

**ENVIRONMENT, INFORMAL SECTOR EMPLOYMENT AND POVERTY:  
COMPARATIVE ANALYSIS OF PAKISTAN AND INDIA**

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**ABSTRACT**

This paper estimate causality analysis between environment, informal sector employment and poverty. This is a comparative study of two countries Pakistan and India. Size of informal sector employment is measured by ARDL approach. Then we check out whether all these three variables Environment, poverty and Co2 emission are causing each other or not. For this purpose Vector autoregressive model is applied for long run causality analysis and for their joint causality analysis Engle granger test is employed. An impulse response function is also employed on these variables which refer to the reaction of any dynamic system in response to some external change. Model is also checked by autocorrelation and stability conditions tests. Model explained long run relationship between Informal sector employment, poverty and environment for both countries India and Pakistan. For Pakistan Poverty and Informal sector employment showed significant impact on Co2 emission. Co2 Emission and Informal Sector employment have significant impact on poverty. Poverty has significant and Co2 emission has significant impact on Informal Sector Employment. For India Poverty showed significant impact on Co2 emission and Informal Sector employment has insignificant impact on Co2 Emission. Informal Sector employment and Co2 emission have insignificant impact on poverty. Poverty has insignificant and Co2 emission has significant impact on Informal Sector Employment.

**KEY WORDS**

Vector Auto regressive, Causality Analysis, ARDL, Co2 Emssions.

**1. INTRODUCTION**

The informal sector plays a vibrant role in Pakistan. The portion of the informal sector in the urban employment of Pakistan was estimated to be about 69 per cent for the year 1972-73 by Guisinger and Irfan (1980 Ahmad (1989) calculated the portion of the informal sector in the total employment of Pakistan as 74.48 per cent for the year 1984-85. The informal sector, informal economy, or grey economy is considered that the part of an economy that is neither taxed, nor monitored by any form of government. Unlike the formal economy, activities and income of the informal economy are not included in the gross national product (GNP) and gross domestic product (GDP) of a country. This informal economy is also some characterized as black market, shadow economy and underground economy. Although informal sector economy is big source of employment for poor in developing

countries but increase in the informal sector slow down the growth of respective country. According to Heintz and Joann 2007 there is conceptual and measurement issues associated with linking informal employment to poverty outcomes. According to Pakistan Poverty Reduction Strategy 2010, 75% of the country's population revolves around the poverty line. Poor, illiterate, low skilled women find low paid work at their doorsteps. They trust on middlemen and contractors for providing work and become extremely vulnerable to trouble and misuse. Lack of capital, lack of resources, low human development level and low wages are common characteristics of poor force them to enter in the informal sector employment because entry in informal sector is easier as compare to formal sector.

In present scenario environmental protection become highly consideration issue as there are different appropriate regulations have been done on national and international levels to control and protect our environment from further deterioration particularly in connection with the solid waste and smoke comes from informal sector. In industrialized countries street dealing is controlled, licensed and organized in periodic street fairs and permanent markets. Sustainable forms of development restore production conditions; where this does not occur, inter linked processes of social and environmental deterioration, frequently marked by production declines, and are set in motion (Connor, 1988). Collins (1991) and Blaikie and Brookfield (1987) mentioned the importance of ecological knowledge in their study and stated that no one explains how "ecological consciousness" is acquired.

Whether simply because of peoples' precarious existence or because of the severe and direct threats arising from ecological disasters. Hesseling (1996) has documented legal and institutional incentives for local environmental management, adding that the attitude of operators of the sector is determined by social relationships.

In a general way there are many problems associated with wastes generated from urban informal economic activities; but, there are only few well documented case studies of environmental degradation associated with informal sector activities. Study of Onyenechere 2011 draws attention to some neglected aspects of informal sector research, especially one which relates to the environment, an area which should be further investigated by researchers undertaking field research on the informal sector in Nigeria. By focusing on specific sub-sectors of the informal sector, and how they affect the environment, insufficient safety and health ethics and environmental hazards are particularly evident in the case of the informal sector. Poor working environment including inadequate premises and often very unsatisfactory welfare facilities, as well as practically non-existent occupational health services are causing large human and material losses, which burden the productivity of national economies, impair health and general well-being as well as the quality of life of informal workers and their families. The protection of the health and welfare of informal sector workers is a challenge which should be faced with an integrated approach to health promotion, social protection and quality employment creation and has, therefore, to be part of a strategy to improve the basic living conditions of the urban poor (Forastieri, ILO).

### 1.1 Objectives

- To measure the size of informal sector employment in Pakistan and India by using ARDL approach
- To find out causality relationship between Informal Sector Employment, Environment and Poverty
- To depict a comparative analysis between India and Pakistan.

### 1.2 Hypothesis

- H0: Informal Sector Employment does not cause Poverty
- H1: Informal Sector Employment does cause Poverty
- H0: Informal Sector Employment does not cause Environment.
- H1: Informal Sector Employment does cause Environment
- H0: Poverty does not cause Informal Sector Employment
- H1: Poverty does cause Informal Sector Employment
- H0: Poverty does not cause Environment
- H1: Poverty does cause Environment
- H0: Environment does not cause Informal Sector Employment
- H1: Environment does cause Informal Sector Employment
- H0: Environment does not cause Poverty
- H1: Environment does cause Poverty

## 2. DATA AND METHODOLOGY

Annual data on currency in circulation, M1, M2, Banking services, resident foreign currency account, bank liabilities, tax revenue, enrollment in tertiary education, data on Poverty are taken from various issues of the Annual Report of The State Bank of Pakistan and Hand Book of Statistics on Pakistan Economy by the State Bank of Pakistan and Economic Survey of India Data on GDP, GNP, inflation, are taken from various issues of the Economic Survey. Data on Co2 emission is taken from World Bank. Data are collected from 1971 to 2014.

### 2.1 Construction of Variables

The size of the informal sector can be estimated by direct as well as indirect methods. Direct methods are micro approaches that rely upon either survey or samples based on voluntary replies, or tax auditing.

In this paper, we use a modified version of the monetary approach through autoregressive distributed lag (ARDL) model suggested by Pesaran and Shin (1999) and Pesaran et al. (2001).

### Assumptions of Model

In this paper we establish a long run relationship between the currency ratio and other related variables and then used it to measure the size of the informal sector in Pakistan and India's economy which in turn indicate the employment in informal sector. We have made some modifications to the standard monetary model of estimating informal sector employment and have instituted a relationship between the currency to M2 ratio as a

dependent variable and tax to GDP ratio, a proxy for financial sector development, inflation rate, bank services and higher education as key determinants.

As elucidated below:

- a) The tax to GDP ratio as argued by Tanzi (1980);
- b) We expect that with the financial sector development, people spend less the use of currency and switch to other financial instruments for payments for this purpose we take Bank Services as indicator of financial development.
- c) Inflation increases demand for money so that for earning people are enter in informal sector because access in informal sector is much easier as compared to formal sector
- d) We also include higher education in this model because in a developing country like Pakistan and India one cause of informal sector is jobs are not available according to education of peoples.

An ARDL representation of this relationship is formulated as follows:

$$C_t = \gamma_1 Y_{1,t} + \gamma_2 Y_{2,t} + \gamma_3 Y_{1,t-1} + \gamma_4 Y_{2,t-1} + \gamma_5 C_{t-1} + \varepsilon_t$$

$C/M_t$  = currency in circulation to M2 ratio

$T_{yy}$  = ratio of total taxes to nominal GDP

$F_t$  = financial development indicator represented by the ratio of monetary liabilities of the banking system (excluding currency in circulation) to nominal GDP $_t$

$BS$  = *Bank Services*

$Info$  = *Inflation rate*

$TE$  = *level of higher education proxy by enrolment in tertiary education*

### Assumptions of Model

The presence of a valid long-run relationship is tested by Wald coefficient restriction test with null hypothesis of  $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = 0$ . The calculated F-statistic in this test is compared with the band of critical values tabulated by Pesaran et al. (2001); they tabulated two sets of appropriate critical values for different number of regressors. One set assumes that all the variables are integrated of order zero, i.e. I(0) and another set assumes that they all are I(1). A computed F-statistic higher the upper level of the band implies the presence of a co integrating relationship among the variables. With the approval of the bound test the following long-run model is deduced in the form of Equation 2 and 3

$$C/M_t = \beta + \beta T_{yy} + \beta TE + \beta inf + \beta lnbl + \beta BS \dots \dots \dots 2 \text{ (for Pakistan)}$$

$$C/M_t = \beta + \beta T_{yy} + \beta TE + \beta inf + \beta lnBS \dots \dots \dots 3 \text{ (for India)}$$

$$\beta \lambda_i / \lambda_i = \text{for } i = 0, 2, 3, 4, 5.$$

Given the 1 and 2 and assumptions of the model as discussed earlier, the informal economy as a ratio to the total size of the economy (formal *plus* informal) is worked out as follows.

$$U_t = Y_i / Y = \frac{\beta T_y + \beta T_e}{M_t}$$

$U_t$  = Informal sector employment

$Y_i$  = Informal sector income

$Y$  = Formal sector income

$Y_i$  is income in informal economy,  $Y$  is the total size of the economy and  $mt$  is the ratio of  $M1$  definition of monetary aggregates to  $M2$ .

## 2.2 VAR Modeling and Engle Granger Test for Short Run and Joint Causality

### 2.2a Causality Analysis

In the words of Stock and Watson (2003), the general definition of causality is that “a specific action leads to a specific, measurable consequence”. The phenomenon of causality is prevalent in many different subject areas, such as philosophy, logic studies, and the sciences. Applied to asset pricing, the idea of a causality test is to examine whether the price of security  $Y$  can be explained and forecasted by using lagged values of security  $X$  and  $Y$ , i.e.  $X_{t-1}$  and  $Y_{t-1}$ . If  $Y_t$  can indeed be forecasted using the lagged terms of  $X$ , then  $X$  is *causing*  $Y$ .

### 2.2b Vector Auto Regressive (VAR)

A VAR consisting of two time series variables,  $Y_t$  and  $X_t$ , is modeled by two equations, where in the first one the dependent variable is  $Y_t$  and in the second one where the dependent variable is  $X_t$ :

$$Y_t = \beta_{10} + \beta_{11}Y_{t-1} + \dots + \beta_{1p}Y_{t-p} + \gamma_{11}X_{t-1} + \dots + \gamma_{1p}X_{t-p} + u_{1t} \dots \dots \dots 4$$

$$X_t = \beta_{20} + \beta_{21}Y_{t-1} + \dots + \beta_{2p}Y_{t-p} + \gamma_{21}X_{t-1} + \dots + \gamma_{2p}X_{t-p} + u_{2t} \dots \dots \dots 5$$

The regressors in both equations are lagged values of both variables. For example, equation (4) above implies that the value of  $Y_t$  can be predicted by using lagged values of itself ( $Y_{t-p}$ ), as well as lagged.

### 2.2d Impulse Response Function

Impulse response function (IRF) of a dynamic system is its output when presented with a brief input signal, called an impulse. More generally, an impulse response refers to the reaction of any dynamic system in response to some external change.

### 3. RESULTS AND DISCUSSIONS

#### 3.1 Unit Root Tests

In Economics research, test for unit root become very necessary due to non-stationary nature time series data because regression estimation give us misleading results if series have unit root problem. In our Analysis we used Augmented Dickey Fuller test for unit root. Null Hypothesis is that variables contains unit root and the alternative hypothesis is that variables are not contain unit root. If unit root is found on level then test is applied on first difference and on second difference until the problem of unit root is vanished.

**Table 1(a)**  
**Augmented Dickey Fuller Tests Result for Unit Root (Pakistan)**

Variables	Levels I(0)	At First Difference I(1)
<b>C/M2</b>	-0.375295	-6.638093***
<b>BS</b>	-2.491604	-5.226143***
<b>LNBL</b>	0.297590	-6.306399***
<b>TY</b>	-3.366467	-4.241297***
<b>TE</b>	2.487910	-5.070735***
<b>INF</b>	-3.310757**	
<b>Co2</b>	-2.629772	-7.699249***
<b>Pov</b>	-0.026410	-5.227589***
<b>Infse</b>	-1.891561	-6.137774**

Critical Values at 1%, 5% and 10 % level of significance are \*\*\* for 1% \*\* for 5% \* for 10% significance level respectively.

**Table 1(b)**  
**Augmented Dickey Fuller Tests Result for Unit Root (India)**

Variables	Levels I(0)	At First Difference I(1)
<b>C/M2</b>	-2.312811	-5.800385***
<b>LnBS</b>	-1.734144	-6.136124***
<b>TY</b>	-1.830131	-7.327920***
<b>TE</b>	3.032689	-4.058252***
<b>INF</b>	-5.382298***	
<b>Co2</b>	6.538614	-3.356687**
<b>Pov</b>	-1.570228	-7.729618***
<b>Infse</b>	3.499219	-3.738752***

Critical Values at 1%, 5% and 10 % level of significance are \*\*\* for 1% \*\* for 5% \* for 10% significance level respectively.

### 3.2 ARDL Approach for construction of Variables

The result of ARDL model is reported in equations. We have estimated the model for  $k=1$  to 4 lags, and selected the model with  $k = 2$  on the basis of minimum Akaike information criterion for both India and Pakistan. The long-run relationship of currency ratio with other variables is deduced as follows:

$$C/M = 1.074 + 32.97TY - 1.14BS - 0.179inf + 2.076TE - 3.62lnbl \dots \dots \dots (4) \text{ Pakistan}$$

$$C/M = 0.53 + 0.001024TY - 0.018108LnBS + 0.006190inf - 0.006389TE \dots \dots \dots (5) \text{ India}$$

The results of this study are close to those obtained by other studies on Pakistan. However, there are some differences in growth paths as derived by different studies. Both the Kemal (2007) and this study show a rising trend up to the end of 1990s while Ahmed and Haider (2008) shows a declining trend. Arby et al., (2010) shown decline trend but our results shows an increase trend after 2009.

**Table 2**  
**Measurement of Informal sector Economy for Informal sector Employment**

Informal sector Employment* as % of total Economy in India and Pakistan measured by ARDL approach					
Years	India	Pakistan	Years	India	Pakistan
1971	5.0	23	1994	11.3	16
1972	5.1	29	1995	9.9	15
1973	5.2	23	1996	11.7	16
1974	5.2	17	1997	12.7	28
1975	5.2	16	1998	13.9	27
1976	5.4	15	1999	14.5	21
1977	5.3	15	2000	20.4	19
1978	7.5	16	2001	21.8	20
1979	7.9	15	2002	23.9	20
1980	7.9	15	2003	24.4	19
1981	8.6	14	2004	24.4	21
1982	8.1	15	2005	23.2	26
1983	9.4	14	2006	25.5	27
1984	9.9	15	2007	30.9	18
1985	10.1	14	2008	38.1	18
1986	10.5	19	2009	40.7	19
1987	11.3	18	2010	45.4	24
1988	10.0	18	2011	62.9	28
1989	10.2	19	2012	69.8	31
1990	10.7	19	2013	72.6	31
1991	10.5	16	2014	72.6	30
1992	11.7	16			
1993	11.7	16			

\*Informal economy is used as proxy of informal sector employment.

### 3.3 Vector Auto Regressive Model

#### 3.3a Pakistan

VAR results from Pakistan time series data are given in Table 3. Eq. 1. indicates that impact of poverty on Co2 emission is positive and significant in first lag but it is positive and insignificant in second lag. The impact of informal sector employment on Co2 is positive and significant in first lag but it is insignificant in the second lag.

**Table 3**  
**Vector Auto regression Model (Pakistan)**

Independent Variables	Dependent Variables		
	Eq1	Eq2	Eq3
	Co2	POV	IFSE
<b>Co2</b>	.7587182	-.0006465	.00039
<b>L1</b>	[5.01 ] (0.00)	[-2.19] (0.029)	[2.21] (0.027)
<b>L2</b>	.1924943 [1.30] (0.193)	.0004533 [1.57] (0.116)	-.00031 [-1.80] (0.072)
<b>POV</b>	19.5805 [2.68] (0.007)	1.062362 [7.47] (0.000)	.09273 1.90 (0.07)
<b>L2</b>	7.617166 [1.02] (0.305)	-.391743 [-2.64] (0.008)	.11856 [1.33] (0.183)
<b>IFSE</b>	36.76924 [1.76] (0.017)	-.4296703 [-2.17] ( 0.03)	.81281 [6.85] (0.000)
<b>L2</b>	1.278974 [0.21] (0.990)	.2426659 [1.17] (0.240)	-.43807 [-3.53] (0.000)
<b>CONS.</b>	9785.904 [1.85] (0.064)	28.74336 [2.79] (0.005)	6.1801 [1.00] (0.318)
<b>R-square</b>	0.9961	0.9705	0.7854
<b>chi2</b>	10591.39	1381.626	153.75
<b>P&gt;chi2</b>	0.0000	0.0000	0.0000

[Shows z-value] (Shows p-value)

Results of Eq. 2 indicates that Co2 emission have negative and significant impact on Poverty in the first lag but it has positive and insignificant impact on poverty in the second lag. Informal sector employment has negative and significant impact in the first lag but it has positive and insignificant impact in the second lag.



**Table 3(b)**  
**Vector Auto Regression Model (India)**

Independent Variables	Dependent Variables		
	Eq1	Eq2	Eq3
	Co2	POV	IFSE
<b>Co2</b>	.8730726	.0000179	-.0000388
<b>L1</b>	[7.22]	[0.72]	[-3.86]
	(0.000)	(0.474)	(0.000)
<b>L2</b>	-.177423	-.0000299	.0000767
	[-0.35]	[-0.82]	[5.20]
	(0.727)	(0.414)	(0.000)
<b>L3</b>	.3259364	-5.1106	-.0000306
	[2.36]	[-0.18]	[-2.66]
	(0.019)	(0.858 )	(0.008 )
<b>POV</b>	.753357	.4463047	.0519329
<b>L1</b>	[0.71]	[2.87]	[0.83]
	(0.477)	(0.004)	( 0.407)
<b>L2</b>	.1369775	-.0318472	.1058416
	[0.17]	[-0.19]	[1.55]
	(0.868)	( 0.851)	(0.122)
<b>L3</b>	.3996013	-.109500	1080572
	[4.92]	[-0.65]	[1.60]
	(0.000)	(0.513)	(0.109)
<b>IFSE</b>	.163306	-.1349769	1.385313
<b>L1</b>	0.97]	-0.39	9.86
	0.334	0.699	0.000
<b>L2</b>	.5709707	.0422001	-.5759066
	0.22	0.08	-2.69
	0.824	0.937	0.007
<b>L3</b>	.1117388	.3894686	.0935887
	0.54	0.91	0.54
	0.592	0.365	0.589
<b>CONS.</b>	-.492241	37.1433	-9.91429
	-3.94	3.66	-2.42
	0.000	0.00	0.015
<b>R-square</b>	0.9987	0.7996	0.9899
<b>chi2</b>	31374.06	163.5955	4022.496
<b>P&gt;chi2</b>	0.0000	0.0000	0.0000

[Shows z-value] (Shows p-value)

Results of Eq. 3 shows that Co2 has positive and significant impact on informal sector employment in the first lag and it has negative and significant impact in the second lag. Poverty has positive and significant impact on Informal Sector employment in the first lag but it has positive and insignificant result in the second lag.

### 3.5b India

VAR results from India time series data are given in Table 4 Eq. 1. Indicates that impact of poverty on Co2 emission is positive and insignificant in first lag and second lag but it is positive significant in the third lag. The impact of informal sector employment on Co2 is positive and insignificant in the first second and third lag. Results of Eq. 2 indicate that Co2 emission has positive and insignificant impact on Poverty in the first lag but it has negative and insignificant impact on poverty in the second and third lag. Informal sector employment has positive and insignificant impact in the first lag but it has positive and insignificant impact in the second and third lag. Results of Eq. 3 shows that Co2 has negative and significant impact on informal sector employment in the first lag, it has positive and significant impact in the second lag but again in third lag it has negative and significant impact. Poverty has positive and insignificant impact on Informal Sector employment in the first lag and second lag but it has positive and insignificant result in the second and third lag.

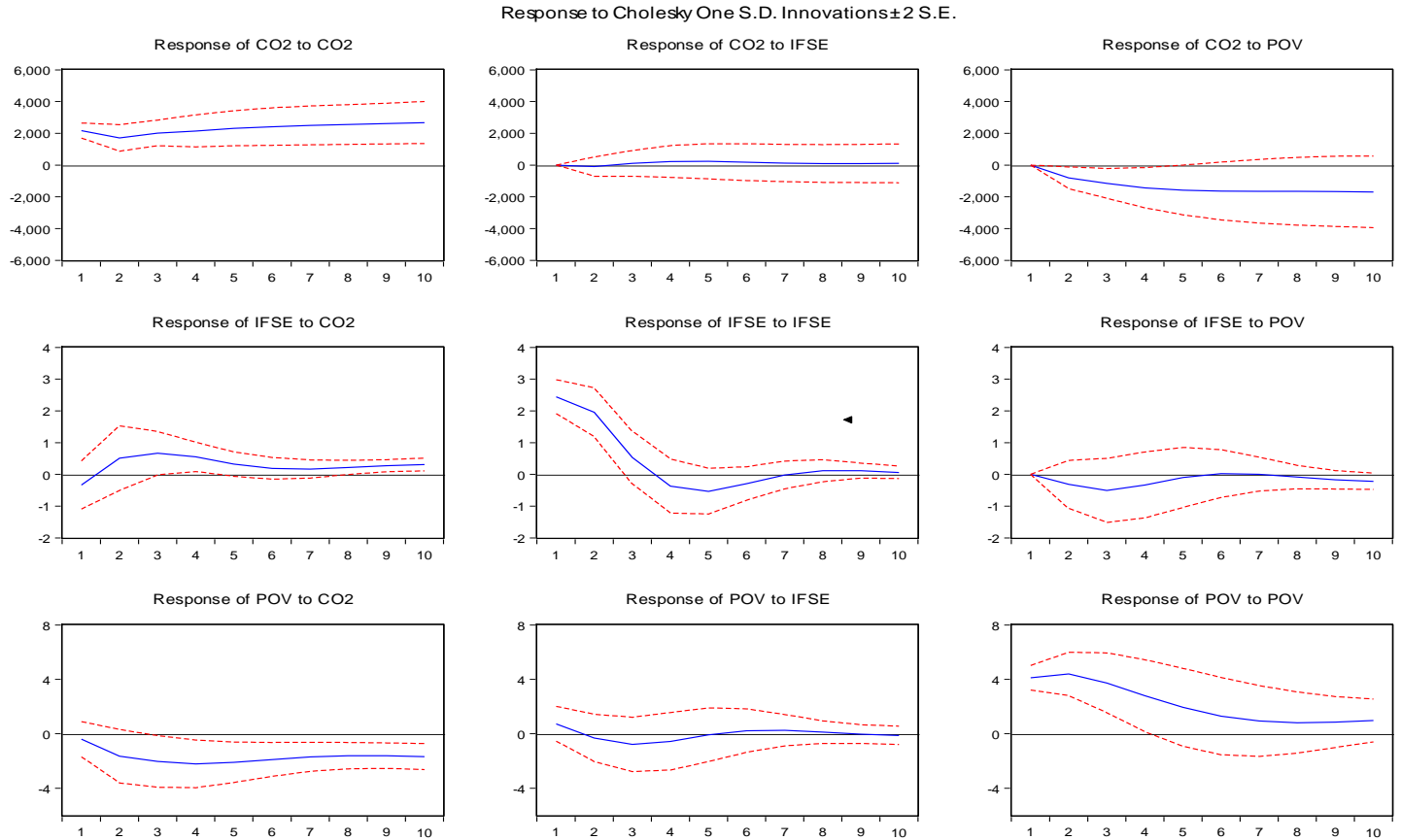
### 3.6 Impulse Response Function

#### Empirical Analysis:

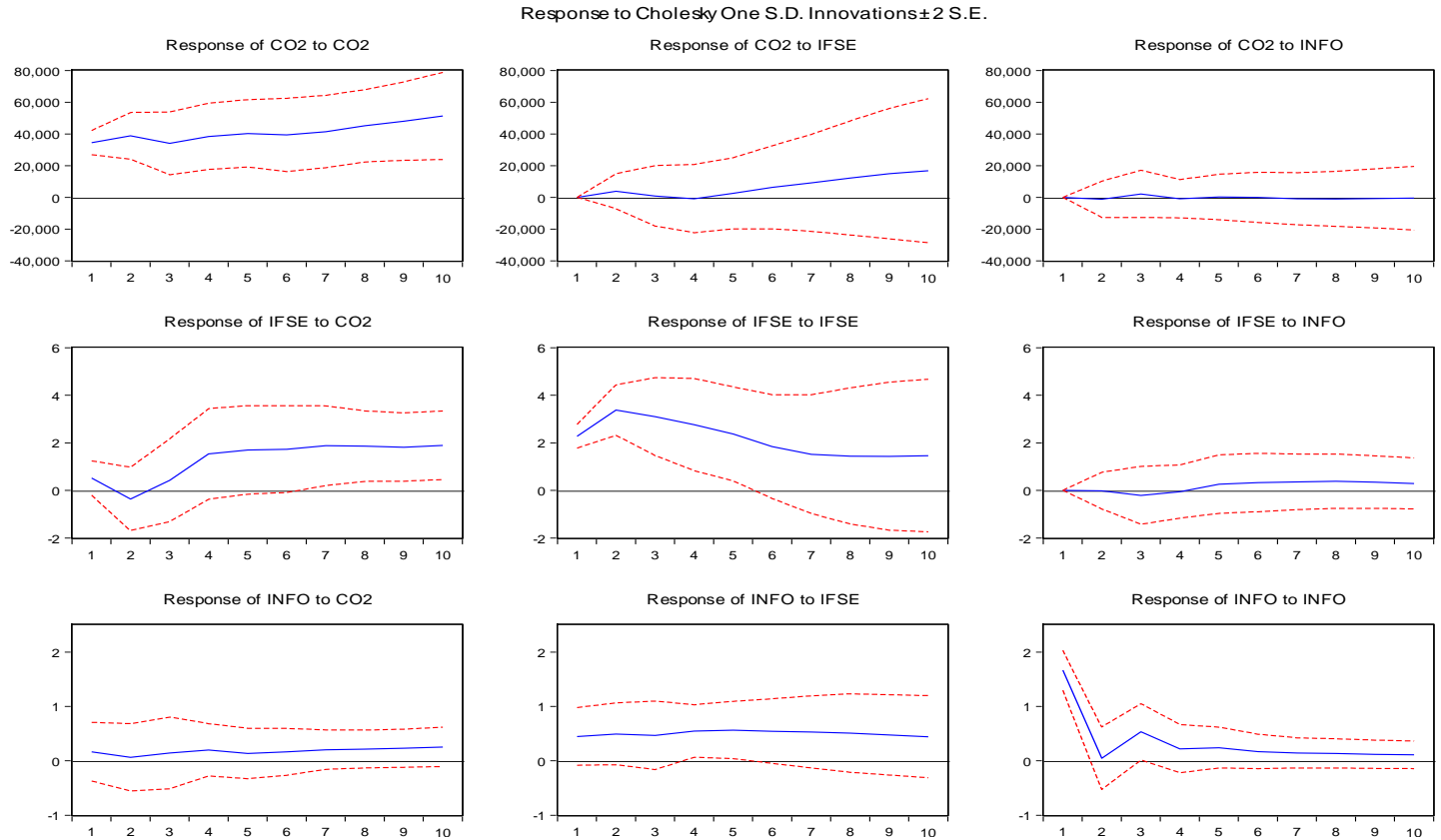
The impulse response function of VAR is to analysis dynamic effects of the system when the model received the impulse. As our VAR model, we have three variables. We can work the response between these variables.

#### 3.6a Pakistan

Figure 1 Showed magnitude of impact of caused by Co2 on Poverty and Informal Sector Employment. Its Shows response from Co2 to changes to Poverty and Informal Sector Employment. If Co2 changes by 10% it will reduce poverty by in first year. 000646 but will reduce by in the next year and so on. If Co2 changes by 10% it will increase Informal sector employment by .000392 % in first year but will increase by .000364 in the next year and so on Magnitude of impact of caused by Poverty on Co2 and Informal Sector Employment. It shown response from Poverty to changes to Co2 and Informal Sector Employment. If Poverty changes by 10% it increase Co2 by 1.06236% in first year but will increase by .9033% in the next year and so on. If Poverty changes by 10% it will reduce Informal sector employment by .092736% in first year but will reduce by .132018s % in the next year and so on Magnitude of impact of caused by Informal Sector Employment on Co2 and Poverty. It Shown response from Informal Sector Employment to changes to Co2 and Poverty. If Informal sector employment changes by 10% it will increase Co2 by 36.7692 % in first year but will increase by 143.195 % in the next year and so on. If Informal sector employment changes by 10% it reduces Poverty by .42967 % in first year but will by reduces by .586813 % in the next year and so on.



**Figure 1: Impulse Response of Co2, Informal Sector Employment and Poverty (Pakistan)**



**Figure 2: Impulse Response of Co2, Isfe and Pov (India)**

### 3.6b India

Figure 2 showed magnitude of impact of caused by Co2 on Poverty and Informal Sector Employment. It Shows response from Co2 to changes to Poverty and Informal Sector Employment. If Co2 changes by 10% it will increase poverty by 9.406% in first year but will reduce by -1.606 % in the next year and so on. If Co2 changes by 10% it will reduce Informal sector employment by -.000032% in first year but will reduce by -.000034% in the next year and so on. It showed magnitude of impact of caused by Poverty on Co2 and Informal Sector Employment. Table shows response from Poverty to changes to Co2 and Informal Sector Employment. If Poverty changes by 10% it will reduce Co2 by .596997 in first year but will increase by .112868 % in the next year and so on. If Poverty changes by 10% it will reduce Informal sector employment by -.000032% in first year but will reduce by -.000034% in the next year and so on Figure showed magnitude of impact of caused by Informal Sector Employment on Co2 and Poverty. Table shows response from Informal Sector Employment to changes to Co2 and Poverty. If Informal sector employment changes by 10% it will reduce Co2 by .222894 in first year but will increase by .036701 % in the next year and so on. If Informal sector employment changes by 10% it will increase Poverty by 1.29074s % in first year but will be increase by 1.21019 % in the next year and so on.

## 4. MODEL SPECIFICATION TESTS

### Wald Granger Test

**Table 6: Comparative Analysis for India and Pakistan through Wald Granger Test for Join Causality Analysis**

Wald Granger Test for Join Causality Analysis(for India)					Wald Granger Test for Join Causality Analysis (for Pakistan)				
Equation	Excluded	Chi2	df	Prob>Chi2	Equation	Excluded	Chi2	Chi2	Prob>Chi2
Co2	Pov	32.562	3	0.000	Co2	Pov	8.6144	2	0.013
Co2	Ifse	1.7148	3	0.634	Co2	Ifse	0.22219	2	0.895
Co2	ALL	36.275	6	0.000	Co2	ALL	10.588	4	0.032
Pov	CO2	10.149	3	0.017	Pov	Co2	9.0801	2	0.011
Pov	Ifse	3.3224	3	0.345	Pov	Ifse	4.7673	2	0.092
Pov	ALL	14.698	6	0.023	Pov	ALL	14.024	4	0.007
Ifse	Co2	37.775	3	0.000	Ifse	Co2	6.5108	2	0.039
Ifse	Pov	9.5615	3	0.023	Ifse	Pov	1.8204	2	0.039
Ifse	ALL	42.96	6	0.000	Ifse	ALL	30.357	4	0.00

### 4.1a Pakistan

From this result for Pakistan when the cause variable is Poverty; the p value of the test is 0.013. It is less than 0.05; we can reject the null hypothesis. That's mean Poverty have Granger cause relationship with Co2. When the cause variable is IFSE, the p value of the test is 0.895. It is more than 0.05; we cannot reject the null hypothesis. But when we see overall results p value is 0.032 which is less than 0.05 then we reject the null hypothesis and concluded that Poverty and Informal sector employment have Granger cause relationship with Co2. When Co2 and Informal sector employment are because variable over all p value is 0.007 which is less than 0.05 which means that we can reject the null hypothesis that's means Co2 and Informal sector employment have Granger

Cause Relationship with Poverty. When Co2 and Poverty are cause variable over all p value is 0.000 which is less than 0.05 which means that we can reject the null hypothesis that's means Co2 and Poverty have Granger Cause Relationship with Informal sector employment

#### **4.2b India**

From this result for India when the cause variable is Poverty the p value of the test is 0.000. It is less than 0.05; we can reject the null hypothesis. That's mean Poverty have Granger cause relationship with Co2. When the cause variable is Informal sector employment, the p value of the test is 0.643. It is more than 0.05; we cannot reject the null hypothesis. But when we see overall results p value is 0.000 which is less than 0.05 then we reject the null hypothesis and concluded that Poverty and Informal sector employment have Granger cause relationship with Co2. When Co2 and Informal sector employment are cause variable over all p value is 0.023 which is less than 0.05 which means that we can reject the null hypothesis that's means Co2 and Informal sector employment have Granger Cause Relationship with Poverty. When Co2 and Poverty are cause variable over all p value is 0.000 which is less than 0.05 which means that we can reject the null hypothesis that's means Co2 and Poverty have Granger Cause Relationship with Informal sector employment.

### **5. CONCLUSIONS**

In this study we run VAR model between Informal Sector Employment, Co2 Emission and Poverty for Pakistan and India from 1971 to 2014. Our analysis of VAR for Pakistan time series data shows impact of poverty on Co2 emission is Positive and significant in first lag but it is positive in second lag but for India impact of poverty on Co2 emission is positive and insignificant in first lag and second lag but it is positive in significant in the third lag For Pakistan impact of informal sector employment on Co2 is positive and significant in first lag but it is insignificant in the second la and for India impact of informal sector employment on Co2 is positive and insignificant in the first second and third lag For Pakistan Co2 emission has negative and significant impact on Poverty in the first lag but it has positive and insignificant impact on poverty in the second lag and for India Co2 emission has positive and insignificant impact on Poverty in the first lag but it has negative and insignificant impact on poverty in the second and third lag. For Pakistan Informal sector employment has negative and significant impact in the first lag but it has positive and insignificant impact in the second lag and for India Informal sector employment has negative and insignificant impact in the first lag but it has positive and insignificant impact in the second and third lag. For Pakistan Co2 has positive and significant impact on informal sector employment in the first lag and it has negative and significant impact in the second lag and for India that Co2 emission has negative and insignificant impact on Poverty in the first lag but it has negative and insignificant impact on poverty in the second and third lag. For Pakistan Poverty has positive and significant impact on Informal Sector employment in the first lag but it has positive and insignificant result in the second lag. And for India Poverty has positive and insignificant impact on Informal Sector employment in the first lag but it has positive and insignificant result in the second and third lag.

Wald Granger Causality Test shows that for both India and Pakistan for the cause variable Poverty; we can reject the null hypothesis and accept alternate hypothesis that

poverty cause environment. For the cause variable is IFSE, we can reject the null hypothesis and accept the alternate that informal sector employment cause environment. Similarly for India and Pakistan when Co2 and Isfe are cause variable then we can reject the null hypothesis and accept the alternate that informal sector employment and environment cause Poverty. When Co2 and Pov are cause variable we can also reject the null hypothesis that's means Co2 and Pov have Granger Cause Relationship with Isfe.

For this study we can concluded that when we check the relationship of these three variables in VAR model they have significant and insignificant relationship but when we check their joint causality then all of these three variables are causing each others.

Informal sector employment and environment are closely related and poverty and environment are also closely related. They have mutual causality relationship. Poverty causes environment degradation because poor use woods fuel and other energy for household consumption which cause Co2 emission. Similarly Informal Sector employment has some time positive and some time negative impact on environment. For example certain activities like collection and recycling of material like papers and plastic cause positive impact on environment while some activities like cycle and motor rikstivha's and road side shops cause negative impact on environment.

## 6. RECOMMENDATIONS

Labor Market for informal economy is 4 to 6 percent in developed countries but it is almost 50 to 70 percent in developing countries. In poor countries Informal sector is a source of poverty alleviation. But due to expand of informal sector, issue of environment degradation is seriously highlights on national and International levels.

1. Government should make such polices and laws which restrict informal sectors to conduct such activates which are the main cause of environment degradation.
2. Poverty is the main reason of rapidly expansion of informal sector; government should expand employment in formal sector.
3. Access in formal sector is difficult as compared to informal sector; government should review why this access is difficult for poor's.

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