What is Hidden, in the Hidden Economy of Pakistan? Size, Causes, Issues and Implications

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WHAT IS HIDDEN, IN THE HIDDEN ECONOMY OF PAKISTAN? SIZE, CAUSES, ISSUES AND IMPLICATIONS

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Abstract

There is a worldwide contemporary debate about the role of the hidden economy in achieving the goal of sustained and inclusive economic growth and development, especially in the context of its spillover effects on the formal economy. For this purpose, policy makers and academicians have made concerted efforts to estimate the size of the hidden economy and to analyze its causes, issues and implications on key macroeconomic variables. However, there is a consensus among the policy makers that a better macroeconomic policy formulation and its true implementation are subject to the proper management of the associated issues of the hidden economy with suitable policy measures. In Pakistan, it is generally assumed that the hidden economy contributes about 30% to 50% to the overall GDP. The purpose of this paper is to estimate more precisely the size of the hidden economy with the determination of its potential causes and implications. Five statistical and structural modeling approaches namely; simple monetary approach, modified monetary approach using dynamic ordinary least square (DOLS), multiple-indicators multiple-causes (MIMIC) approach, electricity consumption approach and labor market survey based approach are used to estimate the size of the hidden economy and to analyze the characteristic nature of its growth over the period. The study also investigates the potential determinants of the hidden economy and various interrelated socio-economic issues in perspective of achieving national goal of inclusive growth and development. Finally, policy implications are provided consistent with pervading facts of the hidden economy in Pakistan especially in the context of the 18th Amendment and the 7th NFC Award.

JEL Classifications: C10, E26, D78, H20, H50, O53

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1. INTRODUCTION

The informal economy is initially considered as the subsidiary sector in terms of its contribution to the overall economy. However, it received the focus of attention with the publication of Peter Guttmann's estimates for sizing the informal economy (i.e. US $ 200 billion in 1976) for the US economy especially in the context of achieving the goal of inclusive growth and development. The informal economy is recognized with different names in different countries/regions throughout the world. For example, the Swedish and Russian term it as "Hidden Economy", the English call it "Fiddle", the Japanese recognize it as "Hidden Incomes", the French identify it as "Travail au noir", the Italian consider it as "The Lavorno Nero", while in Pakistan it has been analyzed as an "Hidden Economy" or "Informal Economy".

The informal economy includes all those economic activities which are not reported or not included in the National Income Accounts. These include both legal and illegal economic activities. According to the Resolution adopted by the 15th International Conference of Labor Statisticians (ICLS), the legal side of the informal economy comprises of units such as household enterprises, engaged in the production of goods and services with the primary objective of generating employment and income to the persons concerned, not necessarily with the deliberate intention of evading the payment of taxes or other legislative or administrative provision. These units typically operate at a low level of organization, on a small scale, and with labor relations mostly based on causal employment. Expenditure for production is often indistinguishable from household expenditure. The units as such cannot engage in transactions or enter contracts with other units, nor incur liabilities. A self explanatory Figure 1 provides a simple visual structure of formal and informal sectors and their inter linkages.

Figure 1[1]: Hierarchical Structure of Formal and Informal Sectors

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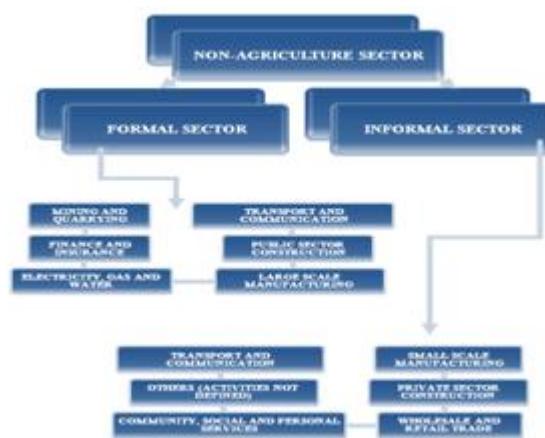
[1]The sectors in the formal sector and informal sector are identified only in the context of Pakistan on the basis of reviewed literature and discussions with the experts in the relevant fields.

The illegal economic activities as part of the informal economy include; smuggling, theft, prostitution, narcotic/forbidden commodity trade, gambling etc. National Income Accounts (NIA) as per design also exclude many activities such as moonlighting, unregistered employment, unregistered income earned through FOREX, under reporting of retail sales, illegal employment (child labor), suspect inventory evaluations, transfer of money through hundi, hidden rentals and barter business. All these economic activities by their nature act as an attempt to evade huge amount of taxes, thereby causing burden on the public treasury.

The persistent failure to manage economic system as reflected by a low tax-GDP ratio, an incredible increase in energy requirements, persistent upward inflationary movements especially in food items and consumer durables explains much of underlying truth of neglecting the quantification, causes and implications of the informal economy with in the public policy framework. Moreover, the informal economy appears to have great respect for geographical and geopolitical boundaries especially in the current phase of Pak-India and Pak-Afghanistan relations and Pakistan's logistic support to NATO forces in the wake of War against Terrorism. The destruction of 2005 Earthquake and calamities of the recent flood in 2010 add a greater potential to the expansion of the hidden economy. From socio-economic point of view, the unbridled price hike especially in food items and consumer durables, incessant increase in the prices of electricity and petroleum goods, the implementation of new GST/VAT system may give an informal attitude to the general living style.

At international level, there is much contemporary debate about the role of the informal sector in an economy and its potential in lessening poverty. The size and significance of the informal sector in Asia, contributing about 41% in the GDP, makes it a vital point of analysis for understanding the brunt of the downturn in the emerging economies of the region. Thus, it is the need of the hour to find out whether or not the informal sector cushions against the self-perpetuating evil of poverty, and helps the stricken economy to escape from the steamrolling noose of recession in Pakistan.

These facts motivate us to undertake the current study and analyze the informal economy from different aspects in Pakistan. Ideally, the correct measurement of the informal economy requires the aggregation of all legal/illegal hidden economic activities. Since, it requires an effective check and balance which is quite unworkable especially in the underdeveloped and the developing economies. The only way left which is rather crude in its nature, is the indirect approach to estimate the size of the informal economy with the available data on macro economic variables. Our contribution in this paper is to estimate the size of informal economy through five indirect approaches namely; Monetary Approach, Modified Monetary Approach through Dynamic OLS (DOLS), Electricity Consumption Approach, Structural Multi-Indicators Multi-Causes (MIMIC) Approach and Labor Market Approach. This blend of

various approaches has been adopted for the first time in case of Pakistan.[2] The other objectives of this study include; the determination of causes, issues/implications of the informal economy in Pakistan and provide useful policy implications in order to ascertain the desired policy goals of inclusive growth and development especially in the context of the 18th amendment and the 7th National Finance Commission (NFC) Award.

The rest of the paper is organized as follows: Section 2 outlines the review of relevant literature. Section 3 discusses the data and empirical methodology in detail. Section 4 analyzes the results and discussions. Section 5 contains the causes and implications of the informal economy which emerge from the analysis. Finally, Section 6 comprises of the conclusion (also containing some public policy guidelines) of the paper whereas results are reported in the appendix part of the paper.

2. REVIEW OF RELEVANT LITERATURE

The informal economy by its structure works through the proliferation of labor-intensive undertakings and backward and forward linkages with the formal economy; see for instance, Williams and Tumusiime-Mutebile (1978). Consequently, it acts as a cushion against poverty and income inequality, especially during external shocks: see for example, Frey (1997). Across the emerging market economies, the informal sector continues to expand in both absolute and relative terms. Its growth has been largely due to the weak capacity of the formal private sector to generate adequate employment and incomes due to high growth rates of labor force and rural-urban migration in the developing areas as noted by Sethuraman (1997).

Over the decades, the informal economy started to attract the attention of economists and policy makers as a result of which many approaches have been adopted to estimate the actual size of the informal economy, but each is tied with its own limitations. Out of all, first one is the labor market approach, the roots of which originate from the labor market by considering the number of workers actively participating in the informal economy and their total number of hours worked. However, Pyle (1989) argues that it is not possible to accurately measure the number of hours worked and the average productivity. Moreover, this approach is useful for countries having small informal economy.

Feige (1979) strived to guesstimate the size of the US economy from the standpoint of payments and transactions. Based on famous Fischer's equation of exchange $MV=PT$, he assumed the aggregate money supply to be a good quality indicator of the total size of the informal economy. The transaction

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[2] In authors' opinion, there is a need to conduct this study to produce more accurate and reliable estimates of the size of the informal economy over the period of analysis with the help of different approaches at once. A study by Ahmed (2009) surveyed various empirical studies on informal economy in the case of Pakistan. The author shows his reservations on the empirical estimates of the size of informal economy available in all previous studies. He concludes that informal economy and tax evasion estimates are unreliable and highly doubtful.

method resulted in a negative hidden economy for the period 1939-68, which illustrated a falling informal economy in the era of World War II. An earlier attempt on this approach was made by Cagen (1958), who was interested in explaining the long run behaviour of the currency to money supply over the period 1875-1955[3].

Tanzi (1980) re-hypothesized the same link to obtain estimates for the US black economy. He assumed that currency was used to carry out transactions in the black economy and high taxes were responsible for the increased size of the black economy. In addition to mentioned studies, O'Higgins (1981) also used the monetary approach by taking the ratio of currency to M1 and ratio of currency to M3 as dependent variables in estimating the underground economy for United States for the period 1960-80. Schneider (2002) estimated the size of the informal economy in 110 developing, transitional and OECD countries by using the currency demand approach, the physical input method and the structural modeling approach. The results concluded that the average size of the informal economy as a percentage of official GNI in the year 2000 was 41% for the developing countries, 38% for the transitional countries and 18% for the OECD countries. A large burden of taxation and social security contributions combine with government regulations were the main determinants of the size of the informal economy.

For many years, the informal economy has been the center of attention of many researchers in Pakistan[4], making tremendous efforts to quantify the actual size of this part of the overall economy through various approaches. Shabsigh (1995) adopted the same route of monetary approach to estimate the underground economy for the period 1975-91. He used ratio of currency in circulation to total demand deposits (M2-currency in circulation) as a dependent variable while real per capita income, real rate of interest, per capita banking services, average taxes on imports, exports and domestic activities were chosen as explanatory variables. He concluded that the size of the black economy was 21% of the total GDP in 1975 and declined slightly to 20.4% in 1990, thus implying a torpid underground economy.

Ahmed and Ahmed (1995) adopted the monetary analysis to estimate the size of the black economy using data for the period 1960-90 through Tanzi's approach. The inclusion of bearer bonds along with currency in circulation revealed that the level of tax evasion has increased over the number of years but the black economy as a percentage of GDP registered a decline in Pakistan. They concluded that the size of the informal economy declined from 52% in 1960 to 35% in 1990.

Aslam (1998) also used Tanzi's methodology to estimate the size of the underground economy by taking the log-ratios of currency in circulation and foreign currency accounts to M2 as a dependent variable, while log of total tax revenues as a percentage of GDP, log of interest rate on time deposits and

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[3] According to Cagen (1958, page. 312), *"Some people evade taxes by making as many transactions as possible with currency and not reporting to the tax collector"*.
[4] Earlier attempts have been made by Burki (1982) who highlights various issues related with urban informal sector of Pakistan and Ahmad *et al.* (1991) who studied the dynamics of learning and earning profile of Pakistan's informal sector.

log of dummy variable for period 1991-98 were taken as independent variables. Author's estimates reveal that the underground economy has been increased from 29% in 1960 to 43.9% in 1990.

Iqbal, *et al.*, (1998) used the ratio of currency in circulation to M2 as the dependent variable while real interest rate, real per capita income growth, banking services, domestic taxes as percentage of GDP, international trade taxes as percentage of GDP, dummy variable for the period 1988-96 and a lagged dependent variable to account for the inertia in the money market were taken as independent variables. They have also estimated the sectoral decomposition of the underground economy. The results concluded that the underground economy increased from 20.2% in 1973 to 51.3% in 1996.

Khalid (2002) estimated the underground economy for Pakistan using monetary approach but his estimates are different from those of Kemal (2003) due to different benchmark periods taken into consideration. In addition to this, Khalid (2002) added the real rate of interest and GDP per capita as independent variables while Kemal (2003) used GDP growth as a proxy to economic development, the results became evident that the underground economy as a percentage of GDP increased after 1991, reached a maximum in 1998 and then declined.

Yasmin (2004) adopted the monetary approach to measure the underground economy (UGE) through tax evasion in Pakistan over the period 1974-02. Estimating the currency demand equation to construct the size of the underground economy and tax evasion, the results demonstrated that the underground economy has increased enormously from Rs. 12 billion in 1974 to Rs. 1085 billion in 2002.

Kemal (2003) used the same dependent variable as above while the explanatory variables were tax-GDP ratio, banking services, GDP growth rate and a dummy variable for the period 1990-02 to estimate the size of informal economy for Pakistan from 1973-02. He concluded that the informal economy increased from 20% in 1974 to 54% in 1998 and then declined to 37% in 2002.

Kemal (2007) revised the old attempt of Kemal (2003) and used the best fit monetary approach to estimate the underground economy and tax evasion for Pakistan for the period 1973-05. The updated estimations showed that the underground economy and tax evasion were increasing rapidly in the early 1980s and this rate accelerated in the 1990s. The rate of increase slowed down till 1999 and then followed an increasing trend till 2003. The underground economy ranges from 54.6%-62.8% of GDP in 2005 while the tax evasion ranges from 5.7%-6.5% of total GDP in 2005.

Ahmed and Hussain (2008) made a comprehensive exercise to obtain the latest estimates for the size of the informal economy in Pakistan for the period 1960-03 by taking into account the tax and tariff reforms of 1990s. Based on the methodology of Ahmed and Ahmed (1995) with slight modifications, they came up with the conclusion that the black economy has a declining trend as a percentage of GDP due to the tax reforms involving rationalization of tax rates. Moreover, the inclusion of bearers bond in the model also increases the size of the black economy. The informal sector as a percentage of GDP

remained at 2% during 1960s, 17% during 1970s, 15% during 1980s and 13% during 1990s. Similarly, the tax evasion as a percentage of GDP remained at 5% during 1960s, 19% during 1970s, 16% during 1980s, and 11% during 1990s and so on.

Finally, in a recent study by Arby, *et al.*, (2010), the size of the informal economy in Pakistan is estimated by using modified monetary approach by employing auto-regressive distributed lagged (ARDL) model based approach, electricity consumption approach and multi-indicators and multi-causes (MIMIC) model approach for the period 1966-08. The modified monetary approach showed that the underground economy increased from less than 30% in 1960s to 33% in 1990s and then declined to 23% in 2000s. The electricity consumption approach showed that the informal economy increased from about 5% in 1970s to 29% in 1990s and then declined to 27% in 2000s. However, the MIMIC model showed that the informal economy was around 30% of the total GDP in Pakistan over the sample period. It also showed that business cycle in informal economy moved with the business cycle of the formal sector economy in Pakistan.

3. DATA AND METHODOLOGICAL SETUP

This section briefly outlines the empirical setup by illustrating data and various structural and statistical approaches to estimate the informal economy for Pakistan.

3.1 Data

To estimate the informal economy using various approaches, data over the annual frequencies from 1973-2010 is used on various economic, political, institutional and demographical variables. Details on the construction and the sources of the data set are provided in Table 1of the appendix.

3.2 Methodologies

In order to estimate the informal economy, we used various structural and statistical approaches. The list of approaches start from simple monetary approach as of Tanzi (1980), modified monetary approach using Dynamic Ordinary Least Square (DOLS) technique of cointegration, structural estimation approach using multi-indicators multi-causes (MIMIC), electricity consumption approach (EC) and labor market approach using statistical accounting. The next subsections consist of descriptions on each methodology in detail.

3.2.1   Simple Monetary Approach

This section provides a simple monetary approach consistent to the seminal attempts of Tanzi (1980) for estimating the informal economy of Pakistan. Following this approach, it is a need to get estimates of the following regression:

$$CFM2 = \beta_0 + \beta_1\,TY_t + \beta_2\,POP_t + \beta_3\,INF_t + \beta_4\,CFM2_{t-1} + \beta_5\,DD_t$$
$$+ \beta_6\,BS_t + \beta_7\,Y_t + \beta_8\,R_t + \varepsilon_t$$

Where,

➢ CFM2 = ratio of currency in circulation and resident foreign currency accounts to money supply

➢ TY = ratio of overall tax to GDP

➢ POP = overall population

➢ INF = rate of inflation

➢ CFM2 (-1) = lagged variable used for the ratio of currency in circulation and resident foreign currency accounts to money supply

➢ DD = dummy variable taking the value of 1 from 1991-2009 (to capture the impact of foreign currency accounts after 1990)

➢ BS = total number of bank deposits / total number of bank accounts

➢ Y = real growth of GDP

➢ R = weighted average rate of return on deposits

For each year, the final predicted value of ratio of currency in circulation and resident foreign currency accounts to money supply is computed by subtracting the regressed values of ratio of currency in circulation and resident foreign currency accounts to money supply without including the tax variable $(CFM2)_{wt}$ from the regressed values of ratio of currency in circulation and resident foreign currency accounts to money supply including the tax variable $(CFM2)_t$ in the regression equations. After subtraction, the final predicted value of ratio of currency in circulation and resident foreign currency accounts to money supply is equal to the coefficient of total tax to GDP ratio times the actual value of total tax to GDP ratio for each year as shown below;

$$(CFM2)_t = \beta_0 + \beta_1\,TY_t + \beta_2\,POP_t + \beta_3\,INF_t + \beta_4\,CFM2_{t-1} + \beta_5\,DD_t + \beta_6\,BS_t + \beta_7\,Y_t + \beta_8\,R_t$$

$$(CFM2)_{wt} = \beta_0 + \beta_2\,POP_t + \beta_3\,INF_t + \beta_4\,CFM2_{t-1} + \beta_5\,DD_t + \beta_6\,BS_t + \beta_7\,Y_t + \beta_8\,R_t$$

$$CFM2_t = (CFM2)_t - (CFM2)_{wt} = [\beta_0 + \beta_1\ TY_t + \beta_2\ POP_t + \beta_3\ INF_t + \beta_4\ CFM2_{t-1} + \beta_5\ DD_t + \beta_6\ BS_t + \beta_7\ Y_t$$
$$+ \beta_8\ R_t] - [\beta_0 + \beta_2\ POP_t + \beta_3\ INF_t + \beta_4\ CFM2_{t-1} + \beta_5\ DD_t + \beta_6\ BS_t + \beta_7\ Y_t + \beta_8\ R_t]$$

$$CFM2_t = (CFM2)_t - (CFM2)_{wt} = \beta_0 + \beta_1\ TY_t + \beta_2\ POP_t + \beta_3\ INF_t + \beta_4\ CFM2_{t-1} + \beta_5\ DD_t + \beta_6\ BS_t + \beta_7\ Y_t$$
$$+ \beta_8\ R_t - \beta_0 - \beta_2\ POP_t - \beta_3\ INF_t - \beta_4\ CFM2_{t-1} - \beta_5\ DD_t - \beta_6\ BS_t - \beta_7\ Y_t - \beta_8\ R_t$$

The solution to above yields: $CFM2_t = \beta_1\ TY_t$. The final predicted value of ratio of currency in circulation and resident foreign currency accounts to money supply is divided by 100 so as to remove the percentage. From here, this estimated series CFM2 is multiplied with M2 to get the illegal money. In order to calculate legal money in the economy, the series of illegal money is subtracted from the series of M2 for each year. Moving ahead, velocity of money in the underground economy is estimated by dividing the total GDP with legal money. Assuming that the velocity of money is same for both legal and illegal money in the economy, the final estimations for the underground economy is obtained by multiplying the illegal money with the velocity of money for each respective year.

Tax evasion for each year is calculated by multiplying the underground economy with total tax to GDP ratio.

- ➤ Illegal money (IM) = CFM2 * M2
- ➤ Legal money (LM) = M2-IM
- ➤ Velocity (V) = GDP / LM
- ➤ Informal Economy (IE)= IM * V
- ➤ Tax Evasion (TE) = IE * (total taxes / GDP)
- ➤ IE as % of GDP = (IE / GDP) * 100
- ➤ TE as % of GDP = (TE / GDP) *100

According to Tanzi (1980), the final estimates from the monetary approach computing the size of the underground economy for any country should not be considered as precise estimates, because they are sensitive to assumptions rather, it would be highly expedient to consider them as broad indicators of a fluctuating trend over the period of analysis.

3.2.2   Modified Monetary Approach using Dynamic OLS

The most recent study in the case of Pakistan by Arby *et al.* (2010) defined a new approach named modified version of the monetary approach using Autoregressive Distributed Lag[5] (ARDL) model. According to authors, it is their seminal attempt to use ARDL modeling approach to estimate the informal

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[5] This Co-integration approach is suggested by Pesaran and Shin (1999) and Pesaran *et al.* (2001).

economy in case of Pakistan. Further, this approach overcomes the problem associated with the estimation of informal economy through simple monetary approach of Tanzi (1980) as the results of simple monetary approach may be spurious. Since, the ARDL modeling approach allows using different order of integration series, while computing long-run estimates; this approach is also capable to handle the problem of endogeneity thus providing unbiased cointegrated estimates. Using the ARDL approach, the authors succeeded in establishing a long run dynamic relationship between the currency ratio and other associated variables. Then, they used the long-run cointegrated estimates to compute informal economy for Pakistan.

The cointegration literature of time series econometrics has another credible approach named Dynamic Ordinary Least Square (DOLS) developed by Stock and Watson (1993). This method is also useful for the investigation of long run relationships among dependent and explanatory variables. The estimation procedure works by estimating the dependent variable on constant plus explanatory variables on level form and leads and lags at the first differences. This method is superior to a number of other estimators as it can be applied to system of variables with different orders of integration; see for example, Stock and Watson (1993). This methodology is a substitute of ARDL approach cointegration as the inclusion of leads and lags of the differenced explanatory variable corrects for simultaneity, endogeneity, serial correlation and small sample bias among the explanatory variables see, Stock and Watson (1993).

We follow Arby *et al.* (2010) specifications to modify Tanzi's (1983) monetary approach of estimating the informal economy. The model specification assumes the (CM) currency to M2 ratio as a dependent variable and (T) tax burden proxies by tax to GDP ratio, a proxy for financial sector development, market interest rate as a proxy of monetary policy, and literacy rate as a proxy of human capital as key determinants. The informal economy's computational procedure is based on DOLS estimation procedure rather than ARDL. Thus, it enables us to use an alternative estimation mechanism and get reliable estimates.

$$CM_t = \varphi_0 + \varphi_1 T_t + \varphi_2 F_t + \varphi_3 R_t + \varphi_4 H_t + \sum_{i=-p}^{r} \theta_{1i} T_{t-i} +$$

$$\sum_{i=-p}^{r} \theta_{2i} F_{t-i} + \sum_{i=-p}^{r} \theta_{3i} R_{t-i} + \sum_{i=-p}^{r} \theta_i H_{t-i} + \zeta_t$$

The usual long-run restriction is tested by Wald-Coefficient restriction tests as specified by Stock and Watson (1993). Once the cointegration hypothesis is accepted, it is assumed that there exists a long-run relationship between the specified set of variables. The long-run model can be re-written from the above DOLS specifications as:

$$CM_t = \hat{\varphi}_0 + \hat{\varphi}_1 T_t + \hat{\varphi}_2 F_t + \hat{\varphi}_3 R_t + \hat{\varphi}_4 H_t$$

It is important to note that there is no need of normalization as DOLS provide direct estimates. Given these estimates, one can easily compute informal economy as percentage of formal economy (GDP):

$$Ratio(IF / F)_t = \frac{\hat{\varphi}_1 T_t + \hat{\varphi}_4 E_t}{m_t}$$

Where, *IF* is GDP of informal economy; *F* is the GDP of formal economy and m_t is the ratio of near money to broad money, respectively.

3.2.3 Structural Approach Using Multi-Indicators and Multi-Causes (MIMIC)

This section formally layouts a modern structural approach named Multi-Indicators and Multi-Causes (MIMIC) approach. It represents a statistical vis-à-vis economic relationship among latent (hidden or unobserved) and manifest (observed) variables. The special structural form assumes linear independent structural relationship (also called as LISREL) among unobserved and manifest variables. In an earlier attempt, Bollen (1989) presents the fundamental hypothesis for structural equation modelling as: $CS = \Omega(\Theta)$, where Ω is the observed population covariance matrix, Θ is a vector of model parameters, and CS is the covariance matrix implied by the model. When the equality expressed in the equation holds, the model is said to "fit" the data. Thus, the objective of this modelling approach is to explain the patterns of covariance observed among the latent and observed variables. A special version of this modelling approach is the Multi-Indicators and Multi-Causes approach. On one hand, it allows to consider the structural equation as a "latent or hidden" variable linked to a number of observable indicators and on the other hand to a set of observed causal variables, which are regarded as some of the most important determinants of the unreported economic activity see for example, Schneider, Büehn and Montenegro (2010).

The MIMIC model is build upon two sorts of equations; the structural one and the measurement equations system. The equation that captures the relationship among the latent variable (IE) and the causes (*X*) is named as "structural model" and the equation that links the indicators (Z) with the latent variable (non-observed economy) is called as "measurement model".

According to Schneider, Büehn and Montenegro (2010), MIMIC model of the informal economy is expressed as:

$$IE = \gamma'X + \upsilon$$
$$Z = \lambda IE + \varepsilon$$

Where, *IE* is the scalar latent or hidden variable (the size of informal economy in our case), $Z = (Z_1, ... Z_p)$ is the $(1 \times p)$ vector of indicators of the *IE* variable, $X' = (X_1, ... X_q)$ is the $(1 \times q)$ vector of causes of *IE*, $\lambda_{(p \times 1)}$ and $\gamma_{(q \times 1)}$ are the vectors of parameters and $\varepsilon_{(p \times 1)}$ and $\upsilon_{(q \times 1)}$ are the vectors of scalar random errors. The ε and υ are assumed to be mutually uncorrelated: ($E(\varepsilon_t \upsilon_t ') = E(\upsilon_t \varepsilon_t ') = 0$.

The MIMIC model assumes that the variables are measured as deviations from their means and that the error term does not correlate to the causes: $E(\eta_t) = E(x_t) = E(\xi_t) = 0$ and $E(x_t \xi_t ') = E(\xi_t x_t ') = 0$. The variance of υ is abbreviated by Ψ and Φ is the $(q \times q)$. covariance matrix of the causes x_t. The measurement model $Z = \lambda IE + \varepsilon$ represents the link between the latent variable and its indicators; the latent unobservable variable is expressed in terms of observable variables. Their $(p \times p)$ covariance matrix is given by Θ_ε. Like the MIMIC model's causes, the indicators are directly measurable and expressed as deviations from their means: $E(Z_t) = E(\varepsilon_t) = 0$. It is assumed that the error terms in the measurement model do not correlate either to the causes x_t or to the latent variable IE_t. $E(x_t \varepsilon_t ') = E(\varepsilon_t x_t ') = 0$ and $E(IE_t \varepsilon_t ') = E(\varepsilon_t IE_t ') = 0$.

The reduced form of the structural equations can be written as: $Z = \Pi X + u$, where $\Pi = \lambda \gamma'$, $u = \lambda \upsilon + \varepsilon$. The error term u is a $(p \times 1)$ vector of linear combinations of the white noise error terms υ and ε from the structural equation and the measurement model: $u \approx (0, \Gamma)$. The covariance matrix Γ is given as: $\text{cov}(u) = \lambda \lambda' \psi + \Theta_\varepsilon$, $\text{cov}(\upsilon, \upsilon) = \psi$, $\text{cov}(\varepsilon, \varepsilon) = \Theta_\varepsilon$ the diagonal covariance matrix of ε.

For identification of MIMIC model, some conditions are available but none of them are necessary and/or sufficient conditions as shown by Bollen (1989). The necessary (but not sufficient) condition so-called the *t-rule*, enunciates that the number of non-redundant elements in the covariance matrix of the observed variables must be greater or equal to the number of unknown parameters in the model-implied covariance matrix, see for example, Bollen (1989). On the other hand, a sufficient (but not necessary) condition of identification is that the number of indicators is two or greater and the number of causes is one or more, provided that is assigned a scale to *IE* (MIMIC rule). For assigning a scale to the latent variable, it is needed to fix one λ parameter to an exogenous value. Although several econometric improvements are introduced in the last years, the most important criticism to the MIMIC method is the strong dependence of the outcomes by the (exogenous) choice of the coefficient of scale (λ).

Given an estimate of the γ vector and setting the error term υ to its mean value of zero, enable us to "predict" *ordinal* value for *IE* which is the relative size of the informal economy at each sample point. Then, if we have a specific value for *IE* at some sample point, obtained from some other source, we can

convert the within-sample predictions for *IE* into a *cardinal* series. We use an average value from other estimations realized using the model specifications to calibrate the time-series of the informal economy.

Arby *et al.,* (2010) study was the first attempt to "calibrate" such MIMIC model informal economy results formally in the context of Pakistani data.

3.2.4 *Electricity Consumption Approach*

The electricity consumption approach looks at physical indicators, particularly electricity usage, to estimate the size of the informal economy. For the first time, Kaufmann and Kaliberda (1996) used this approach at the National Accounts level to estimate the informal economies of post-socialist countries. According to the authors, electricity consumption is the best proxy of overall economic activity both in terms of formal and informal economies. Various empirical studies find that elasticity of electricity consumption to official GDP is approximately closed to one, see for instance, Dobozi and Pohl (1995) and Johnson, Kaufmann and Shleifer (1997). From the National Income Accounts, the amount of electricity needed to produce the official GDP is subtracted from total electrical output. If there is some excess then it is considered as informal economy. For our study we take the ratio of growth of total electricity consumption and official GDP (data taken from the Economic Survey of Pakistan), with deviations from expected levels subsequently used as proxies of informal economic activity.

3.2.5 *Labor Market Approach*

The labor market approach as discussed in economic literature is used not only to estimate the size of the informal economy but it also renders an insight of the causes and implications of informal economy in terms of employment generation and increasing or decreasing inequality in income levels in both high growth period and slow growth period. This approach also helps to understand the trend of migration of people from formal to informal sector and vice versa which gives a key policy implication for sustainability as well as productivity of employment generation in the sector, see for instance, Gennari (2004). It also helps in demarcating between formal and informal sectors and their relationship between themselves[6].

For the purpose of analysis, the overall economy is disaggregated into two main sectors namely; agriculture sector and non-agriculture sector. Minimalism of the non-agriculture sector into formal and informal sectors has lead to a step ahead, where these two sectors are further divided into their respective sub-sectors on the basis of reviewed literature.

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[6] Ghayur (1994) study highlights the importance of labor market information system for informal sector in the case of Pakistan.

The formal analysis is based on various hypotheses. Keeping in view the different results of various studies, we test the following two kinds of hypotheses. First denotes main hypotheses based on stylized facts of various studies and second denotes related hypotheses subject to various conditions.

Main Hypotheses: (Behavior of employment and income per capita growth rates in formal and informal sectors during fast and slow growth periods)

❖ The growth of employment in the formal sector (e_{f2}) is lower than the growth of employment in the informal sector (e_{i2}) during slow growth of the economy.

       Mathematically; $e_{f2} < e_{i2}$

❖ The growth of real income per worker in the formal sector (Y_{f2}) during a slow growth period is lower than the growth of real income per worker in the formal sector (Y_{f1}) during the fast growth period.

       Mathematically; $Y_{f2} < Y_{f1}$

❖ The overall productivity in the informal sector during slow growth of the economy is less than zero.

       Mathematically; $Y_{i2} - e_{i2} < 0$

Related Hypotheses:

❖ When the growth of real income per worker in the total non-agricultural sector during a fast growth period (Y_1) is greater than the growth of real income per worker in the total non-agricultural sector during a slow growth period (Y_2), i.e.,

       Mathematically; $Y_1 > Y_2$

❖ The growth of employment in the formal sector (e_{f1}) is greater than the growth of employment in the informal sector (e_{i1}) during a fast growth period.

       Mathematically; $e_{f1} > e_{i1}$

❖ The growth of employment in the formal sector (e_{f2}) is less than the growth of employment in the informal sector (e_{i2}) during a slow growth period.

       Mathematically; $e_{f2} < e_{i2}$

❖ The growth of real income per worker in the formal sector (Y_{f1}) is greater than the growth of real income per worker in the informal sector (Y_{i1}) during a fast growth period.

       Mathematically; $Y_{f1} > Y_{i1}$

❖ The growth of real income per worker in the formal sector (Y_{f2}) is less than the growth of real income per worker in the informal sector (Y_{i2}) during a slow growth period.

       Mathematically; $Y_{f2} < Y_{i2}$

In order to test various hypotheses regarding formal and informal sectors, secondary annual data for the period 2002-09 has been taken for the purpose of a time series analysis. The data on percentage share of employed labor force above 10 years of age has been taken from various issues of labor force survey (LFS) for the fiscal years 2001-02, 2003-04, 2005-06, 2006-07, 2007-08 and 2008-09. The data on average monthly income has been taken from various issues of household integrated economic surveys (HIES) for the fiscal years 2001-02, 2004-05, 2005-06 and 2007-08. Additionally, steps involved in calculating the informal sector as percentage of overall GDP through labor market approach are as follow:

FOR UNPAID FAMILY WORKERS:

Data for total employed civilian labor force (10-14 year bracket) and female employed civilian labour labor force (10-14 year bracket) is taken from various issues of the Labor-Force Survey. Next, total employed labor force (millions) is multiplied with the above mentioned employed civilian labor force (total and female) which is then subtracted from total employed labor force to get the rest of the labor force employed in all age limits. Moving ahead, data for unpaid family workers for both sexes and female is obtained from various issues of Labor-Force Survey which is divided by 100 to remove the percentage. Estimates for the unpaid family workers in the informal sector are acquired by multiplying the remaining employed labor force employed in all age limits with the data on unpaid family workers for both sexes and female (after dividing by 100) for each year. However, the number of unpaid family workers in the formal sector is calculated by subtracting the estimated number of unpaid family workers in the informal sector from the total unpaid family workers for both sexes and female. Next, the estimated number of unpaid family workers in each respective year in the informal sector is added to the number of workers lying in the age bracket of 10-14 years.

Total per-capita income is further calculated by dividing the total GDP with total labor force employed for each year. In order to get the per-capita income of unpaid family workers in the informal sector, total per-capita income is multiplied with the sum of estimated number of unpaid family workers in each respective year in the informal sector and number of workers lying in the age bracket of 10-14 years. Lastly, the informal sector as %age of overall GDP is estimated by dividing the per-capita income of the informal economy with total GDP and multiplying this fraction with 100 as given in Table 2D.

FOR SELF-EMPLOYED LABOR FORCE:

Similar estimations as above are done through the labor market approach by incorporating the self-employed labor force into the pool of informal economy.

Another estimate through Labour Market Approach is done with the addition of self employed labour force into the pool of informal economy.

4   RESULTS AND DISCUSSION

The main focus of this section is to provide comprehensive interpretations about the size of the informal economy obtained from various methodologies. Furthermore, it also our objective to highlight the significant factors which cause the informal economy in case of Pakistan.

In our first attempt we estimated the size of the informal economy of Pakistan using basic monetary approach. The monetary regression is estimated using ordinary least squares procedure by utilizing data from 1982-2010. The results are reported in Table 3 of the appendix. One can easily draw conclusion from the results that all financial and monetary variables are significant vis-à-vis tax burden plays a dominant role. The informal economy (as % of GDP) obtained from this approach is also plotted in Figure A1. It shows that the ratio increased in mid 90's and then slowed down in the autocratic regime. The figures of informal economy in mid 2000's show an increasing trend, but then there is some downward trend for the past two years. The size of informal economy as percent of GDP remains from 32%-38%. The estimated tax evasion results are also plotted in Figure A2. It shows that tax evasion (as % of GDP) remains from 3%-4% with small cyclical fluctuations over the sample period.

The results of modified monetary approach using DOLS model are reported in Table 4 of the appendix. The DOLS model is initially estimated for setting i = 1 to 4 leads and lags. After using Akaike information criterion we restrict our model by inclusion of one lead and lag variable. The DOLS model is then estimated using maximum likelihood procedure. Using Stock and Watson (1993) specifications, we test the cointegration among selected variables by imposing Wald restriction test. The restriction results finally enable us to accept the hypothesis that all variables are cointegrated. Using the long run estimates obtained from ML procedure, we computed informal economy (as %of GDP) and reported our annual estimates from 1973-2010 in the Table 7 of appendix. The annual estimates show that the informal economy has increased initially and then there is a consistent declining trend over time, but the pace of this decline is quite slow. On an average, in the few years the informal economy (as % of GDP) remained at 20%-22%.

In our third attempt, we have estimated the size of the informal economy using MIMIC model. Arby *et al.*, (2010) only considered one specification of informal economy in case of Pakistan. But in our study, we have considered three specifications of MIMIC model by utilizing various economic and institutional variables. The results of all three specifications are given in Table 5 and in subsequent Figure A3 of appendix. It is interesting to note that while incorporating corruption and size of government indicators in one specification as given in model-C, the estimated ratio of informal economy to formal remains at 50%-60%, which is quite high. However, other specifications which consider economic of freedom and other economic stability variables also show quite reasonable estimates. We apply simple average procedure by taking mean of all three specifications to overcome **biasness.** The average estimates are then reported in Table 7. Our average estimates are very close to Arby *et al.*, (2010) single specification of MIMIC model results. We also compare our estimated results with the results available in a recent study by Schneider, Büehn and Montenegro (2010) for Pakistan. Our MIMIC model results of all three specifications are closed to Arby *et al.*, (2010) but less then (in terms of size) the results of Schneider, Büehn and Montenegro (2010). Finally, our average results show that the size of the informal economy (as % of GDP) remains around 28% over the sample period.

These results also show that tax burden, unemployment rate, economics of freedom, corruption, government size, openness and inflation are significant determinants and play a dominant role in expansion/contraction of the informal economy in Pakistan.

In our fourth attempt, we have estimated the size of the informal economy using the physical indicator approach, namely; the electricity consumption approach. The results of this approach are reported in Table 7 of the appendix. The results of the informal economy (as % of GDP) remained at 40%-50%. These estimates may not be reliable as they over-estimate the informal economy. As Arby *et al.*, (2010) noted, this approach do not incorporate self-generation of electricity by economic agents which boomed in mid 90s due to crisis in official sector of power generation and distribution in Pakistan.

In our final attempt, we have used labor market approach to estimate the size of informal economy from 2000-10. The results of this approach are reported in Table 7 of the appendix. This approach is based on unpaid family workers as well as self-paid family workers where the labor force between 10-14 years is also included in the labor force pool of the informal economy. Published data for 10 years has been used which is obtained from the Labor-Force Survey and the Household Integrated Economic Survey. The estimated results based on unpaid family workers are consistent with our MIMIC average estimates of three specifications while the estimates which include self-paid family workers are also consistent with the estimates of electricity consumption method. It explains the hidden characteristics of the economy that the cottage industry, Small-Scale and Manufacturing industries (generally not

registered) cannot be captured by the simple monetary and simple labor approach but the demand for the electricity to run the factories can be captured by the electricity consumption approach.

The labor market approach facilitates us to test the hypotheses that whether or not the informal economy is a cushion against poverty and income inequality. It also helps to understand the behavioral pattern of growth of informal, formal and overall economy and its inter linkages vis-à-vis spillover effects. In order to test these hypotheses, the percentage share of employed labour force and deflated yearly average incomes in non-agricultural, formal and informal sectors are divided into the above mentioned growth periods (See, Tables 15A and 15B). The results of the annual cumulative growth rates are given below. The results explain that during slow growth of the economy, the growth of employment in the formal sector (e_{f2}) is lower than the growth of employment in the informal sector (e_{i2}). Moreover, the growth of real income per worker in the formal sector during a slow growth period (Y_{f2}) is lower than the growth of real income per worker in the formal sector during the fast growth period (Y_{f1}). Moreover, the overall productivity in the informal sector ($Y_{i2}-e_{i2}$) during slow growth of the economy is less than zero. It further substantiates that when the growth of real income per worker in the total non-agricultural sector during a fast growth period (Y_1) is greater than the growth of real income per worker in the total non-agricultural sector during a slow growth period (Y_2). The growth of employment in the formal sector (e_{f1}) is less than the growth of employment in the informal sector (e_{i1}) during a fast growth period. The growth of real income per worker in the formal sector (Y_{f1}) is less than the growth of real income per worker in the informal sector (Y_{i1}) during a fast growth period. The growth of employment in the formal sector (e_{f2}) is less than the growth of employment in the informal sector (e_{i2}) during a slow growth period. The growth of real income per worker in the formal sector (Y_{f2}) is less than the growth of real income per worker in the informal sector (Y_{i2}) during a slow growth period.

EMPLOYMENT

Annual Cumulative Growth Rate (ACGR)		
	Fast Growth Period	Slow Growth Period
	(2001-02 to 2006-07)	(2007-08 to 2008-09)
Non-Agriculture	e_1	e_2
	-0.53	-0.78
Formal Sector	e_{f1}	e_{f2}
	-5.03	-2.59
Informal Sector	e_{i1}	e_{i2}
	1.63	-0.1

INCOME

Annual Cumulative Growth Rate (ACGR)		
	Fast Growth Period (2001-02 to 2006-07)	Slow Growth Period (2007-08 to 2008-09)
Non- Agriculture	Y_1	Y_2
	3.58	-5.44
Formal Sector	Y_{f1}	Y_{f2}
	0.55	-7.89
Informal Sector	Y_{i1}	Y_{i2}
	8.44	-2.18

Over the period of analysis, on average, the fluctuation in employment share in non-agriculture of 2.88 from the mean value of 24.10 million is mainly caused by the informal sector. The fluctuation in the employment share of informal sector is 2.43 million from the mean value of 17.11 million which is much larger than that of 0.77 million from the mean value of 7.00 million (See, Table 11A). The estimated average yearly income in formal sector results in less fluctuations than average yearly income in the non-agriculture sector by Rs. 14413.68 from the mean value of Rs.58585.52. Two sub-sectors namely; mining and quarrying and electricity, gas and water, are mainly responsible for fluctuations in the average yearly income in the formal sector. The estimated average yearly income in mining and quarrying is the highest among all sub-sectors in the formal sector while, the average yearly income in electricity, gas and water is the lowest. The increase in average yearly income in mining and quarrying can be attributed to large amounts of investment in the sector on yearly basis from 2006-2009. The lowest mean of average yearly incomes in electricity, gas and water was due to the sharp decline in incomes over the period 2004/5-2005/6 which was caused due to a sharp decline in the rate of investments in the preceding years.

Over the period of analysis, there was a fluctuation in the average yearly income in the informal sector. On average, the average yearly income in the informal sector fluctuates more than the fluctuations of average yearly income in non-agriculture sector (formal and informal sector) by Rs.16037.65 from the mean value of Rs. 40992.54, where the maximum value is Rs.66859.44, minimum value is Rs. 18827.09 and the range is Rs. 48032.35. Two sub-sectors namely; wholesale and retail trade and transport and communication are mainly responsible for the fluctuations in yearly average income in informal sector. Over the period of analysis, the average yearly income in wholesale and retail trade was estimated to be the highest among all sub sectors due to an unprecedented increase in investment leading to an increase in average yearly income from 2005/6-2006/7 while, average yearly income in transport and communication was the lowest. This is due to the fact that in the informal sector, the average yearly income of base year

in transport and communication was much lower than the yearly average incomes of other sub-sectors. (See, Table 11B).

Over the range of analysis where the growth rate of the real GDP is above 5%, the growth rate of employed labour force in the formal sector remains constant while that of the informal sector sharply decreases. It can be concluded that the growth of real GDP in Pakistan is consumption led growth and not an employment led growth. Moreover, it also justifies the point that inequality increases with high rates of growth of real GDP in Pakistan. There exists a negative relationship between growth rates of real GDP and growth rates of average yearly income in the informal sector. (See, Figures A5, A6). On the basis of actual estimated values, the hypothesis is true that growth of real GDP results in relatively higher increase in growth rate of average yearly income in the formal sector and vice versa. Moreover, an increase in the growth rate of real GDP results in a relatively larger decline in the growth rate of average yearly income of the informal sector. Simultaneously, on the basis of trend line, there is an inverse relationship between growth rate of real GDP and growth rate of average yearly income in formal and informal sectors (particularly, over the range where GDP is above 5%), See Tables 9 and 10.

5 CAUSES AND IMPLICATIONS OF INFORMAL ECONOMY

The focus of this section is to provide an insight of the causes and implications of the hidden economy and likely consequences on the macroeconomic variables.

5.1 Causes of Informal Economy

On the basis of our analysis and reviewed literature, the main causes/factors of informal economy include; cultural constraints, high ratio of per-capita income and highest currency denomination note, low literacy rate, high cost of doing business, devaluation of currency, transfer of money through hundi, low growth rate of public sector development expenditures in the right direction and current structure of financial system both in terms of growth and service delivery. Factors which may add to the potential expansion of the informal economy in future include; recent destruction of water bomb (See, Table 18), imposition of new GST/VAT system, decreasing rate of general purchasing power, increasing rate of cross border smuggling, price hike of electricity and petroleum goods and weak law enforcement and increasing corruption.

High denomination currency notes are considered as one of the major causes of the existence and expansion of the informal economy in Pakistan. On average, the per-capita per month money holding is less than Pak Rs. 4000/- which is the maximum purchasing power at any day in a month. However, it is

significantly less than the high denomination currency note i.e. Rs. 5000/-. This simple fact explains that Rs. 5000/- is not used for general transactions in the formal sector. It leads to the fact that the demand for Rs. 5000/- note may be attributed to its use for non-productive bustles as well as illegal activities such as hoarding, theft, currency scam (as occurred in past few years), illegal transfer of money and contributes significantly to the size of the informal economy. Second indicator explaining the same fact is that the ratio of per-capita income and highest denomination currency note of Pakistan is extremely low relative to that of developed and developing countries (See, Tables 2A, 2B, 2C).

Corruption, inflation and tax evasion are not only causing an expansion in the size of the informal economy (See, Tables 3, 4, 5) but also hampering the growth rate of informal economy, thereby adding more to economic uncertainty, income inequality and poverty.

According to our estimates, the informal economy constitutes about 30% to 35% of the total economy over the period of analysis. As per the design of the New Tax system and the current economic structure of the country, VAT can only be imposed on the formal sector of the economy. It can lead to a diversion in the resources as well as generation of wealth from formal sector to informal sector, thereby causing the expansion of the informal sector at the expense of the formal sector. Therefore, it will give an impetus to the growth of tax evasion thus leaving the growth of taxes constant even during the fast growth periods in future as happened in the previous years (See, Table 16). In the wake of the recent destruction by water bomb if copped with the current status quo, then it will again lead to the expansion of the informal economy which further adds more to the conventional characteristic of the national economy. The social and cultural constraints (including rural life and conventional mentality as major issues) pose a great difficulty to convert the informal economy into formal economy where illiteracy adds more to it.

5.2 Issues/Implications of the Informal Economy

The most important implications that emerged from our empirical analyses are enlisted below.

5.2.1 Role of Informal Economy on Poverty Alleviation and Socio-Economic Stability

The role of the informal economy is ambiguous in terms of alleviating poverty. It generates low salary jobs which have an uncertain impact on the severity of poverty subject to inflation. During high inflationary period, it is unable to stop the brutality of poverty. As shown in the above analysis, it contributes towards the income inequality in real terms through two ways; first, by keeping incomes low, second; by stimulating inflation. It is also evident from the above analysis that there are stability issues in

the employment and income generation as large fluctuations have been found in the informal sector which gives an uncertain aspect to the economic conditions and discourages the investment.

Cheema *et al.,* (2008) explains that Northern Punjab is at the bottom of the ladder of poverty followed by Central Punjab, West Punjab and Southern Punjab. The ranking of these four regions of Punjab on the basis of informal economy is the same as on the basis of poverty. It manifests the strong positive relationship between the existence of poverty and informal economy. The informal economy causes high inflation rate which results in declining the living standards as the growth of income in this sector is less than that of inflation rate as shown in the following table. The indices values of Food & Beverages and Wheat are the highest in the most backward region of the country where the informal economy dominates. In this way, the existence of informal economy shows the conventional and backward characteristic of the overall economy and contributes towards the divergence within the country as concluded by Ahmad and Ahmed (2008) on the basis of intercity variation in prices.

The social implications of the existence and growth of the informal economy especially during stagflation is swear as the employed labor force start shifting from legal to illegal activities so that they can meet their constant consumption. The unemployed labor force provide ready recruit in the ranks of terrorists and dacoits' etc. It is evident from the fact that the increasing rate of terrorist attacks, theft of national income and resources, surmounting corruption and increasing rate of smuggling are primarily originating from the areas where informal economy dominates the formal economy.

Province/Capital	Food and Beverages Index	Wheat Index
Punjab	99.23	97.15
Sindh	102.30	101.57
NWFP	100.82	109.30
Balochistan	108.35	109.85
Islamabad	110.59	99.00

Source: Ahmed and Gulzar (2008)

5.2.2 Acts as a Constraint against an Effective Public Policy Implementation

Significant size of the informal economy will restrict the effectiveness of VAT in order to increase the tax to GDP ratio. The basic constraint on the successful implementation of VAT lies in the fact that all the

financial transactions will be made through banks. However, the significant size of the informal economy and biased growth of the financial sector (growth of financial sector has been less than the requirement in rural area) under lock almost 50% of the effectiveness of VAT before hand, as one of the basic characteristics of informal economy is that the transactions are made in cash and through barter system in it. It also limits the success of the tight monetary policy during inflation as high interest rates do not attract the poor/low salary people to save more because of their high marginal propensity to consume as determined by Kuznets.

As explained above, the estimation of the informal economy also explains the fact that historically, the informal economy caused low tax to GDP ratio by three ways; first; informal economy contributes nothing to the Tax toll and all the tax collections are made from the formal sector, second; it also provides the cushion to evade taxes in the formal sector which amounts to about 3% of the total GDP as explained above, third; it hampers the growth of formal sector as the share of informal economy to the overall economy did not decrease significantly over the period of analysis as shown in the Table 7 of the appendix.

5.2.3 Implications of the Informal Economy in Context of Globalization and Free Markets

In the context of globalization and free markets, the informal economy is greatly responsible for less value addition in the goods sold in the international market as well as equally responsible for restraining the potential of the country to produce high value added products by restraining the shift of technology even in formal sector through its backward and forward linkages with it. Consequently, the technological shift in manufacturing sector (i.e. formal sector) is relatively lower than that of Pakistan as shown below. It works in three ways; first; as it results in low savings and low capital formation, second; low resource constraint in formal sector, third; puts capacity constraint on labor force and restrain the labor force productivity through underemployment, disguised employment, providing low salary and early age employment (child labor).

Technological Shift in manufacturing sector

Source: UNDP, 2004
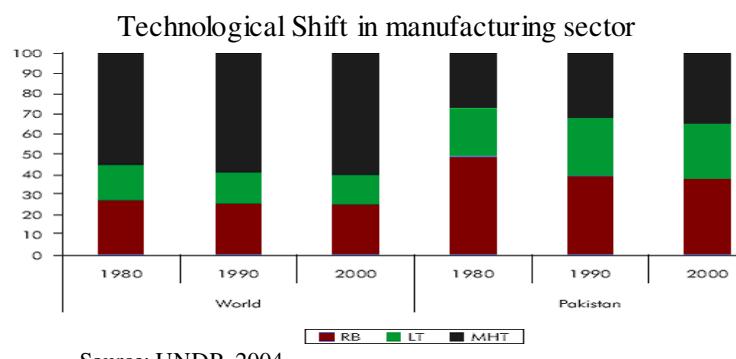
5.2.4 Implications of the Informal Economy in the Context of the 18th Amendment and the 7th NFC Award

Under the 18th Amendment, the concurrent list has been abolished and all subjects have been delegated to the provinces thus putting a test of the provincial capacity to perform all the functions in the current state and also bring improvements in areas that are in line with the spirit of the 18th Amendment. However the pristine objectives of the 18th Amendment and the 7th NFC Award of strengthening the federation and empowering the provinces through fiscal decentralization may be hampered by the existence of the informal economy, if the proper arrangements for the transformation of the informal economy into formal economy are not made. These arrangements include; starting of public sector development projects that can generate permanent businesses that are adaptable to change as well as business community in the areas of informal economy in order to guarantee permanent and high paid jobs. If the meso policies of the federal and provincial governments remain, then not only the benefits of the two historic breakthroughs may not be reaped as such policies provide stimulus to the existence and growth of informal economy but these may have adverse impacts on the overall economy through increasing income inequality and poverty among provinces which is ever dangerous for an overall national character of the federation.

6   CONCLUSION

The use of different approaches in this study provides more accurate and reliable estimates of the size of the informal economy. These estimates are consistent with other locally and internationally published studies on the same topic. These estimates will prove to be helpful for the policy makers to have a clear glimpse of the macroeconomic structure of the economy from a better position. These estimates also provide the basis for adjustment of the underestimated key macro economic variables which have direct implications at micro level. The difference among the estimates through different approaches enables us to analyze the behavioral as well as structural growth of the informal economy by capturing the impact of its legal and illegal parts, both separately and jointly.

On the basis of labor market approach and electricity consumption approach, the impact of cottage industry and small-scale manufacturing industries (generally not registered) on the growth of informal economy is highlighted. The labor market approach also helps conclude that the role of the informal economy is ambiguous in terms of alleviating poverty. During high inflationary period, it is unable to stop the severity of poverty. It also contributes towards income inequality in real terms through two ways; first; by keeping incomes low, second; stimulating inflation. High instability in the employment and income generation in the informal economy is found on the basis of our analysis.

Through MIMIC approach, corruption and size of the government turn out to be highly significant in explaining the size of the informal economy (as % of GDP). Since the values are quite high for each year than average estimates obtained using other variables. This difference leaves room for further research to capture and analyze the full impact of corruption along with the size of the government on the growth of the informal economy.

On the basis of our analyses and reviewed literature, the main causes/factors of the informal economy include; cultural constraints, high ratio of per-capita income to the highest currency denomination note, low literacy rate, high cost of doing business, devaluation of currency, transfer of money through hundi, low growth rate of public sector development expenditures and their judicious use in the right direction and current structure of financial system both in terms of growth and service delivery. Factors which may add to the potential expansion of the informal economy in future include; recent destruction of water bomb, imposition of new GST/VAT system, decreasing rate of general purchasing power, increasing rate of cross border smuggling, price hike of electricity and petroleum goods, weak law enforcement and increasing corruption.

In our analysis above, certain implications of the informal economy in terms of achieving the goal of stable inclusive growth and development are identified and discussed. Informal economy plays an ambiguous role in poverty alleviation and income inequality. It restricts the effective public policy implementation through its operations. It is also responsible for keeping the country on one of the last positions in the competition under the age of globalization and free markets.

Under the current system, the informal economy will pose a big constraint on the true implementation of the 7th NFC Award and the 18th Amendment in terms of reaping full benefits through their well defined objectives. To eliminate this constraint, there is a pressing need of reviewing the criteria of evaluating the public sector development programs both at federal and provincial levels. The criteria must ascertain that the future development programs especially in the flood hit areas will create an opportunity for regular nature of business, where the ownership belongs to the residents and that the business further generates permanent types of jobs and competitive levels of income.

To achieve the objective of tax to GDP ratio up to 15%-20%, the implementation policy of new GST/VAT must incorporate the informal sector through its identification and its operations to collect the taxes to the potential level. In order to eliminate the capital constraints from cottage industry and SMEs, thus bringing them under the umbrella of formal sector, there is a need to revamp the criteria of financial system to extend the loans on the basis of shake-hand rather than on collateral basis. It will certainly lead to significant expansion in the tax net. There is an incessant need to review the education policy and its implementation which should guarantee providing professional as well as technical/vocational education to the needy people, so that they can work in the formal sector and contribute towards the tax toll after

getting handsome wages. In order to contrive some of the illegal part of the informal economy, the high denomination currency notes may be reduced from a 5000 rupee note to its initial level of a1000 rupee note.

To achieve our national goal of inclusive growth and socio-economic development, the public policy may be devised with the sole objectives of increasing Tax to GDP ratio through expanding the tax base and plugging the tax leakages. The policy may also ensure a team of competent and honest people which may use those government funds in the most efficient and prudent manner to achieve the maximum social and economic welfare. These ultimate targets can be achieved through three intermediary targets: first, formalizing the informal economy while retaining all its positive impacts and during this, searching for competent and honest people from the grass root levels; second, stopping the generation of informal income from within the formal sector; third, to stop the informal/improper implementation of rules and regulations within the formal sector. These three intermediary targets are explained further.

On the basis of the results and their analyses, it is evident that the informal sector is much faster in generating employment than that of formal sector. However, this employment is generally temporary or seasonal and low paid. So there is a need of policy intervention which assures retaining all the positive facts of the informal economy and in the next stage, it help in formalizing it through institutionalizing its backward and forward linkages with the formal sector on all spheres. Since, Pakistan is a multi-cultural land characterized by different geological features and geographical facts, so the policy intervention should be made according to the nature of the growth of informal economy in each district of Pakistan. For example, it is expected that the dominant factor of the informal economy in the bordering areas may be smuggling and in rural areas, dominant factors may be low capital, child labour, and exploitation of labour in those factories or companies working in informal sector. In formal sectors, the policy intervention may revise the regulatory framework with the objective of stopping the generation of informal income in terms of corruption, white-Collar Crime and unbridled powers with the higher hierarchy in formal sector. Third one is the proper implementation of rules and regulations within the formal sector. For example, NHA has benefited with the extra amount of billions of rupees from the source of Toll Tax by privatizing them through open bidding in a highly competitive and transparent manner. It explains the simple fact that earlier the implementation of regulations to collect toll tax was either naïve or insufficient to meet the on ground realities and requirements. The policy interventions only in formal sector in the above said two dimensions will enhance both efficiency as well as add significant percentage of the overall GDP to the Tax Toll.

The first step in devising such a public policy as explained above may be to conduct applied research to understand the characteristic nature of growth phenomenon of the informal economy and informal generation of wealth within the formal sector at disaggregated levels including socio-

geographical locations and different administrative levels (i.e. federal, provincial, district levels etc) respectively.

The above discussion brings us to the conclusion that the public policy may be devised in a manner to focus on the economy at district level with the sole objectives of increasing maximum tax from that district and searching for a team of competent and honest people through achieving intermediary targets, thereby bringing each district to maximum self sufficiency level and put a positive competition among all districts of Pakistan in terms of socio-economic growth and welfare, which is the true essence of fiscal federalism and empowering the provinces in the perspective of two historic breakthroughs (i.e. 18th Amendment and 7th NFC Award) in the history of Pakistan.

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Appendix

Table 1: Description of Variables

Sr. No.	Variable Name	Description	Source
1	CIC	Currency in Circulation: This variable is used in calculation of currency demand variable	SBP, Annual Report, Various Issues
2	TB	Tax Burden: It is computed as total taxes to GDP ratio	MOF, Pakistan Economic Survey, Various Issues
3	Y	Formal Sector GDP: Gross Domestic Product (market prices with base 1999-00)	MOF, Pakistan Economic Survey, Various Issues
4	R	Interest Rate: Weighted Average Lending Rate	SBP, Annual Report, Various Issues
5	DD	Demand Deposits: Non-interest bearing financial instruments (Banking Deposits)	SBP, Annual Report, Various Issue
6	BS	Banking Services: Total Deposits/Total number of Bank accounts	SBP, Annual Report, Various Issue
7	F	Financial Development: Broad Money to GDP Ratio	SBP, Annual Report, Various Issue
8	SOG	Size of Government: Proxies as a ratio of total expenditure to GDP ratio	MOF, Pakistan Economic Survey, Various Issues
9	INF	Inflation Rate: It is calculated as growth rate of Consumer Price index in percent	FBS, Pakistan
10	Openn	Openness: Proxies as total trade to GDP ratio	MOF, Pakistan Economic Survey, Various Issues
11	Elect. Consumption	Total Electricity Consumption	MOF, Pakistan Economic Survey, Various Issues
12	EOF	Economics of Freedom Index	Heritage Foundation[*]
13	Corrupt	Corruption Index	World Bank Indicators, WDI-CD Version 2010
14	H	Literacy Rate: A Proxy of Human Capital	World Bank Indicators, WDI-CD Version 2010
15	LF	Labor Force	MOF, Pakistan Economic Survey, Various Issues
16	UR	Unemployment Rate	MOF, Pakistan Economic Survey, Various Issues
17	POP	Total Population (Millions in Rupees)	MOF, Pakistan Economic Survey, Various Issues

Note: SBP: State Bank of Pakistan; MOF: Ministry of Finance; FBS: Federal Bureau of Statistics
[*]William Beach and T. Kane, (2008), "*Methodology; Measuring the 10 Economic Freedoms*", Index of Economic Freedom, Heritage Foundation

Table 2A: Ratio of Per-Capita Income (in Local Currencies) with High Currency Denomination Note

Country	Per Capita Income (y)	High Currency Denomination (d)	Ratio (y/d)
US	47000 ($)	100	470
UK	2400 (GBP)	50	48
JAPAN	4000000 (Yen)	10000	400
BRAZIL	16000 (Real)	100	160
CHINA	22000 (CNY)	100	220
INDIA	47000 (IRs.)	1000	47
PAKISTAN	89994.65 (PRs).	5000	18

Source: Country Specific Central Banks.

Table 2B: Ratio of Per-Capita Income (in Pakistan Rupees) with High Currency Denomination Note

Country	Per Capita Income (y) (In Pak Rupees)	High Currency Denomination (d)	Ratio (y/d)
US	4043736.65	8603.70	469.99
UK	327681.79	6826.70	48
JAPAN	4206563.06	10516.41	399.99
BRAZIL	823975.53	5149.85	159.99
CHINA	284043.65	1291.11	219.99
INDIA	90965.75	1935.44	47
PAKISTAN	89994.65	5000	17.99

Source: Country Specific Central Banks.

Table 2C: Per-Capita Per Month Money Holding (Pak Rs.)

Per Year Per-Capita income	89994.65
Per-Capita per month average money holding	3749.777

Table 2D: Steps Involved In Calculating the Informal Sector as a Percentage of Overall GDP through Labor Market Approach for Unpaid Family Workers and Self-Employed Workers

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- ➤ A = Take values for employed civilian labour force for total and female (10-14 year bracket)

- ➤ B= Divide values of employed civilian labour force with 100 (A/100)

- ➤ C = Take values of total employed labour force (in millions) for the years mentioned above

- ➤ D = Multiply total employed labour force with employed civilian labour force (C*B)

- ➤ Rest of the labour force employed in other age limits D'= C-D

- ➤ E = Collect the data for unpaid family workers for both sexes and female from labour force surveys

- ➤ F= Divide values of unpaid family workers with 100

- ➤ G= Unpaid family workers in informal sector = D'*F

- ➤ Unpaid family workers in formal sector = E-G

- ➤ H = Add the unpaid family workers in informal sector with the workers of 10-14 age bracket

- ➤ I = Calculate the total per capita income by dividing total GDP to total labour force employed in that year

- ➤ J = Per capita income of unpaid family workers in informal sector = H*I

- ➤ Informal sector as %age of overall GDP = (per capita income of informal economy/total GDP)*100

Table 3: Estimation Results of Monetary Approach

Dependent Variable: CFM2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-72.858	19.016	-3.831	0.001
TY	2.687	1.300	2.068	0.053
INF	0.216	0.129	1.677	0.110
POP	22.113	5.313	4.162	0.001
CFM2(-1)	0.252	0.156	1.615	0.123
DD	8.785	2.243	3.916	0.001
BS	10.389	3.270	3.177	0.005
Y	-0.018	0.291	-0.062	0.952
R	1.287	0.405	3.176	0.005

Diagnostic Tests:			
R-squared	0.856865	Mean dependent var	33.31071
Adjusted R-squared	0.796598	S.D. dependent var	5.333016
S.E. of regression	2.405198	Akaike info criterion	4.848233
Sum squared resid	109.9146	Schwarz criterion	5.276442
Log likelihood	-58.87526	Hannan-Quinn criter.	4.979141
F-statistic	14.21773	Durbin-Watson stat	2.330675
Prob(F-statistic)	0.000002		

Figure A1: Informal Economy (as % of GDP) through Monetary Appraoch
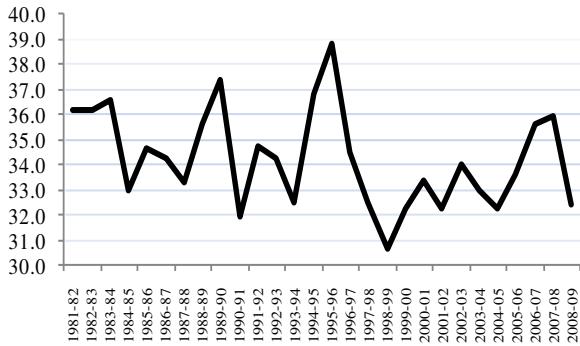
Figure A2: Tax Evasion (as % of GDP) through Monetary Appraoch
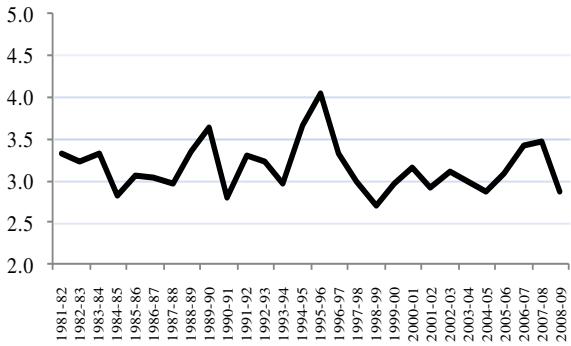
Table 4: Results of DOLS Using Maximum Likelihood Approach

Dependent Variable: CM

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant Term	36.324	3.454	10.517	0.000
Tax Burden	1.557	0.294	5.296	0.000
Human Capital	0.062	0.047	1.339	0.190
Interest Rate	-0.622	0.105	-5.904	0.000
Financial Development	-0.801	0.081	-9.839	0.000

DOLS Regression Residuals
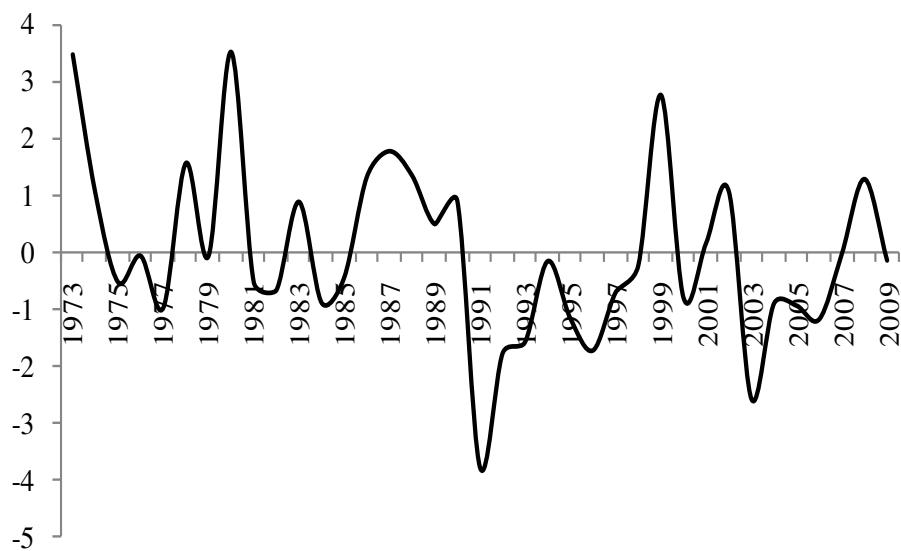
Table 5: Estimation Results of MIMIC Approach[7]

Sr. No.	Cause Variables	Model A		Model B		Model C	
		Estimates	p-values	Estimates	p-values	Estimates	p-values
1	Tax Burden	-0.971	0.003	0.674	0.163	1.373	0.046
2	Unemployment	0.044	0.777	-0.376	0.094	---	---
3	Openness	-0.082	0.018	-0.098	0.238	---	---
4	Inflation	0.203	0.017	-2.144	0.165	---	---
5	Size of Government	---	---	---	---	0.434	0.000
6	Economic of Freedom	0.120	0.821	-0.104	0.423	---	---
8	Corruption	---	---	---	---	1.913	0.011
Sr. No.	**Indicator Variables**						
1	Currency Demand	0.353	0.000	-0.058	0.075	0.700	0.000
2	Electricity Consumption	---	---	---	---	1.000	---
4	Male Labor-Force Participation	1.000	---	---	---	---	---
5	Growth Rate in Labor-Force	---	---	1.000	---	---	---
Sr. No.	**Model Diagnostics[8]**						
1	Global Goodness of Fit[9]	0.793		0.479		0.829	
2	Adjusted Goodness of Fit[10]	0.760		0.397		0.814	
3	Average Log Likelihood	-1.528		-1.964		-6.012	
4	Determinant Residual Covariance	1.927		8.855		95.254	

Note: Authors Calculations

Figure A3: Informal Economy (as % GDP) through MIMIC Approch

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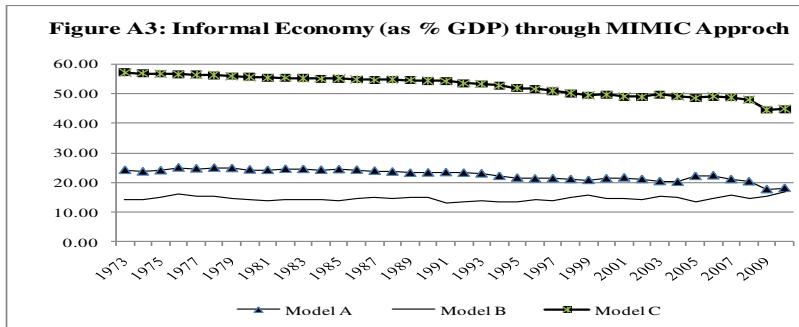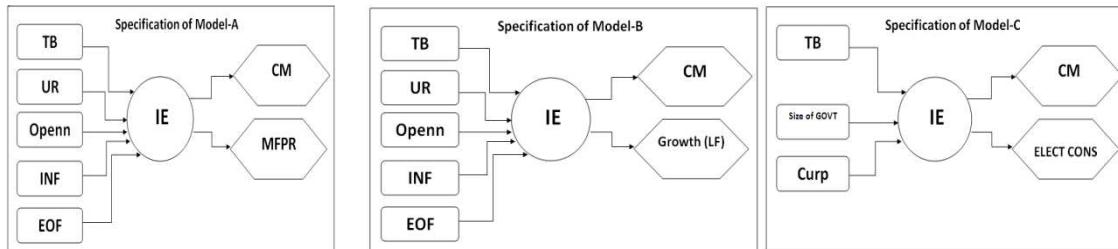
[7] The estimations have been made with the software E-VIEWS 6.0 and LISREL 8.8 (Student version available on internet)
[8] The degrees of freedom are determined by 0.5(q+p)(q+p+1)-t, where p=number of indicators, p=numbers of causes, t=number of free parameters.
[9] P-value for Test of Close Fit (RMSEA<0.05). + means good fitting (p-value>0.05).
[10] Adjusted goodness-of-fit index, AGFI. This indicator takes values into the interval [0, 1].

Table 6: Labor Market Estimation of Informal Economy (as % of GDP)

		Unpaid Family Helpers	Self Employed	Total as % of GDP
2002	**Total**	**24.225**	**41.145**	**65.369**
	Female	10.695	7.029	17.724
	Male	13.530	34.115	47.645
2003	**Total**	**25.982**	**40.640**	**66.622**
	Female	12.251	7.052	19.303
	Male	13.731	33.588	47.319
2004	**Total**	**27.732**	**40.034**	**67.766**
	Female	13.804	7.033	20.837
	Male	13.928	33.001	46.929
2005	**Total**	**29.381**	**39.460**	**68.841**
	Female	13.401	5.839	19.240
	Male	15.981	33.621	49.601
2006	**Total**	**31.018**	**38.606**	**69.623**
	Female	13.000	4.522	17.521
	Male	18.018	34.084	52.102
2007	**Total**	**30.902**	**37.807**	**68.709**
	Female	13.853	4.295	18.148
	Male	17.049	33.512	50.561
2008	**Total**	**32.621**	**37.571**	**70.191**
	Female	14.788	4.324	19.112
	Male	17.833	33.246	51.079
2009	**Total**	**20.717**	**36.492**	**57.210**
	Female	11.605	4.355	15.960
	Male	9.113	32.137	41.250
2010*	**Total**	**18.232**	**34.565**	**52.780**
	Female	10.122	4.215	14.337
	Male	8.110	30.350	38.460

Note: Author Estimates based on Labor Force Survey Data
*Projections.

Table 7: Informal Economy (as % of GDP), Estimates Using Various Approaches

Year	Elec. Cons	DOLS	MIMIC[*]	Monetary Based	Labor Force
1973	---	27.656	31.830	---	---
1974	30.675	26.555	31.555	---	---
1975	38.342	26.954	31.954	---	---
1976	43.395	27.539	32.539	---	---
1977	46.344	27.135	32.135	---	---
1978	54.828	27.130	32.13	---	---
1979	56.478	26.773	31.773	---	---
1980	50.079	26.318	31.318	---	---
1981	47.791	26.173	31.173	---	---
1982	51.493	26.413	31.413	36.197	---
1983	56.930	25.653	31.277	36.197	---
1984	52.962	21.825	31.137	36.597	---
1985	57.120	25.971	31.149	32.985	---
1986	62.195	31.015	31.18	34.62	---
1987	57.697	26.570	31.127	34.232	---
1988	52.502	21.568	30.934	33.27	---
1989	51.352	20.454	30.898	35.601	---
1990	55.537	24.739	30.798	37.404	---
1991	46.651	16.476	30.175	31.947	---
1992	46.460	16.443	30.017	34.767	---
1993	56.671	26.693	29.978	34.28	---
1994	44.088	14.611	29.477	32.511	---
1995	43.385	14.366	29.019	36.798	---
1996	51.027	21.996	29.031	38.839	---
1997	47.615	18.884	28.731	34.523	---
1998	54.130	25.356	28.774	32.464	---
1999	49.662	20.990	28.672	30.65	---
2000	58.444	29.887	28.557	32.229	---
2001	56.561	28.145	28.416	33.414	---
2002	60.953	32.850	28.103	32.229	24.225
2003	55.328	26.850	28.478	34.038	25.982
2004	50.814	22.746	28.068	32.985	27.732
2005	49.567	21.510	28.057	32.276	29.381
2006	50.087	21.475	28.612	33.605	31.018
2007	50.975	22.419	28.556	35.601	30.902
2008	36.117	20.345	27.575	35.948	32.621
2009	37.199	19.234	25.867	32.417	20.717
2010	47.627	18.234	26.630	30.554	18.232

*Average estimates of three MIMIC models.

Table 8: Comparison of Pakistan's Informal Economy (as % of GDP) with other studies

	Schneider, Büehn and Montenegro (2010)	Gulzar *et al.* (2010)	Gulzar *et al.* (2010)	Arby *et al.* (2010)	Arby *et al.* (2010)
	MIMIC	MIMIC*	Average**	MIMIC	Average***
1999	37.0	28.7	33.8	29.3	31.0
2000	36.8	28.6	40.2	29.3	26.0
2001	37.0	28.4	39.4	29.3	26.7
2002	36.8	28.1	37.6	29.2	27.5
2003	36.2	28.5	35.5	29.1	28.6
2004	35.3	28.1	33.6	28.9	26.0
2005	34.9	28.1	33.2	28.6	22.7
2006	33.8	28.6	34.0	28.7	22.5
2007	33.6	28.6	35.0	28.8	18.2
2008	---	27.6	31.3	28.9	24.1
2009	---	25.9	27.4	---	---
2010	---	26.6	28.7	---	---

* Average of three Model Specifications

**Average estimates of all other four approaches [Monetary Approach, Modified Monetary Approach DOLS, Electricity Consumption, Labor Force Survey Approach

***Average Estimates of two approaches [Modified Monetary Approach using ARDL and Electricity Consumption Approach]

Figure A4: MIMIC estimates comparision of three studies

•••■••• Schneider, Büehn and Montenegro (2010)   ■ Gulzar et al. (2010)   ▲ Arby et al. (2010)
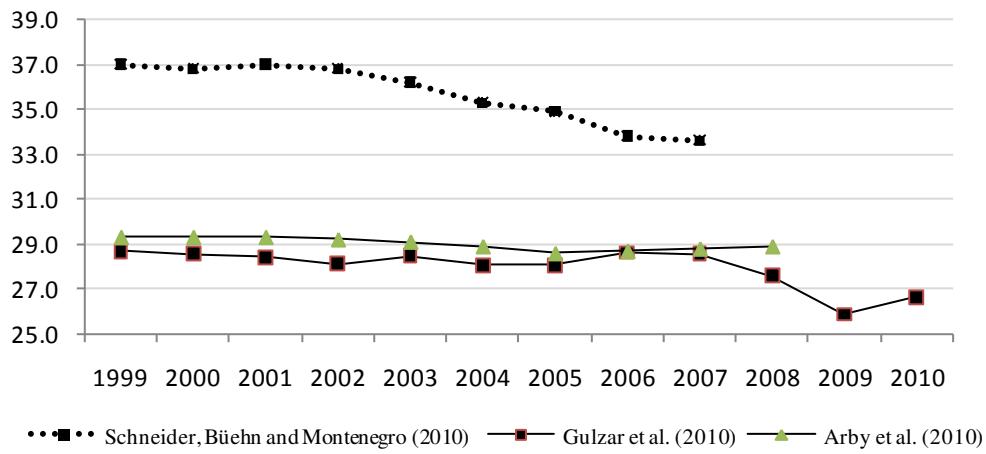
Table 9: Income Growth Rates in Formal and Informal Sectors In Relation with GDP Growth Rates

YEAR	POSITION*			ANALYSIS			HYPOTHESIS
	1	2	3	1	2	3	
2002	Informal	Formal	GDP	Major Decrease	Major Increase	Increase	True
2003	Informal	Formal GDP		Major Increase	Equal Increase		True
2004	Informal	Formal	GDP	Major Decrease	Major Increase		True
2005	Informal	GDP	Formal	Slight Increase	Slight Increase	Major Decrease	False
2006	Informal	GDP	Formal	Major Decrease	Decrease	Major Decrease	True
2007	Formal	GDP	Informal	Major Increase	Slight Increase	Major Decrease	True
2008	Formal	Informal	GDP	Major Decrease	Slight Increase	Slight Decrease	True
2009	Informal	Formal	GDP	Major Increase	Slight Increase	Decrease	False

*Sequence from 1 to 3 showing a declining trend
* Base Year: 2001

Note: (M.I: major increase, M.D: major decrease, D: decrease, I: increase, S.D: slight decrease, S.I: slight increase, E.I: equal increase, Mild I: mild increase, Mild D: mild decrease)

Table 10: Employment Growth in Formal and Informal Sectors in Relation with GDP Growth Rates

YEAR	POSITION*			ANALYSIS			HYPOTHESIS
	1	2	3	1	2	3	
2002	Formal	GDP	Informal	Major Increase	Slight Increase	Decrease	True
2003	Informal	GDP	Formal	Increase	Slight Increase	Major decrease	False
2004	GDP	Informal	Formal	Slight Increase	Major Increase	Slight Decrease	False
2005	GDP	Informal	Formal	Slight Increase	Slight Increase	Major decrease	False
2006	GDP	Formal	Informal	Decrease	Major Increase	Major decrease	True
2007	Formal	Informal	GDP	Major Increase	Major Increase	Slight Increase	True
2008	GDP	Informal	Formal	Slight Decrease	Major decrease	Major decrease	True
2009	Informal	GDP	Formal	Slight Increase	Slight Decrease	Increase	False

*Sequence from 1 to 3 showing a declining trend
* Base Year: 2001

Note: (M.I: major increase, M.D: major decrease, D: decrease, I: increase, S.D: slight decrease, S.I: slight increase, E.I: equal increase, Mild I: mild increase, Mild D: mild decrease)

Fig A5: Real GDP Growth Rates, Growth Rates of Employed Labor force in Formal and Informal Sectors
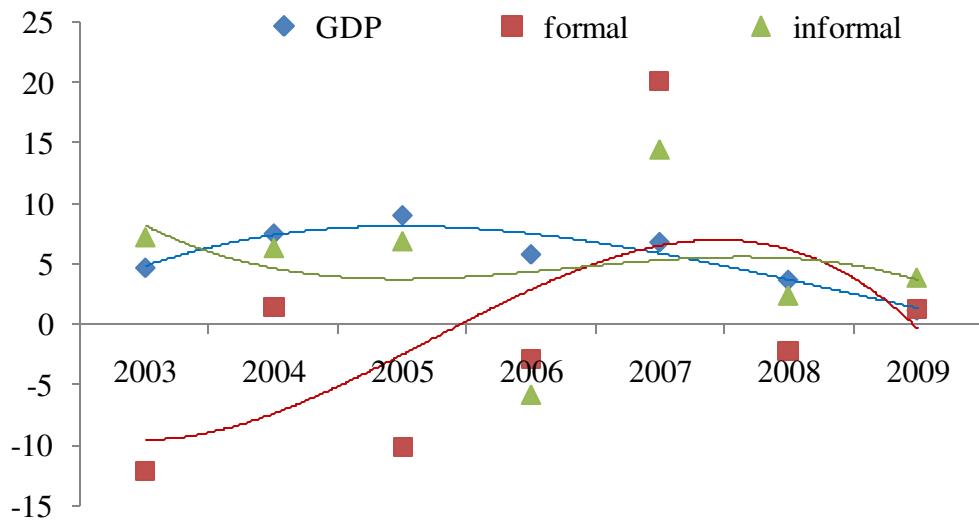
Fig A6: Real GDP Growth Rates, Growth Rates of Yearly Average income in Formal and Informal Sectors

-42-
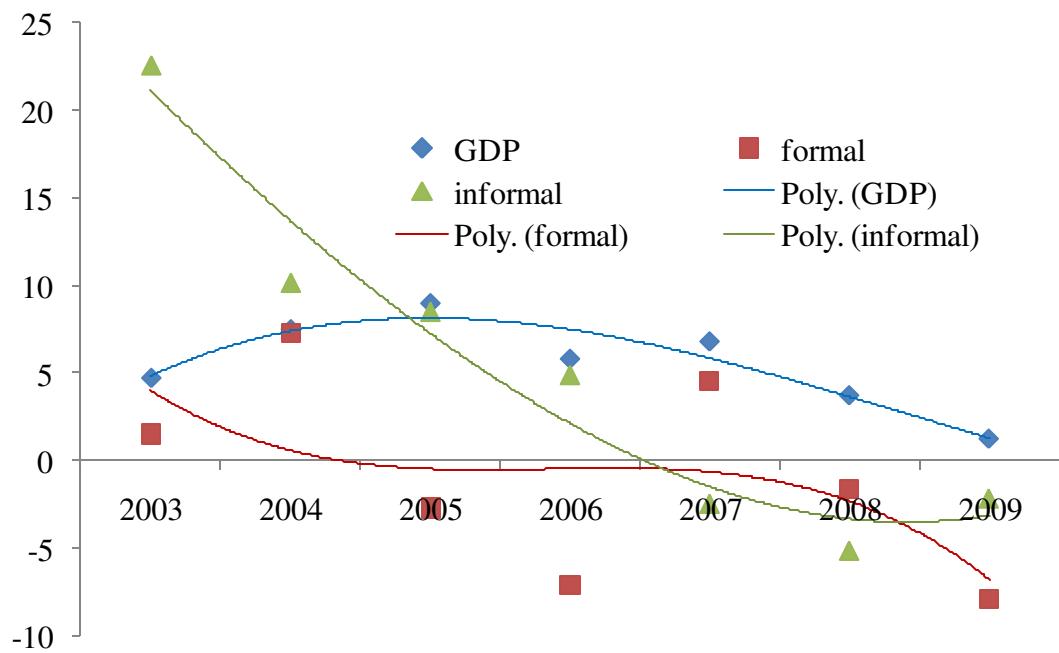
Table 11A: Employment Shares in Million

Years	2002	2003	2004	2005	2006	2007	2008	2009	Max	Min	Range	Stdev	Mean
Non-Agriculture	22.96	23.04	24.16	24.59	23.37	27.11	27.41	28.28	28.28	22.96	5.33	2.15	25.11
Formal Sector	8.13	7.15	7.26	6.53	6.34	7.62	7.45	7.55	8.13	6.34	1.79	0.59	7.25
Informal Sector	14.82	15.89	16.90	18.07	17.02	19.49	19.96	20.73	20.73	14.82	5.91	2.07	17.86

Disaggregation of Employment Shares (Millions) In Informal and Formal Sectors

Formal Sector

	2002	2003	2004	2005	2006	2007	2008	2009	Max	Min	Range	Stdev	Mean
Mining and Quarrying	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.06	0.03	0.03	0.01	0.04
Large Scale Manufacturing	5.40	4.84	4.64	4.17	4.43	4.94	4.42	5.09	5.40	4.17	1.22	0.40	4.74
Electricity, Gas and Water	0.32	0.30	0.28	0.29	0.27	0.36	0.35	0.36	0.36	0.27	0.09	0.03	0.32
Public Sector Construction	0.55	0.69	0.85	0.78	0.66	1.15	1.34	1.21	1.34	0.55	0.79	0.29	0.90
Finance and Insurance	0.35	0.39	0.45	0.47	0.45	0.55	0.70	0.28	0.70	0.28	0.41	0.13	0.46
Transport and Communication	1.49	0.91	1.01	0.79	0.48	0.56	0.59	0.55	1.49	0.48	1.00	0.34	0.80

Informal Sector

	2002	2003	2004	2005	2006	2007	2008	2009	Max	Min	Range	Stdev	Mean
Small Scale Manufacturing	0.09	0.51	1.19	1.84	1.28	1.34	1.45	1.68	1.84	0.09	1.75	0.59	1.17
Wholesale and Retail Trade	5.89	6.00	6.28	6.37	6.05	7.16	7.81	7.32	7.81	5.89	1.92	0.72	6.61
Private Sector Construction	1.85	1.72	1.62	1.80	1.86	2.00	1.78	2.20	2.20	1.62	0.57	0.18	1.85
Social and Personal Services	6.14	6.17	6.37	6.34	5.92	6.93	6.76	1.33	6.93	1.33	5.60	1.82	5.75
Others (activities not defined)	0.00	0.01	0.02	0.02	0.02	0.03	0.05	5.64	5.64	0.00	5.64	1.99	0.72
Transport and Communication	0.85	1.48	1.42	1.69	1.89	2.03	2.11	2.56	2.56	0.85	1.71	0.52	1.75

Table 11B: Average Yearly Income (Rs.) / Yearly Per-Capita Income

Years	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	Mean
Agriculture	24023.41	24383.7	24749.4	26353.92	27958.44	29562.96	91707.12	86835.48	81963.8	83174.94	50071.32
Non agriculture	28361.2	32506.37	37251.24	41809.06	47384.23	52688.85	55709.54	60848.95	65981.9	75348.98	49789.03
Formal Sector	37895.31	42639.99	48567.84	50831.62	56996.62	60589.35	60717.93	68410.48	75367.5	83838.51	58585.52
Informal Sector	18827.09	22372.75	27097.44	33478.52	37771.84	44788.34	50701.16	53287.43	56596.2	66859.44	41178.02

Formal Sector

	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	Mean
Mining and Quarrying	28448.17	35848.16	45173.04	50662.92	56152.8	61642.68	52519.44	74181.48	95843.5	115628.1	61610.03
Large Scale Manufacturing	7559.84	19518.70	31477.56	38244.40	45011.24	51778.08	51801.96	63525.00	75248.04	87206.90	47137.17
Electricity, Gas and Water	40132.87	49523.55	61111.56	78605.56	96099.56	113593.6	79700.88	90608.76	101517	120766.3	83165.92
Public Sector Construction	12786.45	21035.09	29283.72	35025.92	40768.12	46510.32	42910.92	52000.98	61091.04	69339.67	41075.22
Finance and Insurance	93063.42	96093.21	99221.64	105096.3	110970.9	116845.6	165952	165091.7	164231	169409.6	128597.56
Transport and Communication	27544.35	35384.41	43224.48	47448.08	51671.68	55895.28	63692.88	70434.24	77175.60	85015.67	55748.67

Informal Sector

	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	Mean
Small Scale Manufacturing	7559.84	19518.70	31477.56	38244.40	45011.24	51778.08	51801.96	63525.00	75248.04	87206.90	47137.17
Wholesale and Retail Trade	33653.65	40364.08	48412.56	51969.52	55526.48	59083.44	53106.48	72244.08	91381.7	106573.7	61231.56
Private Sector Construction	12786.45	21035.09	29283.72	35025.92	40768.12	46510.32	42910.92	52000.98	61091.04	69339.67	41075.22
Social and Personal Services	27416.3	32659.45	38905.32	45725.24	52545.16	59365.08	58279.2	69311.28	80343.4	93241.7	55779.21
Others	20511.02	24581.49	29459.76	40923.96	52388.16	63852.36	98838.36	76525.62	54212.9	63190.05	52448.36
Transport and Communication	27544.35	35384.41	43224.48	47448.08	51671.68	55895.28	63692.88	70434.24	77175.60	85015.67	55748.67

Table 12: Employment Shares (%)

Year	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non-Agriculture	57.91	56.94	56.95	56.9	56.63	56.39	55.35	54.92
Formal Sector	20.52	17.67	17.11	15.1	15.37	15.85	15.05	14.66
Informal Sector	37.39	39.27	39.84	41.8	41.26	40.54	40.3	40.26

Disaggregation of Employment Shares (%) in Formal and Informal Sectors

Formal Sectors

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Mining and Quarrying	0.07	0.07	0.07	0.08	0.09	0.11	0.12	0.12
Large Scale Manufacturing	13.61	11.95	10.93	9.65	10.74	10.28	8.92	9.88
Electricity, Gas and Water	0.81	0.74	0.67	0.67	0.66	0.75	0.70	0.69
Public Sector Construction	1.39	1.70	2.00	1.81	1.61	2.40	2.70	2.35
Finance and Insurance	0.89	0.98	1.06	1.08	1.10	1.14	1.41	0.55
Transport and Communication	3.75	2.24	2.38	1.82	1.17	1.17	1.20	1.07

Informal Sectors

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Small Scale Manufacturing	0.23	1.26	2.80	4.25	3.11	2.78	2.92	3.27
Wholesale and Retail Trade	14.85	14.83	14.80	14.74	14.67	14.90	15.77	14.22
Private Sector Construction	4.66	4.25	3.83	4.18	4.52	4.16	3.59	4.27
Community, Social and Personal Services	15.50	15.26	15.01	14.68	14.35	14.41	13.66	2.58
Others (activities not defined)	0.00	0.03	0.05	0.05	0.04	0.07	0.10	10.95
Transport and Communication	2.15	3.66	3.35	3.91	4.57	4.22	4.26	4.97

Table 13: Growth Rates of Employed Labor force (%)

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non-Agriculture	0.38	4.84	1.80	-4.99	16.01	1.12	3.19
Formal Sector	-12.09	1.50	-10.08	-2.83	20.14	-2.18	1.30
Informal Sector	7.23	6.34	6.90	-5.77	14.47	2.41	3.90

Growth Rates of Employed Labor force by Economic Activity in Formal and Informal Sectors (%)

Formal Sector

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Mining and Quarrying	2.09	4.82	16.44	7.40	42.40	12.38	4.00
Large Scale Manufacturing	-10.36	-4.13	-10.05	6.25	11.52	-10.61	15.19
Electricity, Gas and Water	-6.73	-5.10	1.13	-5.25	32.39	-3.85	2.51
Public Sector Construction	24.50	23.68	-8.05	-14.85	73.67	15.89	-9.48
Finance and Insurance	11.84	13.96	3.81	-2.77	20.74	27.42	-59.43
Transport and Communication	-39.02	11.37	-22.09	-38.63	16.51	5.66	-7.27

Informal Sector

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Small Scale Manufacturing	459.30	132.93	54.65	-30.14	4.14	8.20	16.46
Wholesale and Retail Trade	1.92	4.64	1.44	-4.96	18.33	9.03	-6.22
Private Sector Construction	-7.00	-5.43	11.06	3.35	7.23	-11.10	23.70
Community Social and Personal Services	0.48	3.13	-0.35	-6.68	16.99	-2.35	-80.36
Others (activities not defined)	0.00	109.64	-8.30	-15.14	103.88	47.17	11287.82
Transport and Communication	73.80	-4.06	18.92	11.58	7.58	3.99	21.33

Table 14: Growth Rates of Average Yearly Income of Employed Labor force (%)

	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non agriculture	8.86	8.38	1.76	-2.03	1.35	-3.19	-5.44
Formal Sector	1.51	7.23	-2.72	-7.14	4.54	-1.64	-7.89
Informal Sector	22.62	10.17	8.51	4.89	-2.48	-5.17	-2.18

Growth Rates of Average Yearly Income of Employed Labor force (%) by Economic Activity in Formal and Informal Sectors

Formal Sector							
Mining and Quarrying	8.78	5.99	0.46	-21.05	31.06	15.35	-0.10
Large Scale Manufacturing	-3.01	-4.37	-8.48	-7.34	-7.21	-10.72	-17.20
Electricity, Gas and Water	24.76	16.91	8.17	-34.99	5.49	0.03	-1.50
Public Sector Construction	-3.01	-4.37	-8.48	-7.34	-7.21	-10.72	-17.20
Finance and Insurance	2.74	0.97	-3.64	31.60	-7.69	-11.18	-14.59
Transport and Communication	-3.01	-4.37	-8.48	-7.34	-7.21	-10.72	-17.20
Informal Sector							
Small Scale Manufacturing	-3.01	-4.37	-8.48	-7.34	-7.21	-10.72	-17.20
Wholesale and Retail Trade	4.12	2.17	-2.62	-16.71	26.23	12.93	-3.43
Private Sector Construction	-3.01	-4.37	-8.48	-7.34	-7.21	-10.72	-17.20
Social and Personal Services	14.00	9.89	3.39	-9.03	10.35	3.49	-3.90
Others (activities not defined)	34.74	22.42	11.54	43.43	-28.16	-36.75	-3.48
Transport and Communication	-3.01	-4.37	-8.48	-7.34	-7.21	-10.72	-17.20

Table 15A: Employment Share (%)

	Fast Growth Period						Slow Growth Period	
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non-Agriculture	57.91	56.94	56.95	56.9	56.63	56.39	55.35	54.92
Formal Sector	20.52	17.67	17.11	15.1	15.37	15.85	15.05	14.66
Informal Sector	37.39	39.27	39.84	41.8	41.26	40.54	40.3	40.26

Source: Labour Force Survey (various issues)

Table 15B: Deflated Average Yearly Income* (Rs.)

	Fast Growth Period						Slow Growth Period	
	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Non- Agriculture	35977.63	39165.39	42447.57	43194.66	42319.62	42890.64	41524.14	39264.71
Formal Sector	46907.32	47617.44	51058.51	49671.54	46124.22	48220.54	47430.79	43688.65
Informal Sector	25047.93	30713.34	33836.63	36717.77	38515.01	37560.74	35617.49	34840.77

*Deflated by CPI

Table 16: Average Growth Rates (%)				
	GDP	Informal Economy	Tax Evasion	Total Taxes
1983-90	5.93	6.47	7.44	13.33
1991-00	4.41	3.32	3.60	13.13
2001-07	5.55	7.15	7.98	13.72
2008-09	2.45	-2.09	-5.45	17.08

Table 17 : Regression Results

Dependent Variable:	Growth rate of Informal Economy			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.004	1.30	0.003	0.990
Rate of Return on Advance	-0.160	0.06	-2.531	0.019
Inflation	-0.080	0.03	-2.321	0.030
GDP growth rate	0.200	0.07	2.645	0.015
Corruption	-0.026	0.01	-1.656	0.112
Tax Evasion growth rate	0.579	0.01	47.22	0.000
Diagnostic Tests:				
R-squared	0.99	Mean dependent var		4.845
Adjusted R-squared	0.992	S.D. dependent var		7.83
S.E. of regression	0.68	Akaike info criterion		2.268
Sum squared resid	9.79	Schwarz criterion		2.556
Log likelihood	-24.62	Hannan-Quinn criter.		2.35
F-statistic	680.8	Durbin-Watson stat		2.013
Prob(F-statistic)	0.0001			

Table 18: Province-Wise Flood Affected Areas (000 Acres)	
Punjab	1200
Sindh	1400
KPK	200
Balochistan	532
AJK	64
Gilgit	21.9
Total	3417.9

Total Losses only on crops: Rs. 501.923 billion

Total funds required for disbursement : Rs.8.200 billion

Source: Ministry of Food, Agriculture & Livestock.