values tabulated by Pesaran, Shin, and Smith (2001). If the estimated F-statistic is greater than the upper bound critical value, the variables are cointegrated. If it is below the lower bound, the null hypothesis cannot be rejected, i.e., there is no support evidence for long-run relationship between countercyclical monetary policy and market rates.

### 3.1 Data and Empirical Results

The sample of the time series data for the commercial banks’ lending rate on the credit market and the Central Bank’s discount rate for this empirical estimation were collected from the International Financial Statistics, maintained by the International Monetary Fund. The sample period was from December 2001 through January 2016, where the data is available.

The Perron’s (1997) endogenous unit root test was used to search endogenously for the possibility of any structural break in the relationship between the commercial banks’ lending rate in the credit market and the Central Bank’s discount rate. The searching process strongly suggested a structural break on October 2006. Therefore, a dummy independent variable $d_t$, with the value of one from October 2006 onward and zero elsewhere in the sample period, was included in the model to be estimated.

As discussed in the methodology section and based on the Akaike information criterion, the estimation process indicates that the optimal values are $n = 5$, $m = 4$, and $s = 0$ as the reported values for AIC in Exhibit 4 suggests, the ARDL (5, 4, 0) model has the lowest AIC value, therefore, it will be used for this investigation. The estimation results and diagnostic statistics for the autoregressive model, ARDL (5, 4, 0), are summarized in the following Exhibits 1, 2 and Figure 1.
Exhibit 1: Estimation Results for ARDL (5, 4, 0) Model and Bounds Test, 2001:12 – 2016:01

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient</th>
<th>t-statistic</th>
<th>Δ Variables</th>
<th>Coefficient</th>
<th>t-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>$i_{-1}$</td>
<td>0.266066*</td>
<td>3.730412</td>
<td>$\Delta i_{-1}$</td>
<td>-0.694257*</td>
<td>-8.587526</td>
</tr>
<tr>
<td>$i_{-2}$</td>
<td>0.270936*</td>
<td>2.653710</td>
<td>$\Delta i_{-2}$</td>
<td>-0.422670*</td>
<td>-4.484424</td>
</tr>
<tr>
<td>$i_{-3}$</td>
<td>0.212207*</td>
<td>2.870687</td>
<td>$\Delta i_{-3}$</td>
<td>-0.211633**</td>
<td>-2.431208</td>
</tr>
<tr>
<td>$i_{-4}$</td>
<td>0.120013</td>
<td>1.363689</td>
<td>$\Delta i_{-4}$</td>
<td>-0.091179**</td>
<td>-2.431208</td>
</tr>
<tr>
<td>$i_{-5}$</td>
<td>0.090389</td>
<td>1.162643</td>
<td>$\Delta r_{0}$</td>
<td>0.332230*</td>
<td>3.429888</td>
</tr>
<tr>
<td>$r_{0}$</td>
<td>0.333644*</td>
<td>3.394934</td>
<td>$\Delta r_{-1}$</td>
<td>0.338666*</td>
<td>3.474400</td>
</tr>
<tr>
<td>$r_{-1}$</td>
<td>0.059219</td>
<td>0.551707</td>
<td>$\Delta r_{-2}$</td>
<td>0.200485**</td>
<td>2.030409</td>
</tr>
<tr>
<td>$r_{-2}$</td>
<td>-0.135068</td>
<td>-0.702827</td>
<td>$\Delta r_{-3}$</td>
<td>0.266831*</td>
<td>2.660222</td>
</tr>
<tr>
<td>$r_{-3}$</td>
<td>0.063595</td>
<td>0.383978</td>
<td>$i_{-1}$</td>
<td>-0.037449</td>
<td>-1.243411</td>
</tr>
<tr>
<td>$r_{-4}$</td>
<td>-0.267300*</td>
<td>-2.783011</td>
<td>$r_{-1}$</td>
<td>0.057165</td>
<td>1.200947</td>
</tr>
<tr>
<td>$d_{0}$</td>
<td>-0.018586</td>
<td>-0.738956</td>
<td>$d_{-1}$</td>
<td>-0.012266</td>
<td>-0.521583</td>
</tr>
<tr>
<td>constant</td>
<td>0.071977</td>
<td>0.268120</td>
<td>constant</td>
<td>0.017218</td>
<td>0.063904</td>
</tr>
</tbody>
</table>

$R^2 = 0.946163$ and $\bar{R}^2 = 0.942292$

$F$ -value = 244.4458* and $AIC = 1.202518$

$R^2 = 0.403532$ and $\bar{R}^2 = 0.360649$

$F$ -value = 9.410004* and Bounds Test $F = 1.146796, k : 2$

Note: "*, **" and *** indicate the 1 percent and the 5 percent significance levels, respectively.

For the sample of 165, critical values for bounds tests at 10 percent: I(0) = 2.713, I(1) = 3.453;
5 percent: I(0) = 3.3235, I(1) = 4.053; 1percent: I(0) = 4.358, I(1) = 5.393.

The left panel of Exhibit 2 reports the diagnostic testing for the correlation among the independent variables and the possibility for the variance of the error term to depend on regressors included in the estimated model. The right panel of Exhibit 2 reveals the AIC-values of the five best estimated models.

Exhibit 2: Diagnostic Tests and Five Best Models According to AIC Criteria

<table>
<thead>
<tr>
<th>Diagnostic Tests</th>
<th>Model Selection Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breusch-Godfrey Serial Correlation LM Test:</td>
<td>Five Best Models</td>
</tr>
<tr>
<td>$H_0$: There is no serial correlation in the residuals.</td>
<td>ARDL (5, 4, 0)</td>
</tr>
<tr>
<td>$F_{(2,151)} = 0.118583$, p-value = 0.8883</td>
<td>ARDL (5, 4, 1)</td>
</tr>
<tr>
<td>Breusch-Pagan-Godfrey Heteroskedasticity Test:</td>
<td>ARDL (5, 5, 0)</td>
</tr>
<tr>
<td>$H_0$: The residual’s variance is constant.</td>
<td>ARDL (6, 4, 0)</td>
</tr>
<tr>
<td>$F_{(11,153)} = 1.565782$, p-value = 0.0884</td>
<td>ARDL (12, 4, 0)</td>
</tr>
</tbody>
</table>

Note: Data are from calculations by author.
Figure 1: illustrates the graph of the CUSUM Test over the sample period.

Graphic illustration of CUSUM test to test for stability of model’s estimated parameters.

An analysis of the overall estimation results indicates that there exists no serial correlation and that the model exhibits strong predictive power, as evidenced by the strength of the Breusch-Godfrey Serial Correlation Lagrange Multiplier Test $F(2,151) = 0.118583$ with the p-value being 0.8883. This finding in turn suggests failure to reject the null hypothesis that there is no serial correlation in the residuals. Also, Breusch-Pagan-Godfrey Heteroskedasticity Test, $F(11,153) = 1.656782$ with the p-value being 0.0884 which fails to reject the null hypothesis that the variance of the residual is constant or no heteroscedasticity at the 5 percent level of significance. Figure 1 illustrates, the CUSUM Test statistic falls in the band of the 5 percent level of significance, except for the 2011-2012 period when it oscillated slightly outside of the band. This empirical finding indicates the relative stabilities of the estimated parameters of the model over the sample period. Overall, the diagnostic analysis indicates that the estimated ARDL(5,4,0) model is very reliable.

As reported in Exhibit 1, the estimated sum of $\delta_0 + \rho_0$ is $0.315058$ ($0.333644 - 0.018586 = 0.315058$). In addition, using the estimated coefficients of equation (1), the following calculation indicates that the estimated long-run interest rate pass-through rate in the Philippine banking system is $\Phi = 0.879051$.

$$\Phi = \frac{\sum_{k=0}^{n} \delta_k + \sum_{j=0}^{n} \rho_j}{1 - \sum_{j=1}^{n} \beta_j} = \frac{0.05409 - 0.018586}{1 - 0.959611} = 0.879051$$

Finally, to test the null hypothesis of “non-existing of the long-run relationship- $H_0 : \lambda_1 = \lambda_2 = \lambda_3 = 0$”, the calculated value of the relevant F-statistic being 1.46796 for the joint significance of the hypothesis is compared to the critical upper values bounds at 5 percent level of significance. Comparing the value of the F-statistic of 1.46796 to the critical value of the lower bound $I(0) = 3.235$ indicates that the null hypothesis of “non-existing of the long-run relationship” in the banking sector could not be rejected at the five percent level of significance. Failure to reject the null hypothesis suggests that there is no long-term relationship between the Central Bank’s discount rate and that the lending rate in the commercial banks’ lending market.

3.2 Discussions of the Empirical Results

The endogenous search process for breaks in the interest rate structure using Perron’s (1997) endogenous unit root test found that the relationship between Central Bank’s discount rate and commercial bank’s lending rate experienced a structural break in October 2006. To account for this structural break, this investigation introduced a dummy variable and assigned the value of 1 from October 2006 onward and 0 elsewhere over the sample period. An analysis of the overall estimation results indicates that there exists no serial correlation and that the model exhibits strong predictive power and confirms that the estimated residuals are white noise.
The estimation results of the Autoregressive Distributed Lag, ARDL(5,4,0) model are represented by equation (1). An analysis of the derived long-run rates of pass-through reveals that the short-run rates of pass-through, $\delta_0 + \rho_0 = 0.315058$ are very low as compared to empirical magnitudes reported in the literature in the emerging and advanced economies (Alencar, 2011, 2003; Pereira and Maia-Filho, 2013, Nguyen 2017-a and 2017-b; Wickens and Breusch, 1988).

Based on the Akaike information criterion, the longest lag retained by the estimation process for the commercial lending rate is five ($i_5$) and for the Central Bank’s discount rate is four ($r_4$). These findings suggest that the commercial banks considered their lending rate five months prior in determining their current lending rate, while these lending institutions took up to four months to respond to the monetary policies completely. The calculated long-run pass-through rate in the banking industry is $\Phi = 0.879051$.

Finally, one way to measure the credibility of the Central Bank is the existence of the long-run relationship between the its countercyclical monetary policy, as reflected in changes in the Central Bank’s discount rate, and the commercial banks’ lending rate in the lending markets. In this investigation, this issue is addressed by testing the above stated null hypothesis $H_0 : \lambda_1 = \lambda_2 = \lambda_3 = 0$. The testing procedure indicated that this hypothesis cannot be rejected at five percent level of significance, suggesting there is no long-run relationship between the its countercyclical monetary policy and the commercial banks’ lending rate in the lending markets.

### 3.3 Concluding Remark

The landscape of the Filipino banking services has been transformed by industry consolidation and digital transformation. It strives to provide efficient, reliable and affordable delivery of banking products and services to banking clients. The merger and consolidation in the industry resulted in reduction of the number of operating banks down to 602 banks at the end of the 2016 calendar year. The prominent features of industry consolidation include the strategic partnership between foreign banks and domestic banks. Additionally, the most common feature of industry consolidation is the merger of rural banks to improve their viability and leverage on each other's branch network to reach a wider base of clientele. Overall, these types of industry consolidation activities helped shape the landscape of the banking system.

Financial intermediation is a critical facilitator of investment and economic growth. Commercial banks are an integral part of the monetary policy transmission mechanism since through their interest rate pass-through, commercial banks change the lending rates in the economy which in turn transmit the countercyclical monetary policy measures to consumption and investment activities of the economy. Changes in these two macroeconomic variables will change the macroeconomic policy target variables: unemployment, inflation and GDP. These aforementioned lifestyle factors of the banking sector motivated this investigation to learn the nature of the interest rate pass-through.

To achieve the above objective, this study utilizes an Autoregressive Distributed Lag model to empirically investigate the nature of interest rate pass-through in the economy. Estimation results suggest that, based on the Akaike information criterion, the ARDL(5,4,0) model best fits the data. Estimation results of the ARDL(5,4,0) model reveal that the short-run rates of pass-through ($\delta_0 + \rho_0$ is 0.315058) is very low as compared to empirical magnitudes reported in the literature in the emerging and advanced economies.

The empirical results also indicate that the commercial banks considered their lending rate five months prior in determining their current lending rate, while these lending institutions took up to four months to
respond to the monetary policies completely. The calculated long-run pass-through rate in the banking industry is \( \Phi = 0.879051 \) which indicates relatively incomplete pass-through in the banking industry.

The procedure testing the null hypothesis \( H_0 : \lambda_1 = \lambda_2 = \lambda_3 = 0 \) indicated that this hypothesis cannot be rejected at the five percent level of significance, suggesting no long-run relationship between the countercyclical monetary policy and the commercial banks’ lending rate in the lending markets. One way to measure the credibility of the Central Bank is the existence of the long-run relationship between its countercyclical monetary policy, as reflected in changes to the Central Bank’s discount rate, and the commercial banks’ lending rate in the lending markets. The failure to reject the above null hypothesis of no long-run relationship is an indicative of the lack of credibility of the Central Bank.

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Impact of Trade Openness on Economic Growth: A Case Study of Pakistan

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ARTICLE DETAILS

Purpose: This paper estimates the impact of trade openness and economic growth in Pakistan by using time series data from period of 1975-2014. Econometric method was applied to estimate the impact of trade openness on economic growth. Gross fixed capital formation (proxy of investment), Foreign direct investment, Imports, Exports & trade openness (proxy of trade openness to check the volume of trade of a country) is used as explanatory variables while gross domestic product is treated as dependent variable in this study. Johansson co. integration approach developed by Johannes & Jeslius (1988) is used to evaluate the long run relationship among variables in this study. The results suggest that trade openness, imports, exports and foreign direct investment cast have positive impact on economic growth while on the other hand; gross fixed capital formation & labor force has negative impact on economic growth.

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1. Introduction

Every country determined the sources of development in the light of recent literature. Trade is the most important and core source of development. The traditional approach regarding trade suggests that “Trade is the engine of growth”. Since last three to four decades, the many countries of the world have used and apply instruments of protection (i.e Tariff, import & export Quota & Export tax) and in this way, they have restricted trade policies. The motive behind trade policies is to protect their infant and newly born industries and this trend is mostly common in developing nations.

Mercantilists were pioneer who gave the concept of international trade and their entire philosophy was based on accumulation of wealth through the surplus of gold and precious metals. Adam Smith (1776) gave the concept of absolute advantage for both nations who are specialized in the production of those goods which are cheaper to produce. David Ricardo gave the concept of comparative advantage. According to him, trade must be possible without comparative advantage.

Factor Endowment and Hecksher-Ohlin theory took one step more by investigating the international trade (Salvatore, 2011). Furthermore neo classical and endowment growth theories predict that trade openness
positively affect on GDP growth. For the protection of infant industries, the first time a Report on Manufactures is written by the first U.S Secretary of the Treasury, Alexander Hamilton”.

After this in 1860, the first free trade agreement was signed between United Kingdom and France which is known as “Cobden-Chevalier”. All the developing countries (Asia, Latin America & Africa) adopted trade openness policies for last four decades.

Pakistan has also adopted trade openness policies since mid-1980s under the series of SAP developed by international Monitory Fund & World Bank while on the other hand, in 1980s, the developed nations enjoy the boom of trade and in USA 25% trade growth is only due to the trade liberalization. As earlier discussed that tariff barriers (TB) and non-tariff barriers (NTB) plays a great and successful role in country’s trade. So in 1980s tariff liberalization accounts for 45% and non-tariff liberalization accounts for 44% of extra growth & decline in transportation cast contributed only 11% of extra trade growth since 1980s (Hufbawer & adler,2009).

The World Bank started research on trade liberalization and market reform in 1987 and it was suggested that for trade openness, the countries must started de industrialization. After 1995, when Pakistan joined WTO trade agreement, the policies of its trade agreement compel Pakistan to decreases on international trade different subsidies and import duties (Siddique & Iqbal,2005). Trade openness is not only exchange of goods but also it enhance productivity , efficiency, experiences, skill and knowledge among countries.

Therefore, the mostly literature on trade openness in recent decades concluded that trade openness has positive impact on economic growth. For this purpose the sufficient allocation of resources, policies according to the circumstances, privatizing foreign trade, removing exchange rate distortions, tariff barriers to imports, improved political stability & increased job opportunities in all developed and developing countries should be enhanced.([Siddique et al. 2003) , (Spanu,2003) , (Stribu & Parikh,2004) , (Siddique , 2005) ,(Chaudhary et al , 2006) , (Gulzar,2007) , (Zakira , 2008) , (Ahmed et al,2009) ,(Zaman et al, 2012),(Ahmed &Arif ,2012) ,(Kauser et al.,2013)].

The objective of this research study is to examine the impact of other macro-economic variables which have a great impact on the size of trade such as imports, exports, gross fixed capital formation, gross domestic product and trade openness (imports + exports/GDP).

2. Literature Review
A number of researchers have already been conducted to generate the link between economic progress and Trade liberalization. Following is an immediate review of some recent studies about growth and Trade openness.

Siddique et al. (2001) examined the relationship between trade openness and economic growth. Real imports, real exports and real GDP were used as explanatory variables for the period of 1960-2001. The study suggested that exports had a positive and significant impact and import had negative impact on economic growth. The result explored that in the long run, there exist bidirectional causality and in the short run, there exist no causality and variations occur due to business cycle fluctuations with no casual’s clear pattern between trade openness and economic growth.

Spanue (2003) explored the impact of openness on trade & its relation to the economic growth with respect to the developed and developing nations. This study used GDP growth as dependent and capital, labour force, exports and imports were treated as explanatory variables and results of the study explored that the portion of absolute poverty was increased in the developing countries those who promoted the globalization & free trade. This study further suggested that trade liberalization promotes economic growth but wrong policies made them ineffective and on the other side, IMF also proved this situation
that low level of trade make countries more volatile to debt crisis. He believed that openness of markets could generate an additional Increase of 1.15% of growth per year.

Chaudhary et al. (2006) investigated the relationship between trade openness and economic development. For this purpose, this study was based on four major measure of economic development which are: per capita GDP, income inequality, poverty & unemployment over the period of 1960-2003. He suggested that trade liberalization only effect employment positively but other three remaining indicator had negative impact on economic development. The study suggested that trade openness focus on labour intensive product.

For the long time, in the light of international economics literature remain dark on service sector because they consider services non-tradable items but in recent literature they denied this fact that services had a great contributions on economic development because through services the movements of technology, skills and experience enhance and now a day’s these indicator (technology, skills and experience) play a key role and these factor had proved a back bone for country. The related article through this topic is regressed below:

Gulzar (2007) investigated the impact of trade liberalization on service sector & this study was carried by using panel data (from UN online database) for the period of 1981 to 2010. Real exchange rate, foreign price, foreign per capita income was used as independent variables This study was carried by taking the panel data of 92 countries. OLS, pooled least square was used for Analysis.

The findings of the study revealed that services had positive impact on trade liberalization but they followed decreasing and increasing trend & service sector promotion depends on trade policy implications. It was more suggested that aim of the trade policy should be to promote domestic market, with maximum benefits in terms of per capita income and employment with following upwards trend.

Salman &Javaid (2011) studied the impact of trade openness on wage inequality. The study was conducted by using three explanatory variables i.e import penetration ratio, export penetration ratio & relative prices. The data was taken for the years 1996 to 2005. The econometric model predicted that wage inequality decreased when the exports with respect to the value added increases & on the other hand, skilled labor had positive impact on wage equality.

Ahmad &Arif (2012) examined the long run relationship between output growth and trade openness. The study was carried by taking time series data from 1972 to 2010. Co-integration & error correction was used for econometric estimation to establish relationship between output growth and trade openness. Output growth & trade openness had positive relationship and the result indicated the long run relationship between two variables and there exist bi-directional significant causality between trade openness and output growth.

Kauser et al (2013) examined the impact of trade liberalization on economic growth in Pakistan. The study was carried by taking time series data from 1975to 2010. Real GDP was taken as dependent variables and: gross fixed capital formation, foreign direct investment & inflation were taken as explanatory variables. The results concluded that capital formation had positive and significant impact while on other side FDI and inflation had negative impact on economic growth of Pakistan.

3. Trade Liberalization in Pakistan
After the independence of 1947, Pakistan economy faced a lot of problem such as political in-stability, mismanagement, lack of infrastructure, lack of industries & illiteracy and after two year in 1949 Pakistan faced devolution crisis.

In 1960s Pakistan started adoption of development strategies so in consequences during this age large scale of manufacturing industries were launched and to protect infant and newly born industries, Pakistan
applied direct (tariff and export tax) and indirect obstacles (exchange rate & long term investment assistance) in the economy. For the protection of infant industry, in 60’s some additional policies introduced which were as follows.

- An overvalued exchange rate
- Export bonuses
- Low interest rate for putting the control on exports
- ESB (export bonus scheme) was introduced through bonus vouchers

In 1970s the Govt. introduced nationalization policies and reduced the anti-export bias but on the other hand, Pakistan faced serious problems such as East Pakistan War 1971 and deficit balance of payment due to oil price shocks. In this decade to support economy the Govt. of Pakistan took following steps.

- Devaluation of Pakistan rupee by 57% in 1972
- Elimination of export bonus scheme

In the age of 80s, the Govt. of Pakistan thought about economic development policies. For this purpose, the economy of Pakistan started to remove obstacle on trade because in the presence of restricted trade, efficiency, advancement in technology, variety of goods and services, competitive environment & skilled labour were remained closed. For the purpose of creating competitive environment the Govt. of Pakistan encouraged private investment and took different initiative steps which are as follows:

- Tax holiday
- Tariff cut
- Reduction in custom duties 13% to 5%
- Flexible exchange rate

Through these initiatives, the poverty declined from 46% to 18% in the late of 1980s. In 1950,60s 70s & 80s Pakistani grew at 6% per year in spite of increasing trend in population growth (Haq’s Musings). In 1990s, due to the political instability, mismanagement, corruption and increasing trend in foreign debt the unemployment followed upwards trend and poverty rose 33% & inflation in double digit. In these decade Benazir Bhutto and Nawaz Sharif played musical chair due to these reason trade to GDP ratio of Pakistan remained 0.4 per annum which is less than other developing countries such as, India (0.8 per annum) & Korea (1% per annum).

In the regime of General Pervez Musharaf, the economy had better position & GDP rose in double digit. The era of 2000-2003 the Govt. took following steps to promote industrialization.

- Deregulation
- Reduction the cost of doing business

In current decade the industrialization sector of Pakistan economy is less liberalized than other developing countries. Pakistan could not produce in competitive environment for industrial sector due to energy crisis, corruption, high exchange rate, unemployment, lack of infrastructure, high import duties on raw material & machinery. This scenario is described as below:

“Pakistan export fell to USD23.64 billion in 2011-12 from USD 24.82 billion in 2010-11, showing decline of 4.75%. Contrary to this, world trade expanded by 5% in 2011 compared to 13.8% growth in 2010.Pakistan exported to Asian countries slightly fell to USD11.709 billion in 2010-11 from USD 11.556 billion in 2011-12.”

4. Theoretical and Conceptual Framework

The economics is said an organized science after 1776 the publications of the “Wealth of Nations” by Adam Smith. During the seventeenth and eighteenth centuries a group of men in which bankers, government official and government and private servants are also included they wrote a pamphlets on international trade and present their arguments that in prance of trade a country become more progressive
if they promoted its export especially in the form of surplus gold and prohibited its imports especially in the form of luxury item & their arguments are called mercantilisms. In 16th and 17th centuries the brutish economist (Adam smith and David Ricardo) are also the advocates of mercantilism. After that the concept of absolute advantage emerged that a nation rely on domestic product and the supplier produced until when demand =supply. This situation is described below through diagram.

**Diagram 1: Equilibrium in Isolation:**

![Diagram 1: Equilibrium in Isolation](image)

X-axis shows Quantity and y-axis price. The negative slope determined demand and positive slope shows supply when the supply and demand forces intersect to each other where the price determined Pe and equilibrium exist in a point A. This is point where qs=qd.

After this, in 19th century the David Ricardo stated the concept of comparative advantage also known as “comparative cost theory the gain from trade emerged. This theory putted arguments that both nations gain from trade by producing those goods which are cheaper in their own country through this way the nations utilized their local resources more efficient way and specialization occur in those commodities which produced cheaper in the country.

Some qualifications of comparative advantage theory are given below:

- This theory considered that there is full employment.
- There is no hindrance in the allocation of resources.
- Only commodities can moved investment resources are not internationally mobile.
- Comparative advantage is the basis of investment decision.

The critics on the qualifications of comparative cost theory are that: if the country having the condition of full employment there is no labour force resources are perfectly allocated and they produced whole goods efficiently than there is no need to decrease the quantity of one good.

After that in the mid of 1980s, the developing nations Asia, Europe & Pakistan etc. adopted trade openness policies ‘under the series of SAP developed by international monitor fund and World Bank’ because rapid economic growth is not possible without trade openness.

Economic growth is directly correlated with efficiency, skilled labour, experiences, variety of goods, investment, capital formation & human capital and those are all do not possible without trade and on the other hand, the topic of globalization is not emerged in the absence of international trade and globalization played a vital role in economic growth because it promoted investment in human capital, capital formation, social safety nets, reduced poverty by creating job opportunities, technological advancement, enhancement in standard of living, raised investment through the attraction of foreign investor, access to new market & made easy foreign lending for developing countries.
These advantages of Globalization through diagram no: 2 are described below:

Diagram 2:

In current studies and arguments Globalization is defined as:
“Globalization is the forces of liberalization of investment & trade regimes, financial integration, international labour flows & technological change which are sweeping the world today with fierce velocity”.

But in the light of recent literature and arguments of development economist Globalization cast both positive and negative impact on economic growth. They putted arguments that before being a part of globalization the developing nations must outlook their circumstances and situation of the economy because in the presence of Globalization income inequality & environmental degradation followed increasing trend and on the other hand highly skilled and educated person moved to the developed nation for the sake of highest earning through this way efficiency reduced in the specific country.

4.1 Data Sources
The basic and core objective of study is to examine the impact trade openness on economic growth. The data of variables for Pakistan is collected of the years from 1975 to 2013 from The World Development Indicator CD-ROM (2003) and Hand Book of statistics (2010)
And For the year of 2014, the data is forecasted through moving average.
For example:

\[
\text{Moving average} = \frac{(v_{2009}) + (v_{2010}) + (v_{2011}) + (v_{2012}) + (V_{2013})}{5}
\]
(Values of above forecasted year (2009……..2013) divided by the number of years)

4.2 Model Specification
In this research study, for avoiding the problem of multicollinearity construction of model is done in two equations because in upper equation we used TOP (trade openness) to check the volume of the country trade which is the sum of imports and exports while on the other hand, imports & exports partially are partially used.
For checking the impact of trade on economic growth the basic two econometric models are defined as:

**Model No. 1**
\[
\text{GDP}_t = \beta_0 + \beta_1 \text{GFCF}_t + \beta_2 \text{FDI}_t + \beta_3 \text{TOP} + \beta_4 \text{LF} + U_t \ldots \ldots (a)
\]

**Model No. 2**
\[
\text{GDP}_t = \beta_0 + \beta_1 X_t + \beta_2 M_t + \beta_3 \text{GFCF}_t + \beta_4 \text{FDI}_t + \beta_5 \text{LF} + U_t \ldots \ldots \ldots (b)
\]

Here,
\( \text{GDP}_t \) = Gross Domestic Product at a time period \( t \)
\( X_t \) = Exports of goods and services at a time period \( t \)
Here $\beta$’s represents the parameters of variable which we consider constant for obtaining results but in real life these variables showed trend.

For this research study, GDP is used as dependent variable and other variables which have significant impact on trade such as imports, exports, gross fixed capital formation and trade openness (used proxy of trade liberalization for the volume of country) are used as explanatory variables.

4.3 Definition of Variables

4.4.1 Gross domestic product (GDP)
“The total value of goods and services which produced in a country in a given time period is called GDP”. GDP is a core, basic indicator, benchmark for competing other countries and initial value for checking the progress of the economy.

4.4.2 Exports ($X_t$)
“Exports are the oldest form of economic transfer the developed nation who endowed with capital intensive technology mostly revenue earned from exports and those nations whose impose fewer restriction on trade such as tariff and quota”.

4.4.3 Imports ($M_t$)
“The word import is derived from the word “Port” since goods are often via boat to the foreign countries. Imports are the back bone of international trade. Mostly the countries import those goods, services and raw material which within country not produce cheaply & efficiently. When the value of imports exceeds the value of exports then we say that the trade balance is negative and when the situation is opposite to this scenario then we say that trade balance is positive”.

4.4.4 Gross Fixed Capital Formation (GFCF)
“Gross fixed capital formation is a major and core components of GDP expenditure & it include entire expenditure bear on fixed assets & replacement cost of fixed capital such as: land, building, machinery, transport equipment and engineering work”. Gross Fixed Capital formation is used as a proxy of Investment.

4.4.5 Trade Openness (TOP)
Trade openness is used as a proxy variable to check the volume of the country. We compute trade openness

$$TOP = \frac{\text{IMPORTS} + \text{EXPORTS}}{\text{GDP}} \times 100$$

4.4.6 Foreign Direct Investment (FDI)
It is a major source of capital inflow. FDI is an investment made by a company or entity based in one country, into a company or entity based in another company. FDI includes all capital transaction between two units or between joined enterprises which may be incorporated or not incorporated.
4.4.7. Labor Force (LF)
All the member of a particular organization or country whose are able to work, employed or seeking employment in a country or region.

5. Results and Discussion
To obtain econometric model of study we take log on both sides. So, model is rewritten as

**Model No. 1**
\[ \ln{GDP_t} = \beta_0 + \beta_1 \ln{GFCF_t} + \ln{FDI_t} + \beta_3 \ln{TOP} + \beta_4 \ln{LF} + U_t \ldots \ldots \ldots \ldots \ldots (c) \]

**Model No. 2**
\[ \ln{GDP_t} = \beta_0 + \beta_1 \ln{X_t} + \beta_2 \ln{M_t} + \beta_3 \ln{GFCF_t} + \beta_4 \ln{FDI} + \beta_5 \ln{LF} + U_t \ldots \ldots \ldots \ldots \ldots (d) \]

5.1. Unit Root Test
In this study co-integration is used to explore the long run association between human capital and economic growth of Pakistan. First of all stationarity of the variables is checked before applying co-integration.

**Table-2 ADF test results**

<table>
<thead>
<tr>
<th>Variable Names</th>
<th>Level</th>
<th>1st Difference</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Domestic Product</td>
<td>-0.5651</td>
<td>-7.1843</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.8668)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imports</td>
<td>-0.4753</td>
<td>-6.872107</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.8853)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>-0.49795</td>
<td>-6.4618</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.8809)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Fixed Capital Formation</td>
<td>-1.7994</td>
<td>-8.3816</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.3753)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign direct investment</td>
<td>-2.9428</td>
<td>-7.0898</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.0496)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade Openness</td>
<td>-0.4753</td>
<td>-6.872107</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.8853)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labour Force</td>
<td>-0.39685</td>
<td>-9.1764</td>
<td>I(1)</td>
</tr>
<tr>
<td></td>
<td>(0.8749)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Parenthesis shows probabilistic values)

After applying unit root test we conclude that all variables are stationary at I(1). So for showing results its first requirements that to decide the optimum lag length criteria. For this purpose, Akiake & Schwarz information criteria is used and in LR test, the optimum lag length is one. After deciding the lag length, Johansson co. Integration test is used. Johansson co. integration test executes two steps.
- Trace Statistics
- Maximum Eigen Value Statistics
Table-3 Unrestricted co. integration Rank Test (Trace)

<table>
<thead>
<tr>
<th>Hypothesized No. of CE.(s)</th>
<th>Eigen value</th>
<th>Trace Statistics</th>
<th>Critical value (0.05)</th>
<th>Prob.**</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>None*</td>
<td>0.660853</td>
<td>96.98430</td>
<td>76.97277</td>
<td>0.0007</td>
<td>Exist long run relationship</td>
</tr>
<tr>
<td>At most 1*</td>
<td>0.478421</td>
<td>55.89405</td>
<td>54.07904</td>
<td>0.0341</td>
<td>Exist long run relationship</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.372494</td>
<td>31.16005</td>
<td>35.19275</td>
<td>0.1277</td>
<td></td>
</tr>
<tr>
<td>At most 3</td>
<td>0.231019</td>
<td>13.45200</td>
<td>20.26184</td>
<td>0.3288</td>
<td></td>
</tr>
<tr>
<td>At most 4</td>
<td>0.087267</td>
<td>3.469842</td>
<td>9.164546</td>
<td>0.4968</td>
<td></td>
</tr>
</tbody>
</table>

Table-4 Unrestricted Co. integration Rank test (maximum Eigen value)

<table>
<thead>
<tr>
<th>Hypothesized No. Of CE(s)</th>
<th>Eigen value</th>
<th>Max Eigen statistics</th>
<th>Critical value</th>
<th>Prob.**</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>None*</td>
<td>0.660853</td>
<td>41.09025</td>
<td>34.80587</td>
<td>0.0000</td>
<td>Long run relationship exist</td>
</tr>
<tr>
<td>At most 1*</td>
<td>0.478421</td>
<td>28.73399</td>
<td>24.58808</td>
<td>0.0002</td>
<td>Long run relationship exist</td>
</tr>
<tr>
<td>At most 2</td>
<td>0.372494</td>
<td>17.70805</td>
<td>22.29962</td>
<td>0.4382</td>
<td></td>
</tr>
<tr>
<td>At most 3</td>
<td>0.231019</td>
<td>9.982160</td>
<td>15.89210</td>
<td>0.3896</td>
<td></td>
</tr>
<tr>
<td>At most 4</td>
<td>0.087267</td>
<td>3.469842</td>
<td>9.164546</td>
<td>0.8247</td>
<td></td>
</tr>
</tbody>
</table>

Table-3 &4, represent the results of Johansson co. integration test. The table-3 of Trace values show that there exist long run co. integrated relationship among variables [GDP= imports, exports, GFCF & trade openness] at 2 levels because on two levels we reject the Null hypothesis that Trace value > critical value

Table-4 shows the maximum Eigen values and there exist 2 co. integrating vector because we reject Null hypothesis on two levels that

Maximum Eigen value Statistics> critical value

Such as 41.099025 are greater than 34.80587 and 28.73399 is greater than 24.58808.

Model-1

Table-5 Co-integrating coefficient Of Normalized equation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Standard error</th>
<th>T- Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>L Imports</td>
<td>5.59541</td>
<td>-1.25946</td>
<td>4.4427</td>
</tr>
<tr>
<td>L Exports</td>
<td>9.925253</td>
<td>-1.04695</td>
<td>9.4801</td>
</tr>
<tr>
<td>L GFCF</td>
<td>-0.026236</td>
<td>0.00867</td>
<td>3.0260</td>
</tr>
<tr>
<td>L FDI</td>
<td>1.033667</td>
<td>0.3934475</td>
<td>2.6270</td>
</tr>
<tr>
<td>L Labour Force</td>
<td>-0.0194710</td>
<td>0.003365</td>
<td>5.7863</td>
</tr>
<tr>
<td>C</td>
<td>0.184265</td>
<td>0.049705</td>
<td>3.7072</td>
</tr>
</tbody>
</table>
Model-2

Table-6 Co- integrating coefficient of normalized equation

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Standard error</th>
<th>T- Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>L Trade openness</td>
<td>9.925253</td>
<td>-1.04695</td>
<td>9.4801</td>
</tr>
<tr>
<td>L GFCF</td>
<td>-.026236</td>
<td>0.00867</td>
<td>3.0260</td>
</tr>
<tr>
<td>L FDI</td>
<td>1.033667</td>
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</tr>
<tr>
<td>C</td>
<td>0.184265</td>
<td>0.049705</td>
<td>3.7072</td>
</tr>
</tbody>
</table>

These results suggests that foreign direct investment, imports & exports have positive impact on gdp growth while on the other hand; gross fixed capital formation& labour force has negative impact on economic growth. The reason behind these results are as follows:

a. In the light of recent literature, it is a common argument that in global world, trade is the core and major element of economic growth & the expansion of trade is only possible through imports and exports and exports are the basic indicator of economic development so, for the expansion and diversification of exports the Govt. often took initiative step such as “Export Subsidies” because exports of Pakistan is often based on primary agricultural commodities (wheat, rice & cotton),manufacturing leather, textile and sports goods. According to the Fiscal year of 2008 72% of total GDP is based on mentioned above commodities and on the other hand, it is insufficient condition for the country to produce everything in the situation of Isolation so, imported goods enhanced the living standard of the people through removing poverty because people enjoy more opportunities of business, technology advancement and services and latest knowledge.

b. Liberalized economies enjoy foreign direct investment & through this way market expand, cost per unit decreases, specialization occur & technological transmission become a reason to attain the attention of foreign investors.

\[ \text{Trade openness} \ TOP = \frac{\text{IMPORTS}+\text{EXPORTS}}{\text{GDP}} \times 100 \]

is used as proxy variables to check the volume of the country and volume of the country is determined through imports and exports so, these indicators impose positive relationship on GDP growth. So, these results suggested that trade openness enhanced the volume of country when the economy is liberalized they enjoy competitive environment and the topic of specialization occur. Through this way, we concluded that imports, exports and trade openness cast positive impact on economic growth. These significant impacts described through many channel.

c. Trade openness may create incentives for policy makers to pursue many macroeconomic policies, either because the threat of capital flight or because international arguments, implicit or explicit, that act as a check on policy and technological transmission. In turn, macroeconomic stability became reasons of many advantages such as: reducing prices uncertainty, moderating public deficit and it became a reason of increasing future tax.

d. On the other hand, liberalized economies enjoy laissez- fair environment and public demanded goods provided in these economies. Openness economies will tend to specialization according to their comparative advantages so it became a cause of market expansion and attention of foreign investors. Trade openness simply allow domestic agents to import capital goods that are unavailable in the country or available at higher cost so these importable commodities became a reason to expand market size and raised the portion of export in the foreign market and create competitive environment for country. Liberalized economies enjoyed foreign direct investment and it capture the incident of a certain type of technological transmission & proves a substitute for trade because foreign investment is used to set up plants producing goods that cannot be imported because of trade restrictions. So, with the help of described above channel we can say that trade
openness became a reason of expanding imports and exports and through this way it cast positive impact on economic growth. Production function is determined through labour and capital.

\[ Y = F(K,L) \]

e. Every commodity is manufactured goods through those factor of production. Pakistan is one of them in developing countries and in 1994-95 it is a common argument that labour cast a positive impact on growth while on the other hand, by applying growth accounting approach to measure the contribution of labour tells us that in Pakistan economy labour cast a negative impact on economic growth. The main reason of this phenomenon is illiteracy, low wages, unskilled labour, child labour, unemployment & increasing trend in population. Pakistan is a labour abundant economy but the utilization of labour is not in uniform manner. The labour group of Pakistan having no sufficient knowledge about the work they have done so the topic of specialization is not occur and on the other hand, food material is having insufficient quality because their wages are very low so in consequences their productivity follows decreasing trend. In this way, labour cast negative impact on the economic growth of Pakistan.

f. GFCF (Gross Fixed Capital Formation) is used here as a proxy of Investment. In a common sense Investment cast positive impact on GDP growth but in developing countries because the people having no sufficient employment opportunities and they having a low amount for saving so, mostly investment are take place in loans and then mostly the ratio of profit is low then the amount of loans and then mostly these loans is used for unproductive necessities and therefore, the burden of debt follows increasing trend in Pakistan.

6. Conclusion
This research study empirically analyse the impact of trade openness on economic growth. For this purpose, imports, exports, trade openness & gross fixed capital formation used as explanatory variables while real GDP treated as dependent variable for the time period of 1975-2014. After applying Johansson Co. integration approach, the result suggested that imports, exports & trade openness cast positive & significant impact on economic growth while gross fixed capital formation & labour force cast negative impact on economic growth.

For improving this situation the policy recommendations are as follows:
- According to the report of American Business Corporation of Pakistan, in a present situation import duties are applicable on raw material, machinery & equipment and those goods are not locally available in the country & on the other hand, Custom duties also follows increasing trend in 2008-09 so, reduction in these duties is very necessary for achieving the low cost of products.
- For increasing the portion of exports, the Govt. trade policies must be according to the circumstances of Pakistan. For this purpose, it’s necessary that the Pakistan Development Authority conduct a questionnaire for knowing the condition of big and small unit industries.
- Improvement in infrastructure is very necessary to increase the volume of trade. For this purpose, it’s necessary that chairman of relevant major Public Sector Organizations meet to relevant Ministries.
- Environmental change is very important for increased the productions in industries and raised the portion of services. For this, Pakistan Environmental Agency should be opened.
- Because Pakistan is a developing country and unemployment is going to be increased day by day so, Pakistan must introduced labour intensive products & also raised the portion of services.
- Pakistan should liberalize its exports & imports in such a manner that balance of trade achieved through imports and exports for achieving this target the Pakistan should pay more attention on technological advancement & capital goods.

References


Impact of Microfinance on Income and Employment in Pakistan: A Primary Data Analysis

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ABSTRACT

Purpose: This paper investigates impact of microfinance on household income and employment. It is a primary data research conducted in the Bahawalpur division, Pakistan. The study employed the tool developed by Assessing the Impact of Microenterprise Services (AIMS) and Small Enterprise, Education and Promotion (SEEP). The tool has been modified in local context. The sample consists of 1524 respondents, out of which 773 are established clients (treatment group) and 751 are incoming ones (control group), belonging to different microfinance providers of Pakistan. Independent Sample T-Test and Multiple regressions have been used for analysis. The regression analysis shows that participation to microfinance program has strong positive impact on household income while very minute positive impact on employment. Other independent variables such as prior access to any other loan, micro saving, household assets, age of respondent, gender, education and household size have positive impact on household income but a mixed impact on income generating activities.

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1. Introduction

Microfinance is not a new development. Its origin can be traced back to 1976, when Muhammad Yunus set up the Grameen Bank, as experiment, on the outskirts of Chittagong University campus in the village of Jobra, Bangladesh. Since then several microfinance institutions came up and have succeeded in reaching the poorest of the poor, and have devised new ground-breaking strategies with time for the fulfilment of their vision. These included the provision of collateral free loans to poor people, especially in rural areas, at full-cost interest rates that are repayable in frequent instalments. Borrowers are organized into groups and peer pressure among them, which reduced the risk of default.

Microfinance is such a concept that gives the masses and underprivileged section of the society an access to business opportunities and the power to overcome ossified social structures. Apart from the benefit of creating social equality in business arena, finance (particularly microfinance) acts as an extraordinarily effective in eradicating poverty. Microfinance is defined as an entire range of financial and non-financial services including skill up gradation and entrepreneurial development, rendering to the poor for enabling them to overcome poverty. Financial assistance is provided in the form of small loans, acceptance of
small savings and provision of other financial products and services to the poor. It provides the financial services not accessible through the traditional financial system, needed by many people to increase and diversify their economic activities. It boosts self confidence among the poor.

Microfinance is now being considered as one of the most important and an effective mechanism for poverty alleviation. These are also effective mechanisms through which to disseminate precious information on ways to improve the health, education, legal rights, sanitation and other living standards, which are of relevant concerns for the poor. Above all, many micro-credit programs have targeted one of the most vulnerable groups in society – women, who live in households with little or almost no assets. By providing opportunities for self-employment, many studies have concluded that these programs have significantly improved women’s security, autonomy, self-confidence and status within the household.

What do we mean by “impact of microfinance”? Impact is about understanding how financial services affect the lives of poor people. Impact indicators extend beyond enterprise measures (assets, employment, revenues) to include multiple dimensions of poverty, including overall household income, social improvements in health and education, and empowerment (in terms of increased self-esteem and control of household resources among women).

Participation in microfinance programme can reduce vulnerability: through three main pathways income-smoothing, building assets and empowering women. It is commonly suggested that micro loans are often used to increase household income not only by increasing the number and diversity of sources of income but also by including increased participation of household members in income-generating activities (IGAs).

It is often observed that borrowers utilize microloans for offering a greater variety of goods and services within the same enterprise or for starting a new enterprise that runs together with their existing IGAs by selling into different markets at different times of year. For example, farmers sell farm products after harvesting, while they trade non-farm products during the pre-harvesting periods. Sometimes the microfinance beneficiaries invest their microcredit, as a side business, in craft-making for a brief tourist season.

It is often observed that the poor, instead of growing one income generating activity into a highly profitable business, are much more likely to develop two or more small businesses. They take it as more risky to invest all eggs in one basket. This diversification strategy, in return, causes to smooth income generation and therefore consumption through the year.

Microfinance leads to increase participation in IGAs by more members of the household. The main contributing factor in this connection is the increased economic activity by women. Especially, when they avail loans and start some IGAs because majority of them had not been much engaged in such activities before having access to loans. The evidence indicates that women spend more time on income-generating work than before. However it is also observed in some other cases that they spend comparatively less time at work but bring in the same or more amount of money because their loan-supported IGAs or investment in labour and time saving technology use their time more productively. Self-employment also often allows women to combine IGAs with child and home care, unlike labour away from home. On the other hand, there has been concern that family-run IGAs are more likely to engage children in labour when they could be in school.

The hypothesized mechanisms, through which microfinance is considered to reduce poverty are diversification of income sources and increased engagement in IGAs. Microfinance is supposed to bring a change in the lives of poor borrowers though these two factors.

While describing different ‘makers of change’ Sebstad et al (1995) strongly recommend the household
income measured by two factors: changes in the amount of income earned by all household members from all IGAs (income generating activities) and changes in the amount of income earned by the household from the IGA in which microfinance has been invested. There is awe-inspiring evidence to validate that households that participate in microfinance programs enjoy an increase in household’s income (Murdoch and Haley, 2002). They also benefit from consumption smoothing and the ability to sustain gains overtime (Khandker, 1998). The important contribution of microfinance is its ability to raise the living standard of low income people.

Studying the impact of microfinance on employment is very important as it provides the base for economic growth. All the studies dealing with theoretical issues of impact of microfinance strongly recommended the inclusion of employment (Nelson et al 2000; Sebstad et al 1995; Schafer, 2001). The earlier impact assessment studies present a very substantial evidence of this impact domain and demonstrate mix result about the impact

In this paper, we try to present evidence of the important contributions made by microfinance in the eradication of poverty by increasing the household income, per capita household income, the income generating activities and the persons involved in IGAs.

2. Literature Review

Saboor et al (2009) analyzed how micro-credit affect the farm income and agricultural production in Rawalpindi and drew some fruitful policy lessons. An important finding was that availing microcredit has significant positive impact on average farm income of farmers with credit from crops which was PKR 32708 as compared to PKR 30115 for without credit. Average farm income from livestock was recorded PKR 42000 for credit category and PKR 44385 for without credit category. To attract maximum farmers, he study recommended a fool proof system for acquiring credit and recovering it.

Waqas et al (2015) studied the role of the microfinance institutions in alleviating poverty. Primary data was collected through questionnaires from the clients of Tameer Microfinance Bank. Multiple linear regression and paired t-test were applied for analysing the data. It has been found that the income of the microcredit beneficiaries increases after availing microfinance. Beta coefficient of credit is 0.690 which indicates that 1 percent increase in credit will bring 69 percent increase in the income of the borrowers. Moreover Results show that microfinance has a strong positive impact on children education and enterprise financial performance. However, there is mixed evidence found on food security, household expenditures and household assets.

Abbas et al (2005) designed a study to explore the correlation not only between participation in microfinance programme and increase in income but also between increased income and consumption. The study conducted in Faisalabad district obtained the primary data from a sample of seventy microfinance borrowers of three branches of National Bank of Pakistan through questionnaire. The overall impact of micro financing on per capita income was highly significant and also positive with an increase of 33 percent, from PKR 1221 to PKR 1628. The results indicate that micro credit and change in income are positively and highly correlated with a value of correlation 0.859. The value of correlation (0.7024) between increased income and consumption implied that greater part of changed income is consumed by respondents. Regression analysis showed positive coefficient for change in income against availing microcredit (0.13) and change in consumption against change in income (0.14).

Akram and Hussain (2011) studied the contribution of microfinance in raising the living standard of low income people of district Okara Pakistan. It is a primary data research. The main concern is with the impact of microfinance on income level which is observed positive as 85.40% of respondent reported that their income level has increased after getting microfinance facilities. However as the limitations are concerned, the sample size is too short to generalized the result.

Waheed (2001) defines microcredit and studies the micro financing of PRSP (Punjab Rural Support Programme) in terms of impact of microfinance on income. The results of survey show that 43 percent
loans were taken for livestock with 118.7 percent change in income. 25 percent loans for micro enterprises with 118 percent change in income and 25 percent loans for agriculture inputs with 27.7 percent change in income.

Naureen (2010) surveyed four microfinance institutions to study the role of microfinance in poverty alleviation. It was a primary data research. Impact of microfinance has been analyzed both on household and enterprise level by comparing new clients to establish ones, using chi sequence test. Results presented a mix picture of impact, showing significant impact on children education and financial performance of enterprise, mixed evidence on food security and assets and no impact on housing and income smoothing of enterprise.

Brannen (2010) tried to expand and improve upon the earlier studies and to re-examine the impact of Village Saving and Loan Association (VLSA). He presented a general profile of the Tanzania and also highlighted the historical, economic and social context of the study. The study had a rich discussion about selection bias. The study focused on social and economic impacts which are assessed at both the individual and household level. The study observed the positive impact of VLSA participation on income generation activities.

Akhtar (2014) assessed the impact of microfinance on the welfare of microfinance beneficiaries. The sample size for the study is sixty-two respondents and Danyore Union council is focus area. The results show improvement in health, education and income level after availing microfinance. It has been found that microfinance loan affects the household level of income as it increases by Rs 4165.34. The value of the coefficient of $β_1$ is 0.056350; it shows a one unit of microfinance loan taken leads to increase in household income of clients by Rs 0.056350. It shows that a microfinance loan affects the income level of clients but in minor terms.

Barnes et al (2001) investigate the impact of three microfinance programs in Uganda i.e. FINCA, FOCAS and PRIDE on profits of the enterprises of borrowers and non-borrowers. By comparing the both groups, the study found out strong positive impact of microfinance on profits. Almost 43 percent of the borrowers experienced increase in the profit from their enterprises as compared to only 31 percent of non-borrowers experienced the increased profit.

Arjmand (2004) investigates the impact of Kashf microfinance on eradicating poverty. It is a longitude study based on before after approach providing a comprehensive comparison between control and treatment groups. Initially their monthly incomes were approximately same (PKR 5158 for comparison group and PKR 5376 for treatment group). One year later, the members of Kashf Foundation reported a significant increase of 30.9 percent in their monthly average income; while the members of control group reported only 20.3 percent increase. The monthly average incomes of Kashf beneficiaries and comparison group have increased to PKR 7039 and PKR 6206 respectively.

3. Objectives of the Study
The objectives of the study are:
- To evaluate the impact of microfinance on household income
- To assess the impact of microfinance on employment

4. Data and Methodology
The present study has been conducted in the area of Bahawalpur Division which was princely state. It is situated along the southern bank of the Sutlej and Indus Rivers.
To study impact of microfinance on household income and employment level, the comparison between mature clients and incoming clients has been analysed. The use of incoming clients as a control group has two pluses. First, there is no need to identify and survey non-participating members to generate a control
group. Inclusion of such members causes selection bias and it becomes difficult to motivate them to participate in a time-consuming survey. Second, another advantage is that there is no need to follow clients over time, as in a longitudinal survey (Karlan, 2001). However the problem of experiencing the differences in the entrepreneurial spirit, decision power, health quality can be tackled by the cross-sectional approach, as both its control and treatment group consist of such members who have decided to participate in the microfinance programme The incoming clients are the control group, whereas the clients with a membership of microfinance programme for more years are the treatment group (Karlan, 2001)

The sample for the present study consists of 1524 respondents, out of which 773 are established clients (treatment group) and 751 are incoming ones (control group). They all are clients, either mature or incoming, of the following MFPs which are the leading supplier of microfinance services in the area of study: National Rural Support Programme(NRSP), Akhuwat (AKHU), The First Microfinance Bank Ltd.(FMFB), Kashf Foundation (KASHF), Khushhali Bank (KB), National Rural Support Programme Bank Ltd. (NRSP-B), Tameer Microfinance Bank Ltd. (TMFB). With respect to infra-structure, financing structure and outreach, these microfinance providers (MFPs) are the prominent institutions of Pakistan microfinance sector.

4.1 Formulation of Hypotheses and Operationalization of Variables

Based on the literature review presented above, we formulate the hypotheses and operationally define the variables. Purpose of operationalization is to translate the variables into measurable elements. To analyse the impact of microfinance on income and employment, we test the following hypotheses:

\( H1a \): Participation in microfinance programme leads to increase monthly household income

\( H1b \): Participation in microfinance programme leads to increase per capita monthly household income

\( H1c \): Participation in microfinance programme leads to increase income from IGAs where microcredit invested

Moreover to investigate the impact on employment, we formulate the following hypotheses:

\( H2a \): Participation in microfinance programme leads to increase the household income generating activities (IGAs).

\( H2b \): Participation in microfinance programme leads to increase the number of persons involved in IGAs.

The impact domain of income can be analysed in detail by three impact dimensions: (i) monthly household income (ii) per capita monthly household income (iii) monthly income from IGAs where microcredit invested. To investigate the impact dimension of household employment, two impact indicators have been designed: number of IGAs, persons involved in IGAs.

### Table 1: Operationalization of Dependent Variables

<table>
<thead>
<tr>
<th>Impact Dimension</th>
<th>Impact Indicators</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \text{INCM}_2 = \text{Per Capita Monthly Household Income} )</td>
<td>Hossain (1998), Abbas et al. (2005)</td>
</tr>
<tr>
<td></td>
<td>( \text{INCM}_3 = \text{Monthly Income from IGAs where microcredit invested} )</td>
<td>Sebstad et al. (1995)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household Employment</th>
<th>Impact Indicators</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EMPL</strong></td>
<td>( \text{EMPL}_1 = \text{Number of IGAs} )</td>
<td>Nelson et al. (2000), Brannen (2010)</td>
</tr>
<tr>
<td></td>
<td>( \text{EMPL}_2 = \text{Persons involved in IGAs} )</td>
<td>Schafer (2001), Brannen (2010)</td>
</tr>
</tbody>
</table>

**Model Specification for impact of microfinance on income and employment**

In the present study, regression analysis measures the impact of program participation and some other important socio-economic variables on a specific set of dependent (outcome) variables, as the following...
expression explicates;
\[ Y_i = f (MMFP, PAOL, MSAV, NOEP, IGAs, IMFI, HHAS, AGE, GNDR, EDU, HHSZ) \]
Where \( Y_i \) = dependent/ outcome variables which are household income and employment

**Independent Variables:** As the independent variables are concerned, they are:
- ‘Membership to microfinance programme’ (MMFP) which is a binary variable. As all the members of treatment group with membership for more than three years take the value ‘1’ while all the members of control group with membership for less than three months take the value ‘0’.
- Prior access to any other loan (PAOL)
- Micro saving (MSAV)
- Number of employed persons (NOEP)
- Number of income generating activities (IGAs)
- Household assets (HHAS)
- Age of respondent (AGE)
- Gender (GNDR)
- Education (EDU)
- Household size (HHSZ)

Age has been measured by number of years of age, while gender is a binary variable with value 1 for female and 0 for male.

4.2 Multiple Linear Regression Model for Monthly Income and Employment
To investigate the impact of microfinance on household income and employment, five models have been designed

\[
INCM 1 = \beta_0 + \beta_1 MMFP + \beta_2 PAOL + \beta_3 MSAV + \beta_4 NOEP + \beta_5 HHAS + \beta_6 AGE + \beta_7 GNDR + \beta_8 EDU + \beta_9 HHSZ + Ui
\]
\[
INCM 2 = \beta_0 + \beta_1 MMFP + \beta_2 PAOL + \beta_3 MSAV + \beta_4 NOEP + \beta_5 HHAS + \beta_6 AGE + \beta_7 GNDR + \beta_8 EDU + \beta_9 HHSZ + Ui
\]
\[
INCM 3 = \beta_0 + \beta_1 MMFP + \beta_2 PAOL + \beta_3 MSAV + \beta_4 NOEP + \beta_5 HHAS + \beta_6 AGE + \beta_7 GNDR + \beta_8 EDU + \beta_9 HHSZ + Ui
\]
\[
EMPL 1 = \beta_0 + \beta_1 MMFP + \beta_2 PAOL + \beta_3 MSAV + \beta_4 NOEP + \beta_5 HHAS + \beta_6 AGE + \beta_7 GNDR + \beta_8 EDU + \beta_9 HHSZ + Ui
\]
\[
EMPL 2 = \beta_0 + \beta_1 MMFP + \beta_2 PAOL + \beta_3 MSAV + \beta_4 IGAs + \beta_5 HHAS + \beta_6 AGE + \beta_7 GNDR + \beta_8 EDU + \beta_9 HHSZ + Ui
\]

5. Result and Discussion
The earlier evidence from literature presents a notable positive relation between household income and participation in microfinance programme (Murdoch and Haley, 2002; Khandker, 1998). The table 2 presents the central tendency, minimum and maximum values and standard deviation of each of five variables mentioned above for both groups: treatment and control group. The data analysis shows that the average monthly household income of treatment group is PKR 20061 which is greater than that of control group that is PKR 14387. So it can be concluded that participation in microfinance programmes contributes to increase in income but with a notable variations as the standard deviation is 7394.
Table 2: Descriptive analysis of Comparison between Treatment and Control Group with respect to Monthly Income (INCM) and Employment (EMPL)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment Group</th>
<th>Control Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Min</td>
</tr>
<tr>
<td>INCM 1</td>
<td>20061</td>
<td>5000</td>
</tr>
<tr>
<td>INCM 2</td>
<td>4197</td>
<td>800</td>
</tr>
<tr>
<td>INCM 3</td>
<td>11831</td>
<td>2000</td>
</tr>
<tr>
<td>EMPL 1</td>
<td>1.94</td>
<td>1</td>
</tr>
<tr>
<td>EMPL 2</td>
<td>2.11</td>
<td>1</td>
</tr>
</tbody>
</table>

About the per capita monthly income (INCM 2) and income from IGAs where microcredit has been invested (INCM 3) it is found that the treatment group enjoyed a higher level of income as compared to control group. This indicates a better living standard on the part of treatment group. The per capita monthly income for treatment group is PKR 4197 as compared to only PKR 3090 for control group. The average income from IGAs where microcredit invested is PKR 11831 and PKR 6673 for treatment and control groups respectively.

As the number of income generating activities (EMPL 1) is concerned, no substantial difference has been found between the two groups. On average, among the treatment group the household members are involved in 1.94 IGAs as compared to 1.87 IGAs involved by household members of control group. About the number of persons involved in IGAs (EMPL 2), the treatment group appears to be marginally better with the average of 2.11 than control group with the average of 1.89.

Table 3: Independent Sample T-Test for Income and Employment

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levene's Test for Equality Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig</td>
</tr>
<tr>
<td>INCM 1</td>
<td>49.09</td>
<td>0.00</td>
</tr>
<tr>
<td>INCM 2</td>
<td>27.21</td>
<td>0.00</td>
</tr>
<tr>
<td>INCM 3</td>
<td>36.09</td>
<td>0.00</td>
</tr>
<tr>
<td>EMPL 1</td>
<td>0.07</td>
<td>0.79</td>
</tr>
<tr>
<td>EMPL 2</td>
<td>0.06</td>
<td>0.81</td>
</tr>
</tbody>
</table>

With respect to INCM 1, INCM 2 and INCM 3, the table 3 shows that the significance value of the Levene test statistic is lesser than 0.05, we do not accept the null hypothesis at 95 percent confidence interval and have no confirmation to claim that the variances are equal and the difference between the means of both samples, treatment and control groups is equal to 0 against the alternative hypotheses that the difference between the means of both samples are not equal to 0. The income more earned by treatment group is not due to chance alone. So we do not reject the alternative hypotheses (H₁ a, H₁ b, H₁ c) that participation in microfinance programme leads to increase household income.

The table 3 shows that the no significant difference has been found between treatment and control groups in terms of income generating activities and number of employed persons. (EMPL 1 and EMPL 2 ). The Levene's Test for equality variances for employment (EMPL) showed that the significance values for all the both variables is remarkably greater than 0.05, indicating that there is adequate evidence to claim that variances are equal. So, we do not reject the null hypothesis that the both groups are different with respect to sample means.

Regression analysis is used to explore further the impact of microfinance. In the present study, regression analysis measures the impact of program participation and some other important socio-economic variables on a specific set of dependent (outcome) variables. As we aim not only at assessing the relationship between dependent and independent variables but also at identifying the independent variables which
comparatively have a greater effect on the dependent variable, so the present study relies on both standardized and unstandardized coefficients for analysis.

Following table 4 provides summary of regression results for monthly household income (INCM 1), per member household monthly income (INCM 2), monthly household income from IGAs where microcredit was invested (INCM 3). The level of significance is 95% for all data analysis in the present study as it is a rule of thumb for social science studies.

The results for INCM 1 show that all the independent variables except MSAV and GNDR effect monthly household income positively and significantly. The contribution of MSAV and GNDR is also positive but insignificant at 95 percent level of confidence. Membership of Microfinance programme (MMFP) leads to increase the monthly household income.

Table 4: Regression Analysis for Monthly Household Income (INCM 1), Per Member Household Monthly Income (INCM 2), Monthly Household Income from IGAs where microcredit invested (INCM 3)
a) Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>INCM 1</th>
<th>INCM 2</th>
<th>INCM 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Standardized Beta</td>
<td>Beta</td>
</tr>
<tr>
<td>Constant</td>
<td>3345.597</td>
<td>0.217</td>
<td>4086.698</td>
</tr>
<tr>
<td>MMFP</td>
<td>3086.140*</td>
<td>0.217</td>
<td>594.621*</td>
</tr>
<tr>
<td>PAOL</td>
<td>734.088*</td>
<td>0.061</td>
<td>87.271</td>
</tr>
<tr>
<td>MSAV</td>
<td>216.617</td>
<td>0.013</td>
<td>137.234</td>
</tr>
<tr>
<td>NOEP</td>
<td>1227.093*</td>
<td>0.157</td>
<td>16.012</td>
</tr>
<tr>
<td>HHAS</td>
<td>830.226*</td>
<td>0.407</td>
<td>160.324*</td>
</tr>
<tr>
<td>AGE</td>
<td>37.9040*</td>
<td>0.050</td>
<td>8.3300*</td>
</tr>
<tr>
<td>GNDR</td>
<td>265.639</td>
<td>0.018</td>
<td>38.874</td>
</tr>
<tr>
<td>EDU</td>
<td>359.355*</td>
<td>0.223</td>
<td>88.950*</td>
</tr>
<tr>
<td>HHSZ</td>
<td>212.109*</td>
<td>0.070</td>
<td>-518.004*</td>
</tr>
</tbody>
</table>

b) Model Summary and ANOVA Results

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>INCM 1</td>
<td>0.687</td>
<td>0.472</td>
<td>0.468</td>
<td>135.089</td>
<td>0.00</td>
</tr>
<tr>
<td>INCM 2</td>
<td>0.648</td>
<td>0.420</td>
<td>0.417</td>
<td>121.12</td>
<td>0.00</td>
</tr>
<tr>
<td>INCM 3</td>
<td>0.590</td>
<td>0.348</td>
<td>0.344</td>
<td>85.89</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Although PAOL (prior access to any other loan) also has a significant positive impact on INCM1, yet it is lower in terms of both standardized and unstandardized coefficients which imply the supremacy of microfinance to any other loan. The table 4 shows that NOEP and HHAS affect INCM1 significantly and positively. Higher the number of employed persons in household, the higher would be monthly household income. The variable, HHAS, is a comprehensive index for household assets containing several livestock, transportation and electric appliances. Contribution of HHAS to the model is significant and positive one. The positive contribution to the model by NOEP and HHAS indicates the indirect positive impact of participation in microfinance programme on INCM1, as the both are directly affected by membership to microfinance programme.

The positive coefficient associated with AGE implies that more aged people earn more. Similarly the positive contribution of GNDR to the model suggests that female respondents have higher monthly household income as compared the male ones. The significant positive beta attached with EDU indicates that the educated people have higher potential to earn more. Moreover the results of table show that the
greater the household members, the higher the household income level as more members are available for income generating activities.

As the standardized coefficients are concerned, it has been found that the variable which has greater effect on dependent variable is HHAS with standardized beta equal to 0.40. The other more significant variables are EDU and MMFP with standardizes beta 0.223 and 0.217 respectively. The standardizes beta for MMFP shows that monthly household income would change 0.217 standard deviation, due to per standard deviation change in membership to microfinance programme (MMFP).

The results for INCM 2 show that all the independent variables expect HHSZ effect per member monthly household income positively. Among these variables, MMFP, HHAS, EDU have significant impact while PAOL, MSAV, NOEP, AGE, GNDR have insignificant one at 95 percent level of confidence. However HHSZ affect the INCM 2 negatively and this effect is statistically significant. As the standardized coefficients are concerned, it has been concluded that the most influential and effect determining variable is HHSZ with a higher standardized beta that is 0.56. The other influential variables are HHAS, EDU and MMFP with high standardized betas that are 0.26, 0.18 and 0.14 respectively.

The regression analysis for monthly income from IGAs where microcredit invested has been presented in column 3. The independent variables such as MMFP, NOEP, HHAS, EDU, HHSZ have strong and significant effect on dependent variable, INCM 3. Simply participation to microfinance programme would lead to increase INCM 3. On the other hand, the MSAV, AGE have a positive but insignificant effect. PAOL and GNDR affect the dependent variable negatively; however the coefficient of PAOL is insignificant one.. PAOL has an insignificant negative effect on INCM 3, implying that access to any other loan instead of microloan, just creates a financial burden and does not lead to increase income. The proponents of micro saving take it as a substitute for microloan but the regression analysis in the present study depicts a lesser positive impact of micro saving on income as compared to microcredit. GNDR has been found to be negatively correlated with INCM 3, implying that male respondent have a higher level of monthly income from the project where microfinance has been invested than female ones.

With respect to the standardized coefficients, it has been found that the most influential and effect determining variable is MMFP with a higher standardized beta that is 0.401. The other influential variables are NOEP, HHAS with high standardized betas that are 0.288 and 0.182 respectively.

According to model summary, the multiple correlation coefficients, R, are 0.687, 0.648 and 0.59 for INCM 1, INCM 2, INCM 3 respectively showing high linear correlation between predicted and observed values of all the three variables. Values of R-Square, are 0.472, 0.420 and 0.348 for INCM 1, INCM 2, INCM 3 respectively indicating variations have been explained by the model. The significance value of the F statistic is less than 0.05 for all the three models, which means that the variation explained by the model is not due to chance.
Table 5: Regression Analysis for Number of IGAs (EMPL1) and Persons involved in IGAs (EMPL 2)
a) Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>EMPL1</th>
<th></th>
<th></th>
<th></th>
<th>EMPL2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beta</td>
<td>Standardized Beta</td>
<td>Beta</td>
<td>Standardized Beta</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td>Variables</td>
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</tr>
<tr>
<td>Constant</td>
<td>0.979</td>
<td>0.090*</td>
<td>0.033</td>
<td>0.055</td>
<td>0.470*</td>
<td>0.007*</td>
<td>0.017*</td>
</tr>
<tr>
<td>MMFP</td>
<td>0.090*</td>
<td>0.068</td>
<td>0.163*</td>
<td>0.029</td>
<td>0.037</td>
<td>0.689*</td>
<td>0.038</td>
</tr>
<tr>
<td>PAOL</td>
<td>0.033</td>
<td>0.029</td>
<td>0.004</td>
<td>0.002</td>
<td>0.025</td>
<td>0.009*</td>
<td>0.060</td>
</tr>
<tr>
<td>MSAV</td>
<td>-0.021</td>
<td>-0.015</td>
<td>0.364*</td>
<td>-0.021</td>
<td>-0.021</td>
<td>0.364*</td>
<td>0.060</td>
</tr>
<tr>
<td>NOEP/IGAs</td>
<td>0.470*</td>
<td>0.649</td>
<td>-0.172*</td>
<td>0.007</td>
<td>0.038</td>
<td>0.041*</td>
<td>0.060</td>
</tr>
<tr>
<td>HHAS</td>
<td>0.000</td>
<td>0.025</td>
<td>0.009</td>
<td>-0.003</td>
<td>-0.015</td>
<td>0.195</td>
<td>0.060</td>
</tr>
<tr>
<td>AGE</td>
<td>0.000</td>
<td>0.025</td>
<td>0.009</td>
<td>-0.003</td>
<td>-0.015</td>
<td>0.195</td>
<td>0.060</td>
</tr>
<tr>
<td>EDU</td>
<td>0.017*</td>
<td>0.060</td>
<td>0.086**</td>
<td>0.017*</td>
<td>0.060</td>
<td>0.086**</td>
<td>0.060</td>
</tr>
<tr>
<td>HHSZ</td>
<td></td>
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</table>

b) Model Summary and ANOVA Results

<table>
<thead>
<tr>
<th>Model</th>
<th>Model Summary</th>
<th>ANOVA Results</th>
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</thead>
<tbody>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>R Square</td>
</tr>
<tr>
<td>EMPL1</td>
<td>0.642</td>
<td>0.412</td>
</tr>
<tr>
<td>EMPL2</td>
<td>0.740</td>
<td>0.548</td>
</tr>
</tbody>
</table>

The table 5 presents the regression analysis for number of IGAs (EMPL1) and persons involved in IGAs (EMPL 2). MMFP, NOEP, HHAS and HHSZ have positive and significant effect on the dependent variable (EMPL1). PAOL, MSAV and AGE have positive but insignificant effect on EMPL1. While the GNDR and EDU impose a negative but insignificant effect on EMPL1. With respect to unstandardized coefficients, it has been found that the small value of coefficient for MMFP indicates that participation to microfinance programme effect the number of income generating activities very minutely. The established clients have been expected to have only 0.09 more IGAs than incoming ones. The positive effect of NOEP on EMPL1 is a remarked one while that of HHAS and AGE are very minute. The negative coefficient for GNDR implies that male respondents have more IGAs as compared to female ones. Female respondents have to confine themselves to some specific economic activities due to some social constraints. The effect of EDU on EMPL1 is negative but insignificant one, implying no strong relation between the both variables.

With respect to the relative importance, explained by standardized coefficients, NOEP has been found the sole dominant and the most impactful variable with standardized beta 0.649 while a comparatively very small standardized beta for MMFP has been found.

The summary of regression results for persons involved in IGAs (EMPL 2) have been presented in column 2. All the predictors except MSAV and EDU have positive effect on dependent variable (EMPL 2). However the effect of MSAV and EDU is negative and significant one. The positive and significant coefficient for MMFP implies that due to one unit change in MMFP, the expected change in EMPL 2 would be 0.163. The effect is positive but minute one. The members of treatment group would be slightly better than those of control group with respect EMPL 2. The negative coefficient for MSAV demonstrates that higher microsaving provides financial stability against shocks and thus involves less participating members in IGAs. The significantly negative coefficient for EDU implies that an educated respondent prefers more to send his/her children to college /school than to involve in IGAs as compared to illiterate ones. The variable GNDR has a significant positive coefficient showing that all the households of female respondents have higher number of employed persons than those of male respondents because of the female participation in economic activities.
Using the standardized coefficients, to investigate the relative effectiveness of independent variables for the dependent one, EMPL2, it has been found the most impactful variable for EMPL2 is IGAs with standardized coefficients, 0.499, followed by HHSZ and GNDR with standardized coefficients, 0.221 and 0.195 respectively. MMFP has a comparatively very small effect with standardized coefficient, 0.09.

According to model summary, the multiple correlation coefficients, R, are 0.642 and 0.74 for EMPL1 and EMPL 2 respectively showing high linear correlation between predicted and observed values of both variables. Values of R- Square, are 0.412 and 0.548 for EMPL1 and EMPL 2 respectively indicating the variations explained by the model. The significance value of the F statistic is less than 0.05 for both models, which means that the variation explained by the model is not due to chance.

6. Conclusions
The present study measures the impact of program participation on a specific set of dependent (outcome) variables. The household monthly income has been found to be positively correlated with all the independent variables including Membership to Microfinance programme (MMFP). MMFP leads to increase the monthly household income. However the most impactful variable is HHAS with standardized beta equal to 0.40 followed by EDU and MMFP with standardizes beta 0.223 and 0.217 respectively. Similarly all the variables effect the household monthly income from the IGAs where microfinance has been invested(INCM 3) positively except GNDR. The most influential and effect determining variable in this connection is MMFP with a higher standardized beta that is 0.401. The other influential variables are NOEP, HHAS with high standardized betas that are 0.288 and 0.182 respectively.

Participation to microfinance programme effect the number of income generating activities very minutely. The mature clients have been expected to have only 0.09 more IGAs than incoming ones. The positive effect of NOEP on EMPL1 is a remarked one while that of HHAS and AGE are very minute. The negative coefficient for GNDR implies that male respondents have more IGAs as compared to female ones. Female respondents have to confine themselves to some specific economic activities due to some social constraints. The effect of EDU on EMPL1 is negative but insignificant one, implying no strong relation between the both variables. All the predictors except MSAV and EDU have positive effect on the number of persons involved in IGAs. The negative coefficient for MSAV demonstrates that higher microsaving provides financial stability against shocks and thus involves less participating members in IGAs. The significantly negative coefficient for EDU implies that an educated respondent prefers more to send his/her children to college /school than to involve in IGAs as compared to illiterate ones.

6.1 Policy Implications
From the study, the following suggestions are devised to make micro-credit more effective as a tool for poverty alleviation.

- Microcredit schemes should have broader target group, including the ones in extreme poverty. The solution for providing microfinance services to the very poor is to design programs that suit the needs of destitute families.
- While designing an effective microfinance programme, MFIs should integrate microfinance scheme to the life style of an area by using knowledge of the specific culture and traditions of that area.
- For better utilization of microfinance, the provision of basic education and relevant business training should be coupled with the financial support provided by microcredit programme.
- Micro-credit programs should also focus on women. Focus on female entrepreneurs allows marginalized women to gain access to the economic opportunities that they need to empower themselves.

References


Impact of Foreign Capital Inflows and Money Supply on Exchange Rate: A Case Study of Pakistan

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ARTICLE DETAILS

ABSTRACT

The study attempts to examine the impact of foreign capital inflows and money supply on exchange rate of Pakistan. For this purpose we have undertaken time series data for the period of 1973-2016. Annual data for the period 1973-2016 is used, taken from Economic Survey of Pakistan (various issues) and International Financial Statistics (IFS). The main variables used in our analysis are exchange rate, openness, workers’ remittances, foreign direct investment, foreign aid and money supply. Simple Linear Regression model with ordinary least method (OLS) is used to analyse the results. Money supply is positively and significantly related to exchange rate. Worker’s remittances (WREM), foreign aid (FAID), foreign direct investment. (FDI) and openness (OPP) are negatively and significantly related to exchange rate. The study shows that foreign capital inflows and workers’ remittances significantly appreciate the exchange rate in the case of Pakistan.

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Keywords

Exchange Rate; Workers’ Remittances; Money Supply; Foreign Aid

JEL Codes

E50, E51, E52

1. Introduction

The real exchange rate shows the degree of competitiveness of a country towards international trade. The real exchange rate is considered as an important factor for economic growth of a country. Stability of exchange rate is helpful for driving up exports and private investment. Misalignment in exchange rate will leads to price distortions which further leads to resource misallocations between the sectors of tradable and non-tradable goods. Undervaluation or overvaluation of a real exchange rate is a common case in underdeveloped countries. Due to overvaluation of real exchange rate the profit in tradable goods reduces which leads to less investment in this sector. So we can say that it has negative impact on exports and balance of trade.

Cottani et al. (1990) argued that in many developing countries, misalignment of real exchange rate harmed the agriculture sector and its growth which resulted in reduction of food supply. Besides, a number of economists have emphasized on understanding the importance of real exchange rate and its determinants.
Capital inflows are considered as important factor to determine the real exchange rate. According to a well-known Dutch Disease theory (Corden and Neary 1982), more amount of capital inflows are the main cause of appreciation of exchange rate. Moreover, this exchange rate also affects tradable and non-tradable sectors of a country. Capital inflows can be treated as a reserves’ accumulation or a deficit in current account according to the type of exchange rate regime. For example in floating exchange rate regime where there is no role of central bank, capital inflows leads to increase in capital assets which will further leads to increase in imports. So in this way capital inflows will widen the current account deficit. Now, if there is fixed exchange rate then central bank will interfere by monitoring the appreciation pressure. In this case, capital inflows will lead to increase in foreign exchange reserves.

Monetary policy shocks have different effects on the exchange rate. The results are conflicting in nature. Commonly, there are two possible affects. The first is according to the prescribed theory and the second is opposite which is called ‘a puzzle’. According to theory, monetary expansion is a main cause of increase in money supply. So in this way the interest rate of central bank will be reduced. If we increase money supply, the exchange rate of currency with other currencies will decrease. On the other hand, a tight monetary policy will leads to a higher base interest rate which will attract investors because of higher return on domestic assets than foreign assets. So the demand and value of domestic currency will increase and in the result the exchange rate will also increase. But there are lots of evidences which are contrary to the above theory called ‘exchange rate puzzle’.

The main purpose of this paper is to evaluate the determinants of exchange rate in Pakistan for the period from 1973 to 2016 using time series econometric approaches that may be helpful to formulate a realistic exchange rate policy. The study proceeds as follows: In section 1 brief introduction of exchange rate is given. Section 2 gives a brief review of the empirical literature related to the study. Econometric model is developed in section 3 which includes data and methodology. Section 4 is based on results and conclusion which summarized the paper.

2. Literature Review
Cornell (1982) found the relationship between money supply, exchange rate and interest rate. The results showed that an unanticipated increase in money supply leads to increase in exchange rate and interest rate due to speculator’s intervention. When money supply was increased through expansionary monetary policy then if investors believed that soon it leads to monetary contraction then they will increase the demand of currency to make future profits which will ultimately raise exchange rate.

Mahamadu and Philip (2003) explored the association between exchange rate, inflation and monetary growth in Ghana. They used Error Correcting Mechanism. The results indicated that there exist a long-run relationship between inflation, money supply and real income and exchange rate. It was demonstrated that inflation was positively correlated to exchange rate and money supply and negatively related to real income.

Due and Sen (2006) examined the interrelation between real exchange rate, capital inflows, indicators of fiscal and monetary policy and balance of account for Indian economy for the period of 1993 to 2004. The result indicated that variables were cointegrated with each other and granger caused to real exchange rate. The analysis of generalized variance decomposition suggested that determination of the real exchange rate include net capital flows, current account surplus, government surplus and money supply.

Hyder and Mehboob (2006) explored equilibrium exchange rate and its misalignment in Pakistan. They collected annual data from 1978 to 2005 and used co-integration econometric technique. It was founded that gross domestic product and real investment to GDP ratio were negatively related to exchange rate. Terms of trade and real investment to GDP ratio were positively and negatively related to exchange rate respectively.
Korsu and Braima (2007) evaluated the determinants of real exchange rate in Sierra Leone. They found that equilibrium exchange rate, the sustainable level of macroeconomic policies and nominal exchange rate were positively related to actual real exchange rate and the index of macro policies is negatively related to real exchange rate. The authors suggested that real exchange rate was undervalued during the periods of 1999 to 2005 and 1972 to 1998.

Zakaria et al. (2007) analyzed the determination of nominal exchange rate in Pakistan. They used quarterly time series data that covered the period of 1983 to 2004 and used a generalized method of moment (GMM) estimation technique. They concluded that relative price (RP) was negatively related to nominal exchange rate and net capital inflow was positively related to nominal exchange rate.

Rehman et al. (2010) tested the effect of FDI (foreign direct investment) on equilibrium real exchange rate in Pakistan. They collected the annual time series data from the period 1993 to 2009 by using the method of behavioral equilibrium exchange rate (BEER). They applied cointegration technique and concluded that FDI inflows and worker’s remittances had significantly appreciated the equilibrium real exchange rate in Pakistan.

Fida et al. (2012) examined the value of equilibrium exchange rate in long run by applying purchasing power parity (PPP) approach. They collected time series data that covered the period of 1983 to 2010. They used co-integration technique and concluded that terms of trade, government expenditures and productivity were negatively related to real exchange rate. They argued that external debt among other microeconomic variables plays a significant role in the fluctuations of real exchange rate.

Saeed et al. (2015) investigated the behavior of exchange rate. They used time series data that covered the period of 1982 to 2014. They concluded that nominal money, foreign debt and politically instability were positively associated to exchange rate and foreign exchange reserves were negatively associated to exchange rate. The author suggested that an effective monetary and fiscal policy together with political stability is necessary to maintain the exchange rate and macroeconomic stability in Pakistan.

3. Data and Methodology

Secondary data is used in this study which covers the period from 1973 to 2016. Data have been obtained from International Financial Statistics (IFS), 50 Years Statistics of Pakistan published by Federal Bureau of Statistics and Economic Survey of Pakistan (various issues).

This paper investigates the determinants of exchange rate by examining the impact of foreign capital inflows and money supply on exchange rate of Pakistan. We construct the following mathematical model for analysis:

$$ER = f (WREM, FAID, FDI, OPP, M_2)$$

The econometric model of the study is given as follows.

$$ER = \beta_0 + \beta_1 WREM + \beta_2 FAID + \beta_3 FDI + \beta_4 OPP + \beta_5 M_2$$

Where,

- E.R = Exchange rate
- WREM = Workers’ remittances
- FAID = Foreign aid
- FDI = Foreign direct investment
- OPP = Openness
- M_2 = Money supply

3.1 Variable Description

This section of the study is reserved to explain the variables of the analysis. The variables are selected due to their relative importance on theoretical as well as empirical grounds. Attempted variables and their
explanation about hypothetical impact are defined as follows:

3.2 Workers' Remittances
Workers' remittances are referred to current transfers by migrants who are employed in some other economy in which they are considered residents. Workers’ remittances are the type of unrequited current private transfers which minimizes the deficits in current account of receiving country. These inflows have also significant effect on equilibrium real exchange rate. If an economy properly spends these inflows on non-tradable goods then it leads to appreciation of real exchange rate.

3.3 Money Supply
The money supply include total amount of monetary assets circulated in a country in some specific period of time. \( M_1 \) money supply contains cash and assets that can be immediately converted into currency while \( M_2 \) money supply refers to \( M_1 + \) short term money deposits and saving deposits. Theoretically, an increase in money supply leads to reduction in exchange rate and vice versa.

3.4 Foreign Aid
It is referred to international transfer of capital, goods or services from one country to another country for the purposes of relief, rehabilitation or economic stability. Theoretically, foreign aid should have a positive effect on the exchange rate of recipient country.

3.5 Openness
Open economy means that market economy which is almost free from barriers of trade and thus imports and exports form a large proportion of the GDP. In fact, no economy is considered totally open or closed and different countries have varying degree of control over foreign trade. One of the important measurements for the openness of a country is the percentage of its GDP devoted to foreign trade.

3.6 Foreign Direct Investment
Foreign direct investment (FDI) indicates the direct investment in production by such a company which is located in some other country. This company invests in some other country by buying a company or expanding the existing business. FDI can affect the exchange rate in two ways i.e, by depreciation of domestic currency or appreciation of domestic currency depending on utilization of FDI inflows.

4. Results and Discussions
In this section, first of all the descriptive statistics of the data is presented. Descriptive statistics describes main quantitative features of the data through statistical and econometric analysis of data. It gives simple and uncomplicated summaries about the data and the measures.

Table 1: Descriptive Statistics of the Variables

<table>
<thead>
<tr>
<th></th>
<th>ER</th>
<th>WREM</th>
<th>FAID</th>
<th>FDI</th>
<th>OPP</th>
<th>M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>31.29233</td>
<td>2110.926</td>
<td>2004.766</td>
<td>755.6184</td>
<td>0.340853</td>
<td>1040628.</td>
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<tr>
<td>Median</td>
<td>22.75407</td>
<td>1647.140</td>
<td>1913.500</td>
<td>256.1000</td>
<td>0.333494</td>
<td>370947.5</td>
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<td>Minimum</td>
<td>8.50000</td>
<td>128.0000</td>
<td>355.0000</td>
<td>-6.30000</td>
<td>0.259786</td>
<td>22059.00</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>22.48348</td>
<td>1760.161</td>
<td>959.9782</td>
<td>1359.545</td>
<td>0.045079</td>
<td>1372136.</td>
</tr>
</tbody>
</table>

Note: All the estimations are carried out by E-view

Table 1 represents the descriptive statistics of the model. In the above table exchange rate (ER) is a dependent variable and workers’ remittances (WREM), foreign direct investment (FDI), foreign aid
(FAID), openness (OPP) and money supply ($M_2$) are independent variables. The sample size consists of 43 observations from the period of 1973 to 2016. The maximum and minimum value of exchange rate is 83.80 and 8.5 respectively, whereas the standard deviation is 22.48 and the mean value is 31.29. Workers’ remittances have minimum value 128.0, maximum value 7810.95, mean value 2110.92 and standard deviation 1760.161.

Foreign direct investment having minimum value -6.30, maximum value 5410.20, mean value 755.61 and standard deviation 1359.54). Openness having minimum value 0.259, maximum value 0.480, mean value 0.340 and standard deviation 0.045. Foreign aid having minimum value 355.0, maximum value 4688, mean value 2004.76 and standard deviation 959.97. Money supply has minimum value of 22059, maximum value 5137205, mean value 1040628 and standard deviation 1372136.

In equation the dependent variable is exchange rate while the independent variables are worker’s remittances, foreign aid, foreign direct investment, Openness unit and money supply. The coefficient of worker’s remittances is negative and highly significant at one percent level. It indicates that if worker’s remittances increase one million then the value of exchange rate will decrease 0.0067 percent and due to decrease in the value of exchange rate our currency will appreciate.

The negative coefficient of foreign aid is significant at five percent level shows the decrease in the value of exchange rate due to increase in foreign aid. If the foreign aid increases one million then the value of exchange rate will decrease 0.00305 percent. Due to decrease in the value of exchange rate our currency will appreciate. The negative coefficient of foreign direct investment shows the decrease in the value of exchange rate due to increase in foreign direct investment and is highly significant at five percent level. If the foreign direct investment increases one million then the value of exchange rate will decrease 0.00404 percent and our currency will appreciate. The openness has negative effect on the value of exchange rate and its coefficient is significant at one percent level. If the value of openness increases then the value of exchange rate will decrease and hence our currency will appreciate.

Money supply is positively associated to exchange rate. Increase in the supply of money leads to increase in the value of currency. Here coefficient is highly significant at one percent level. Increase in the value of exchange rate means depreciation of our currency. This finding is in line with previous work by Saeed et al. (2012). The value of $R^2$ is .99 which implies that approximately 99 percent of the variation in the dependent variable is explained by the variation in explanatory variables. F-Test is used to test the overall significance of the model and it determines whether a significant relationship exists between dependent variable and all the independent variables. For detection of auto-correlation we have used Durbin Watson test. The value of this test shows that there is no autocorrelation in our data set.

4.1 Normality Test
We apply the normality test to check the normality of the residuals. We have the null and alternative hypothesis as following:
$H_0$: Residuals are normally distributed
$H_1$: Residuals are not normally distributed
As we see that the probability value is greater than 0.10 so we may not reject the null hypothesis and concluded that residuals are normally distributed.

4.2 Tests for Autocorrelation and Heteroskedasticity

Now we use Breusch - Godfrey serial correlation LM test for the detection of autocorrelation and white test for detection of heteroskedasticity in our data.

4.2.1 Breusch-Godfrey Serial Correlation LM Test

The Breusch–Godfrey serial correlation LM test is used for the detection of autocorrelation in a regression model. It uses the residuals of the model which considered in a regression analysis and a test statistic is also obtained from these residuals. We have null hypothesis (H₀) and the alternative hypothesis (H₁) as follows:

H₀: There is no problem of autocorrelation
H₁: There is a problem of autocorrelation

R² shows explanatory power of the model it measures the proportionate of variation in dependent variable which is explained by independent variable. The value of F-statistics shows overall significance of the model. The values of this test show that there is no presence of autocorrelation.

4.2.2 White Heteroskedasticity Test

The white heteroskedasticity test is the most general test for detection of heteroskedasticity. This test is very general and commonly used for large sample sizes. The values of this test show that the problem of heteroskedasticity is not present in estimated problem.

<table>
<thead>
<tr>
<th>Breusch-Godfrey Serial Correlation LM Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
</tr>
<tr>
<td>Obs*R-squared</td>
</tr>
</tbody>
</table>
5. Policy Recommendations

The paper’s examination of the impact of foreign inflows and money supply on exchange rate exposes genuine contributions that allow us to depict following policy recommendations:

I. Foreign remittances help countries to balance their exchange rate depreciation during recession. So Pakistan should make policies to reduce or avoid the competitiveness which is related to the appreciation of exchange rate that follows capital inflows. Furthermore, it is necessary to make such monetary arrangements which balance the exchange rate that is one of the main macroeconomic tools for attracting the significant amount of remittances and capital inflows.

II. Developing countries appreciate exchange rate to attract capital inflows. But the appreciation of exchange rate might destabilize macroeconomic management. Developing countries should concentrate on short-term inflows like portfolio investments which have a large appreciation effect than other types of capital inflows.

III. Unfortunately, the exchange rate policy failed in Pakistan due to several reasons. The main reason is that devaluation of our currency was accompanied by inappropriate monetary management. Increase in money supply resulted in a high inflation which led to offset the favourable effects of devaluation. So it is a need to improve the balance of payment through adjustment of real exchange rate. The State Bank of Pakistan should adopt tight monetary policy and should have also control on money supply.

IV. In Pakistan, both fiscal and monetary policy has a significant effect on exchange rate variation. So it is a need to harmonize both policies with each other and then link them with trade policy. If monetary and fiscal policy will run smoothly then we can boost economic growth as well as stabilize the exchange rate.

6. Conclusion

In this study the issues of the impact of foreign inflows and money supply on exchange rate has been discussed. Money supply is positively and significantly related to exchange rate. Workers’ remittances (WREM), foreign aid (FAID), foreign direct investment (FDI) and openness (OPP) are negatively and significantly related to exchange rate. Due to increase in money supply exchange rate will increase and the value of currency will depreciate. FDI inflows appreciated the exchange rate in Pakistan which shows the signs of ‘Dutch Disease’. Workers’ remittances also appreciate the exchange rate. In Pakistan, although workers’ remittances are increasing day by day since 9/11 but the sources of these inflows are concentrated to a few countries of the world.

References


Daboh, L. (2002). Real Exchange Rate Management in the West African Monetary Zone. Journal of Monetary and Economic Integration, 10(2), 1-35.


