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THE REAL SIZE OF UNDERGROUND ECONOMY: A Case of Pakistan

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Informal economy is an observable issue around the globe. Researchers of both the developed and developing countries are continuously investigating its different dimensions (size, determinants, etc). The current study is an attempt to estimate the real size of informality (underground economy) in Pakistan. For its estimation the real factors of economy like employment level, political stability, tax to GDP ratio and cost of working in informal economy are used, over a period (Time series) of 1972 to 2010. HP-Prescott filter method is utilized for obtaining the potential GDP and actual GDP series from the estimated GDP which is estimated through Feasible Generalized Least Square (FGLS)[1] and then from these series informal GDP is estimated. About 71 per cent of the informality was found, in the case of Pakistan economy. The finding suggests that combating informality, the factors taken must be targeted properly.

I. Introduction and Literature

The existing research provides different names for conventional economy like 'informal, underground, shadow, black, second economy, etc. The definition of this type of economy is also diversified; Feige (1989) defines it that due to tax avoidance and benefits from fraud even legal production and distribution of goods and services in nature were done illegally. The International labor Organization [ILO (1991)] focused on employment sector and says that a small size units (producing and distributing) of goods and services consist of self-employed workers and workers from both the rural and urban areas. Mostly these units are not registered with officials and remain unrecorded from government statistics; they are named as informal economy. Almost all definitions are targeting the economic activities that are kept hidden form the government record. Therefore, in general we can define informal economy as 'economic ac-

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1 Methodology of the paper is taken from the M.Phil thesis (completed) of the first author.

tivities and earning of either a single person, firm, etc., which are legalized by the government; but for performing these activities and earnings, additional cost is required. So avoiding these additional costs such activities and earnings are made illegal'. Both political and economic literatures contain a huge amount of research about the size of informal economic activities. In the course of time, a number of methods were introduced to estimate the size of informal economy.

Starting from micro-level, an ethnographic method can be used for finding the size of informal economy. In this method a survey was organized in which public was interviewed directly through questionnaire and the documents for their involvement in the unrecorded and illegal activities and those who were involved were fined [Cohen and Stephen (2005)]. As this method is much more realistic than the indirect methods it does not need any restrictive assumption [Casser (2001)], but it is criticized by many researchers. The critics say that the method is costly and time consuming process plus the moral behavior distortion of respondents. Due to problem in the direct methods estimation process, indirect methods for estimating informal economy were also introduced side by side, to the ethnographic methods. Feige, et al. (1979) used Fisher's quantity theory of money to calculate the size of informal economic activities. Joreskog and Goldberg (1975) introduced multiple indicator and multiple cause (MIMIC) methods for the first time; and Frey and Wrek (1983) introduced the dynamic multiple indicator and multiple cause (DMIMIC) approach which were considered as more explanatory than the other methods. Lacko (1996) was the first to use the power (electricity) consumption method for estimating the size of underground economy; also Kaufman and Kaliberda (1996) were called the champion of this method. A discrepancy (KQ) approach was also used by Kemal and Qasim (2007). A large amount of literature is available on the underground economy like, Tanzi (1999) found that implication and design of tax system of a country provides incentives to individuals of that nation to go informal. Eilat and Zinnes (2000) focused on the legislative system of a country and found that when a judicial system of a nation is less active people get engaged in the underground economy. Another interesting study performed by Schneider (2006) around the globe, found that informal economy increase corruption in developing nations of the world and in developed nations corruption is reduced by informal sector. In the same study it was estimated that size of an underground economy in India was about 24.2 per cent of the formal economy in 2001-02 and grew up to 25.6 per cent in 2002-03. In Bangladesh the size of informal economy rose from 36.5 per cent in 2001-02 to 37.7 in 2002-03. Marinov (2008), in his study concluded that not only the regulations and tax system of a country contribute to the informal economy but along with it the socio-economic and political factors also cause changes in size of informal economy. A study regarding political economies was carried out by Kufmann, et al. (2009) and found that political stability, violence and peace, government regulations and quality governance, have impact on informality of economy.

Over time, existence of informality was also reported in Pakistan's economy. Through monetary approach Aslam (1998) found that in 30 years of time (1960-1990) informal economy increased to almost 75 per cent. The main factor was increase in the tax burden. A currency demand method (monetary approach) was used by Kemal (2003) which showed variable results regarding changes in size of the informal economy, over time. The author found that in 1971 informality was about 20 per cent and increased to 54 per cent in 1998, but it declined to 37 per cent in 2002. Kemal and Qasim (2007) used discrepancy method which is called the 'KQ' method. The study mainly focused on discrepancies that rose in different sectors of the economy. In 2007-08 about 91 per cent of informality was found in the economy of Pakistan.

The current study utilizes the real factors like real GDP (GDP), employment level (EMPL), political stability (PST), cost of working (CO) and tax to GDP ratio (TGDP), to find out the real size of informal economy in the case of Pakistan's economy. There are number of methods used for estimating the size of informality but all these approaches have some built-in problems; see Kemal and Qasim (2007) for details. The study used the Feasible Generalized Least Square (FGLS) and the HP Prescott filter to obtain a robust set of estimates for calculation of the size of informal economy.

The theoretical framework of the study is under Section II, which is followed by the methodology in Section III. Findings and policy options of the study are presented in Section IV.

II. Theoretical Framework

In the last few decades the world economy expanded dramatically, which is a cause of expansion of individual economies of the world, research in the fields of politics and economic evidences, showing a raise of informal economy along with formal/official economy increase. This increasing trend in the informal economy size makes it more observable and arguable. Both the developed and developing nations of the world experience fluctuation in their informal economy size, over time. At the same token it got attentions of researchers, politicians, policy makers of both, the developing and developed nations. A number of studies were attempted to estimate the size and dimension of underground/informal economy. A common argument based on research finding is that informality is determined by both the economic and political factors. Economic factors which contribute to informality are raising unemployment, changing tax rates, etc., and political instability, government legislative system, corruption and government regulations are political factors. The research also show evidence that expanding size of informality adversely affects the formal economy. In pure economic view, a variable can be estimated by two methods: one is to estimate it by monetary approach and the other is the real factors approach. Both approaches were utilized to estimate the size of informality, such as a method developed by Joreskog and Goldbreger (1975) named as multiple indicators and multiple caused (MIMIC). Kaufman

and Kaliberda (1996) developed the Electricity consumption method and the "KQ" method or discrepancy approach introduced by Kemal (2007), Finding of the authors show that the size of informal economy does increase/decrease from time by time.

A careful analysis is done for the selection of factors to estimate informality in the case of Pakistan. Regarding the economy of Pakistan real factors are used for the first time to find out the real size of informality. The real factors taken in the current study are the cost of being caught by government legislation (CO), total number of labor force employed (EMPL), political stability (PST), a dummy variable and tax to GDP ratio (TGDP).

1. Informal GDP and Formal GDP

GDP works as the centre of gravity for determination of economy performance. There is a close relationship between the formal and informal GDP, as informal GDP is a part which is not counted in the official/formal GDP of an economy. Schneider, et al. (2010) found that when economy expands and stabilise its performance (developed) the informal economy starts contracting. Loayaza, et al. (2010) concluded that a negative correlation exist between the formal GDP (per capita) and the informal economy (GDP). Due to existence of informality the actual size of formal GDP shrinks which create trouble for the policy makers [Yasmin (2003)].

2. Informal Economy and Employment Level (EMPL)

One of the key objectives of both, the policy makers and political economy is to achieve full employment. Through the rate of unemployment, one can trace the informality in economy. The International Labor Organization (ILO) focuses on employment, while describing and defining informality (informal sector). In most developing nations of the world minimum wage law is a larger cause of informal economy [Comola and DeMello (2009)]. Alm and Yunus (2009) found that when unemployment, in the formal economy grows migration of people to informal economy increases and the size of official/formal economy gets depressed.

3. Informal Economy and Tax to GDP Ratio (TGDP)

In the economy, Tax to GDP ratio is actually the real cost on individuals and imposition of tax means to impose a certain amount of cost on public. Therefore, when this cost is increased, people shipment from formal economy to informality also grows. The TGDP shows the government potential of tax collection from individuals in the economy. Large portion of studies regards tax as the main source of informality. When government takes steps to increase the burden of tax on individuals in economy, migration of people starts from formal economy to informality

[Tanzai (1980)]. TGDP also relates positively with informal economy size [Davis and Henrekson (2005)].

4. Informal Economy and Cost of Working (CO) in an Informal Economy

After careful analysis of the informal economy and its determinants this variable is taken and named after its nature. When government legislatives catch someone being involved, informality punishment is given to him, either facing fine or being jailed. In the economy these punishments impose a cost on individuals. That's why the variable is named as Cost of working in Informal Economy (CO). The variable is constructed through the summation of petitions registered in the courts for robberies, decocts, kidnapping, burglary, etc. Data on all such cases is available on annual basis in the Federal Bureau of Statistic yearly press releases. Marinov (2008) found that tax structure efficiency of government legislative also affects the informal economy. Less efficient judicial system provides favorable environment for people in involving informality (less fear to get catch) and increases the informal economy [Eilt and Zinnes (2000)].

5. Informal Economy and Political Stability (PST)

Political stability (PST) is a qualitative variable (dummy) and values assigned are zero and one; a politically stable government is labeled with one, zero otherwise. Over a time, democracy and dictatorship remain in question for different economies. Political stability is revised as an important factor for economic growth. A stable political government can make and implement policies smoothly. Here, expectations of people are also used in a sense that when people expect more, the government will remain stable and larger will be the size of formal GDP in a country. A stable political government leads to best governance, competent lawmaking system, less violence and more harmony. Improved and appropriate government set of laws and all these tools decrease informality and increase the formal/official economy [Kufman, et al. (2009)].

III. Methodology

In case of Pakistan's economy different methods were used to estimate the size of informality, such as MIMIC and Electricity Consumption methods, used by Arby, et al. (2010). Rauf and Yasmin (2003) used the Ordinary Least Square (OLS), and to find out the size of informality Kemal and Qasim (2007) used the Discrepancy method and also named it as 'KQ' approach. The current study uses the combination of two well known methods: the Feasible Generalized Least Square (FGLS) and HP Prescott filter to estimate the size (real) of informality in case of Pakistan.

1. Feasible Generalized Least Square (FGLS) Method

Estimation of Formal Economy through FGLS Method

The following model is used for the estimation of formal economic activities in Pakistan.

$$GDP = \beta_0 + \beta_1 TGDP + \beta_2 EMPL + \beta_3 PST + \beta_4 CO + \varepsilon_t \quad (1)$$

where GDP stands for Gross Domestic Product, TGDP is Tax to GDP ratio, EMPL represents the total labor force employed, PST is political stability and is also a dummy variable; a stable government is valued with one (1), zero (0) other wise, while CO is the cost of working in informal means, ε_t is error term and $\varepsilon_t \sim N(0,\Omega)$. The GDP calculated through Equation (1) incorporates all real factors contribution to official or formal GDP. The existing literature evidenced that all these factors work as determinants of an underground economy. On the basis of these evidences the current study applied the HP Prescott filter on the GDP obtained through Equation (1). The underground economy real size is then calculated.

2. Estimation of Underground Economy

Estimating the formal GDP time series through Equation (1) and taking it as actual size of legal/formal activities in the economy, HP Prescott filter is then used to obtain the potential GDP series and GDP gap series from the formal GDP series. This gap between the potential GDP and estimated GDP is named as the size of informality; further this gap is divided by the formal estimated GDP series to find the real size of informality. The equations for estimations are as follows:

The HP Prescott filter method generates the potential GDP and the GDP gap series as:

$$\min_{\mu_t} \sum_{t=1}^{T} [(GDPt - \mu_t)^2 + \lambda \{(\mu_{t+1} - \mu_t) - (\mu_t - \mu_{t-1})\}^2] \quad (2)$$

where λ is constant, a positive value is to be chosen by user of the filter. This minimization problem has a unique solution $\mu_1, \ldots\ldots, \mu_T$ so that the new series has the same length as of the original series GDP.

For estimating each time series GDP gap (informal economy size) Equation (3) is used which is given as

$$GDPgap = GDPp - GDP_{est} \quad (3)$$

where subscripts '*p*' means potential and '*est*' is defined as estimated GDP.

The real size of informal economy time series is estimated through Equation (4):

$$GDP_{inf} = \frac{GDP_{gap}}{GDP_{off}} \times 100 \quad (4)$$

where subscripts '*inf*' and '*off*' refer to informal and official GDP measures, respectively.

The study used annual data (Time Series) ranging from 1972 to 2010 and data is obtained from the Economic Survey of Pakistan (various issues) released by the State Bank of Pakistan (SBP). For descriptive statistics of data, see Appendix-A (Table A-2) of the study.

IV. Findings and Policy Options

Estimated Size of Informality from Years 2001 to 2010

2001	42.85%	2006	41.82%
2002	49.98%	2007	23.73%
2003	61.34%	2008	57.84%
2004	44.38%	2009	68.63%
2005	45.67%	2010	70.79%

Complete set of estimated size and its comparison with other studies is given in Appendix.

On the basis of current methodology about 71 per cent of informality was found in the case of Pakistan economy. The value of informal economy size shows consistency with 91 per cent found by Kemal and Qasim (2007). As the current percentage value of informal economy (71 per cent) is in real term and if it is adjusted with the rate of inflation the current value will also be around 91 per cent. This enormous amount of informality affects the formal economy negatively because a larger size that can be a part of official GDP is not included in it (Loayaza, et al. 2010). The economic growth (formal GDP) is adversely affected by the growth of informal economy in official terms. Pakistan being a developing country with low GDP per capita (low per capita income) faces serious problems in economic growth like foreign debt, exchange rates, low domestic production, negative net exports, altering tax rates policies, high unemployment and increasing inflation, plus this huge amount of informal economy. If this informality of economic activity is controlled well by the officials (government) it can boost the economic growth (formal GDP) of the country. This larger amount of informality is a great concern for our fiscal and monetary sector because high informality means greater tax evasion and more fiscal loss. This fiscal loss is again compensated by higher taxes which lead to more tax evasion, and boosting the informal economy.

1. Policy Options

This study recommends that combating the informality, legislative system can take a part, but the system must be independent from any influence or political pressure, because an influence free system will function properly as stable legislative system can be helpful in controlling informality through efficient work. Further, the government and policy makers should take steps to reduce tax burden on individuals. Tax network (tax base) expansion is vital in order to equalize tax collection in the economy. In the overall economy, Pakistan is a developing country with narrow tax base (tax network) plus massive corruption involvement in tax auditing process; therefore, proper policies and monitoring is required to overcome these problems. A more progressive income (personal) tax should be in operation. The rate of consumption tax must be set at such a level that middle and lower labor class earnings and spending are not affected so much. The impact of higher tax rate fall more on the white-collar and labor class and they start informality.

Migration of labor class from formal to underground/informal sector can also be controlled by proper employment policies like labor class (employment) earnings should be set at such a level that this class does not move from legal to illegal (informal) economy, corruption (bribes) in recruitment process should be eliminated and opportunities of new job must be created so that each working class does not suffer in getting jobs. Informality can also be controlled by political factors like efficient bureaucratic system. Stability of government can also influence the informality by its effective policies implementation.

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APPENDIX

TABLE A-1

Comparison of the Current Study with Other Studies

Year	Current Study	Kemal (2007)	Qasim (2011)	Arby, Malik and Hanif (2010)	Gulzar, Junid and Haider (2010)	
	Real Factors	Discrepancy Method	Monetary	ARDL	Elec con:	MIMIC
1974	56.67	38.0	24.01	27.1	30.7	31.6
1975	74.36	33.1	22.18	25.9	38.3	32.0
1976	58.22	31.6	24.03	28.4	43.4	32.5
1977	65.52	30.9	23.69	27.9	46.3	32.1
1978	51.54	34.9	28.11	29.2	54.8	32.1
1979	68.94	39.2	30.95	31.1	56.5	31.8
1980	78.46	45.6	33.47	33.3	50.1	31.3
1981	53.74	43.0	31.60	33.1	47.8	31.2
1982	78.84	47.8	38.95	31.6	51.5	31.4
1983	53.01	42.0	38.71	32.8	56.9	31.3
1984	71.14	49.3	38.22	32.1	53.0	31.1
1985	55.86	39.3	35.77	29.6	57.1	31.1
1986	51.92	44.7	36.85	35.2	62.2	31.2
1987	67.54	50.5	36.22	35.4	57.7	31.1
1988	51.42	45.5	35.47	32.7	52.5	30.9
1989	60.53	42.7	37.26	32.5	51.4	30.9
1990	36.34	39.2	39.15	30.0	55.5	30.8
1991	32.28	36.1	33.73	26.1	46.7	30.2
1992	37.59	44.4	37.35	27.7	46.5	30.0
1993	72.02	45.5	34.93	30.1	56.7	30.0
1994	49.16	56.6	33.97	33.3	44.1	29.5
1995	42.93	60.6	38.65	34.8	43.4	29.0
1996	56.73	68.7	41.64	36.8	51.0	29.0
1997	34.89	74.9	35.24	36.4	47.6	28.7
1998	79.81	69.0	33.23	36.4	54.1	28.8
1999	45.69	46.1	32.01	35.2	49.7	28.7
2000	50.43	56.5	33.78	26.0	58.4	28.6
2001	42.85	65.7	34.07	26.3	56.6	28.4
2002	49.98	64.3	33.23	27.0	61.0	28.1
2003	61.34	68.2	35.65	29.0	55.3	28.5
2004	44.38	66.6	35.45	24.9	50.8	28.1
2005	45.67	64.8	35.17	18.7	49.6	28.1
2006	41.82	-	35.56	18.3	50.1	28.6
2007	23.73	-	38.03	18.9	51.0	28.6
2008	57.84	74.3	37.27	19.6	36.1	27.6
2009	68.63	-	32.81	-	37.2	25.9
2010	70.79	91.0	31.80	-	47.6	26.6

TABLE A-2

Descriptive Statistics

Statistics/ Variables	GDP	TGDP	CO	EMPL	PST
Mean	2684659	0.130685	284436.3	33002564	0.641026
Median	2422983	0.126913	272386	31450000	1
Maximum	6018865	0.2464	617812	53840000	1
Minimum	819228	0.09707	3922	19240000	0
Std. Dev.	1497155	0.02718	154531.1	9767785	0.485971
Skewness	0.643784	2.763102	0.235506	0.610727	-0.587975
Kurtosis	2.42061	11.81166	2.557359	2.404469	1.345714
Jarque-Bera	3.239473	175.7995	0.678898	3.000738	6.694217
Probability	0.197951	0	0.712163	0.223048	0.035186
Sum	1.05E+08	5.096723	11093014	1.29E+09	25
Sum Sq. Dev.	8.52E+13	0.028072	9.07E+11	3.63E+15	8.974359
Observations	39	39	39	39	39

The table shows that all variables are normally distributed except the TGDP and PST. Also, variables TGDP, PST and EMPL are skewed toward their respective maximum values. Standard Deviation among all variable is high for EMPL which shows high volatility and dispersion toward GDP.