An assessment of underground economy and tax evasion in Pakistan

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ABSTRACT

Underground economy has serious implications for economic performance and public policy of a country. The purpose of this paper is to estimate the size of underground economy and tax evasion in Pakistan for the period 1973-2016. This study uses monetary approach for estimation of size of the underground economy and tax evasion in Pakistan. The results indicated that increase in taxes, intensity of regulation, and inflation were the driving force of underground economy. The estimates show that the size of underground economy in Pakistan showed an increasing trend from 1974 onward and attained its maximum value in 1998. Thereafter, its size exhibited decreasing trend with small fluctuations. Interestingly, the impact of taxation reforms introduced in 1997 was not considerable. Results indicated that the tax burden is the driving force for the existence of underground economy which need to be appropriately set and enforced. This may discourage people from indulging in underground economies. The results from this study can be used for effective policy formulations with respect to underground economy.

1. Introduction

The underground economy may be defined as those activities which have no record in the official statistics and no taxes have been paid on them. These activities consist of monetary as well as non-monetary transactions. Underground economy exists not only in developing countries but also in developed countries. Many measures are taken such as prosecution, education and growth in different sectors of the formal economy to discourage people' and businesses' participation in the underground economy. Gathering reliable information about the nature and size of underground economy is almost impossible (Spiro, 1993). Many studies have been undertaken to estimate the size of the underground economy, its impact and determinants in various countries. The existence of underground economy and unreliable estimates about its size, makes the data on national accounts such as unemployment rate, inflation rate, and GDP growth rate questionable.

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Ignoring the underground part of the economy in policy formulations at macro level could have strong implications for the direction of the economy.

Underground economy can have extremely negative impacts on cultural, social and economic development of a country, especially for Pakistan which is already facing severe revenue shortfall with high fiscal deficit. It not only affects the equitable distribution of economic resources but also decreases the efficiency. Since the underground and undocumented part of the economy is out of general tax net, it tends to increase tax burden on formal sector of the economy (Iqbal, Qureshi, & Mahmood,1998). Similarly, increase in the size of underground economy is a lost revenue for governments. Since, underground economy is not counted in the official estimates of the national incomes, it could also have strong effect on inflation as well. There is a lack of public trust on governmental institutions, and quality of goods and services produced in the underground economy is compromised. Moreover, underground economy may distort the labour market due to lack of enforcement of the labour laws.

Monetary transactions remain out of the tax net and national accounts either due to negligence of tax collecting authorities or due to its small size or illegality of its nature. These transactions include income from unregistered employment, assets formation from unreported work (like agriculture, housing, hunting, furs like garments and decoration, transaction in property, fishing, medical services, enterprises, restaurants and hotels, catering, transportation, etc.), working "off the books" or "moon lighting" (second jobbing) for cash, sale of information (publication of books, production of posters, video recording, etc.), informal trade (i.e. working without permit), selling home-grown/home-made products, financial instruments (like trade in bonds and stocks), covert rentals (like rent a car, house, shop, etc.), acceptance of tips, currency transaction (money changer), illegal trade in drugs (alcohol and tobacco), theft, prostitution, bribery, smuggling, gambling, corruption, begging and kidnapping (often called Mafia), etc. Given the size of the underground economy in many countries, it is pertinent to discuss the factors that could affect the underground economy (Tanzi, 1980; Thomas, 1999; Yasmin, Bushra, & Rauf, 2003; Khalid, 2002; Kemal, 2007). The volume of shadow economy is associated with many economic and non-economic factors. Rise in tax burden and social transfer, intensity of regulations in the labour market like reduction in working hours, early retirement, decline in tax moral, and restriction on second jobbing are some of the major economic factors which affect its size and extent. The non-economic factor like unwillingness to show the accurate income and tacit cooperation with dishonest officials are some other reasons which play vital role in the expansion of its size (Zaman, & Goschin, 2015; Khan, & Khalil, 2017).

Underground economy has very strong negative impacts on social, cultural and economic conditions of a country. It challenges the writ of the government by violating the established rules and regulations (e.g. no tax payment, no work permits and licenses, provision of illegal unlawful products etc.) and becomes a huge obstacle for the government to achieve the determined budgetary targets. Its effect can also be seen from the perspective of economic policy making, where part of the labour force (unemployed in actual statistics) actually work and earn in the underground part of economy which leads

to ineffectiveness of the macroeconomic policies (Ahmad, & Ahmad, 1995). One the other hand, increase in its size results in further loses in tax revenue, which not only puts additional pressure on revenue generating authorities to increase taxes in the formal sector of the economy, but also increases incentives to hide taxes and escape into the shadow economy (Aslam, 1998). Likewise, the unregistered firms take benefit of not paying taxes which increases the cost of production to the registered firms which pay high taxes. Despite of these negative effects, the underground activities also have some positive effects. The lower cost structure in the informal sector leads to provision of wider opportunities of employment in the unregistered labour market. Due to low entry cost and no permit acquisition by the informal sector's firms, their costs are lower making the unregistered firms charge lower prices than the registered ones. Furthermore, such underground activities provides better competitive environment (i.e. lower prices with high sale volume) for their sustainability and growth in the long run (Tanzi, 1999).

Keeping in view the unreliability about the extent and size of the underground economy and its detrimental effect on the formal part of economy, it is very important to estimate the size of the underground economy as well what determines the size of such economy. Therefore, this study is an effort towards this end.

2. Literature review

This section discusses the previous literature on estimating the size of the underground economy and its effect in various parts of the world. The relevant literature is summarised as follows:

Many researchers used the monetary approach to estimate the size of underground economy. Shabsigh (1995) used ratio of currency in circulation (CC) to demand deposits as a dependent variable and real interest rate, real per capita income, banking services and tax revenue from imports as explanatory variables. He reported that the size of the underground economy was about 20.74 % of GDP for the period from1975 -1990. Similarly, Ahmad and Ahmad (1995) used the ratio of CC to M2, and ratio of CC plus bearer bonds to M2 as dependent variables while interest rate on time deposits, ratio of total tax revenue to GDP, and a dummy for the period 1960-71 to capture the impact of currency holdings were used as explanatory variables. They reported that underground economy declined to 35.09% in 1990 from 51.96% in 1960.

Ogunc and Yilmaz (2000) estimated the size of underground economy in Turkey by applying an indirect monetary approach using data from 1971-1999. They found that that the share of underground economy went from 13.9 % of GDP in 1971 to 20.5 % of GDP in 1999. Similarly, Schneider and Enste (2000) used the monetary approach for different European countries in mid 1990s. They found that the underground economy as a percent of GNP for Greece and Italy was 27-30, for Belgium, Spain, and Portugal was 20-24, for Denmark, Norway and Sweden was 18-23, for Germany, France, Ireland, Great Britain, and Netherlands was 13-16 and for United States, Japan, Switzerland, & Austria was 8-10. Iqbal, Qureshi, & Mahmood (1998) also used monetary approach to estimate the size of

the Pakistan's underground economy over the period 1973-1996. They regressed the ratio of CC to M2 on the banking services, growth rate of GDP, international trade tax, interest rate on time deposits, a dummy for structural adjustment program of 1988 and lagged dependent variable. They found an upward trend as the size of the underground economy was 20.2 % of GDP in 1973 to 51.3 % of GDP in 1996.

Aslam (1998), Khalid (2002) and Kemal (2003) used ratio of CC plus foreign currency accounts to total money supply in their models. However, in explanatory variables they were quite different from one another. In Aslam (1998) the explanatory variables were total tax revenues, interest rate on time deposits and a dummy for foreign currency accounts introduced in 1991. Instead of using the same dummy, Khalid (2002) used structural adjustment program as a dummy variable in his analysis. He also used the banking services and lagged dependent variable in his explanatory part of the model. Instead of using real interest rate and the same dummy of Khalid (2002) model, Kemal (2003) used the dummy of Aslam (1998). Aslam (1998) estimates showed an upward trend from 29 % of GDP in 1960 to 43.9 % of GDP in 1990, stagnant between 1990 and 1996 at 43.8 %, and then declined to 35.5 % in 1998. Khalid (2002) estimates also showed an upward trend from 13.45 % of GDP in 1976 to 28.51 % of GDP in 1998. In Kemal (2003), the estimates went on increasing from 20.27 % of GDP in 1973 to 25.51 % of GDP in 1991, and then with a rapid increase it reached to 54.52 % of GDP in 1998 and then declined to 37.25 % of GDP in 2003. Finally, Kemal (2007) found an upward trend from 16.3 % of GDP in 1974 to 31.4 % of GDP in 2005, with highest 38.7 % value of GDP in 1998.

Yasmin, Bushra & Rauf (2004) reported upward trend from Rs.12 billion to Rs.1085 billion during the period under analysis (1974-2002). A possible explanation of such enormous increase in underground economy could be the absence of tax reforms over a period under study. Qazi and Hussain (2006) used two models by adding tax reform dummy to the model used previously by Ahmad & Ahmad (1995). The estimates of the 1st model reported downward trend from 51.6 % of GDP in 1960 to 20.3 % of GDP in 2003. The estimates of the 2nd model also reported a downward trend. They noted that taxation reforms played a significant role in shrinking the size of underground economy. They found a positive relationship between black economy and corporate and personal tax rates. According to them, when these rates were at its peak (60%) in 1980s the black economy was also at its peak (51.6%), and with gradual decrease in its rate the size of black economy also went on decreasing from 56 % during 1980-86, to 28 % in 1993.

Arby et. al. (2010) estimated the size of underground economy by using the monetary approach and applying an Autoregressive-Distributed Lag (ARDL) model by adding education as an additional factor affecting the size of shadow economy. They found that the size of the underground economy was 30 percent. Similarly, about 20 percent of the overall economic transactions were taking place in the informal sector of the economy. Blackburn et. al. (2012) found factors which play a role in motivating individuals and firms to conceal their true wealth to avoid taxes. In their analysis, they found that the presence of financial market imperfection, the amount of wealth disclosed by an individual and the level of financial development are the key factors which determine the degree of

involvement in tax evasion and engagement in underground economy. Similarly, Capasso & Jappelli (2013) provided a theoretical and an empirical model to study the relationship between financial development and the size of underground economy in Italy. They found that local financial development (reduction in the cost of external finance) can reduce tax evasion and the size of underground economy. Mughal and Schneider (2018) also used the monetary approach for finding the extent of underground economy in Pakistan for a period of 1973-2015 and employing the ARDL and Granger causality methods. They found a significantly positive relationship between the official sector and shadow economy in the long run. The size of underground economy was recorded 25% on average for the period under analysis.

Kireenko & Nevzorova (2015) studied the effect of shadow economy on the quality of life. They used a sample of 150 countries and divided them into 5 groups based on the size of their underground economies for the period of 1999-2007. They found that the quality of life (measured by life expectance at birth and the number of children in school) had a positive association with the size of underground economy. Furthermore, Zaman & Goschin (2015) developed an index for shadow economy in which they included three indicators: shadow economy measured in euro per inhabitants, shadow economy as percent of GDP and shadow economy of Romania as percentage of the total EU-28 shadow economies for the period of 1999-2012. Their results showed that the underground and formal economies were co-integrated.

Ferrer-i-Carbonell and Gerxhani (2016) estimated a relationship between tax evasion and individual wellbeing in fourteen central and eastern European countries in 2013 and 2014 by focusing on the role of institutions and social capital. They found a negative association between tax evasion and individuals' life satisfaction. On the other hand, Khan and Khalil (2017) incorporated some real factors of economy like employment level, political stability, tax to GDP ratio and cost of working to estimate the size of underground economy using the data for a period of 1972-2010. For estimating the size of informal sector, they used HP-Prescott filter method for obtaining the potential GDP and actual GDP series through feasible generalized least squares (FGLS), and found that 71 percent of the Pakistan's economy was informal.

3. Research methods

Various approaches for estimating the size of underground economies have been discussed in the previous literature. These approaches are discussed in the following subsections.

3.1 Direct approaches

Exclusive survey technique surveys the suppliers and consumers engaged in underground activities or services. The basic advantage of this method is that it provides information about the underground economy directly from those who are engaged in it. However, the unwillingness of respondents to cooperate presents a huge obstacle. Auditing of tax return technique scrutinizes the tax payers' files by the tax collecting

authority in depth. This approach provides information in detail about self-employed persons who have better opportunities of concealment. However, the estimates based on this technique imitate only that portion of income discovered by the relevant authority, which is likely to be a fraction of the hidden ones. The tax audits have proved that this method can't reveal all tax evasion, and that they are limited to taxable activities only.

3.2 Indirect approaches

These are mostly macro-economic approaches or indicator approaches which contain information about the shadow economy. Income and expenditure approach (generally referred to as the fiscal approach) states that if exact estimates of the expenditures of a nation do exist, then the difference between the expenditure and income of that nation can be used as an indicator of the presence of black economy. However, this approach is criticized on the ground that the gap between expenditure and income may increase due to other reasons, like: illness, unemployment, retirement and over-report of consumption expenditures or under-report of income level, etc.

Labour market approach measures the total number of hours available to informal sector in terms of monetary units by multiplying it with average productivity of the workers in shadow economy. On other hand, the decrease in availability of labour force for the official economy is linked with increase in underground economy. Main problem with this approach is that we can't measure the average productivity of workers and the number of hours spent by the workers in shadow economy accurately. The identification of second jobbing (which is often the case) is another problem with this approach. That's why economists consider this approach as a weak indicator for the measurement of black economy.

3.3 Monetary approach

Monetary approach developed by Cagan (1958) was used to study the relation between currency ratio and tax pressure for the United State over the period 1919-1955. It was found that a number of factors like interest rate, weighted average tax rate, real per capita income, and income tax affect the currency ratio significantly. Direct and indirect tax burden were both included in this model. Tanzi's (1983) took the Cagan (1958) approach and developed it further. He took all conventional factors in his analysis for the United States over the period 1929-1980. The model he used for his analysis is given as under:

$$ln(C/M_2)_t = \beta_0 + \beta_1 ln(1+TW)_t + \beta_2 ln(WS/Y)_t + \beta_3 lnR_t + \beta_4 ln(Y/N)_t + \xi_t \qquad (1)$$

where $\beta_0 > 0$, $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 < 0$, $\beta_4 > 0$, *ln* represents natural logarithms, and C/M2 is the ratio of currency in circulation to broad money supply, TW is the weighted average tax rate, WS/Y is the ratio of wages and salaries to national income, R is the interest payment on saving deposits, Y/N is the ratio of national income to population and finally ξ is the error term.

3.4 Physical input (electricity) demand approach

This is the latest developed discrepancy approach. This approach focuses on the consumption of electricity which is required to produce the national income of a country.

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In this method, the excessive use of electricity is then attributed to black economy. However, many of the underground activities do not use much or even no electricity (e.g. personal services), and that they often use other energy sources like gas, oil, coal, etc. for such types of activities. Another problem with this approach is that it does not control for the variations in technological progress across the country which may bring a huge change in quantitative and qualitative aspects of the product.

3.5 Empirical model for this study

This study will use the monetary approach with slight modifications in the models. Four different versions of the models given below shall be used on the data for the period from 1973 to 2016. The significance of using four models in the current study is to check the sensitivity and robustness of the explanatory variables to different dependent variables. These models are as under:

$$[([(CC + DD + FCA)/M2]_t = \beta_0 + \beta_1 TY_{t-1} + \beta_2 BS + \beta_3 Y_g + \beta_4 INF + \varepsilon_t \qquad (2)$$

$$\text{with} \qquad \beta_0, \beta_1, \beta_4 > 0 \text{ and } \beta_2, \beta_3 < 0$$

$$[(CC + DD + FCA)/M2]_t = \beta_0 + \beta_1 TY_{t-1} + \beta_2 BS + \beta_3 INF + \beta_4[(CC + DD + FCA)/M2]_{t-1} + \varepsilon_t \qquad (3)$$

$$\text{with} \qquad \beta_0, \beta_1, \beta_4 > 0 \text{ and } \beta_2, \beta_3 < 0$$

$$[(CC + DD + FCA)/M2]_t = \beta_0 + \beta_1 TY_{t-1} + \beta_2 BS + \beta_3 INF + \beta_4 D97 + \varepsilon_t \qquad (4)$$

$$\text{with} \qquad \beta_0, \beta_1, \beta_3 > 0 \text{ and } \beta_2, \beta_4 < 0$$

$$[(CC + DD + FCA)/M2]_t = \beta_0 + \beta_1 TY_{t-1} + \beta_2 BS + \beta_3 Y_g + \beta_4 INF + \beta_5[(CC + DD + FCA)/M2]_{t-1} + \varepsilon_t \qquad (5)$$

$$\text{with} \qquad \beta_0, \beta_1, \beta_4, \beta_5 > 0 \text{ and } \beta_2, \beta_3 < 0$$

where *CC* is the in currency in circulation, *DD* is the demand deposits, *FCA* is the foreign currency accounts, M_2 is the combination of M_1, time deposits and other deposits, *TY* is the tax-to-*GDP* ratio, *BS* is the banking services defined as the ratio of total amount of banks deposits to total number of bank accounts, Y_g is the growth rate of real *GDP* rate in percentage per annum, *INF* is the inflation rate in percentage per annum, D_{97} is the dummy variable to capture the impact of taxation reform on underground economy(Year 1997 was selected due to reason that the excise tax reform was on its peak in 1997, even though it was started in 1990) and finally ξ is the error term.

3.6 Estimation of underground economy

The size of the underground economy shall be estimated as follows:

For each year, the liquidity holding with tax variable $[\{(CC+DD+FCA)/M_2\}_t]$ and without tax variable $[\{(CC+DD+FCA)/M_2\}_{wt}]$ was calculated for each equation through regression. The difference between $[\{(CC+DD+FCA)/M_2\}_t]$ and $[\{(CC+DD+FCA)/M_2\}_{wt}]$ gave us an indication that how much liquid money holding is tax-induced. In other words, it will indicate the extent to which higher level of taxes (direct and indirect) induce people to hold larger amounts of liquid money like cash, demand deposits and foreign currency accounts. The level of increased demand for liquid money is presumed to

indicate the magnitude of tax evasion, which is known by illegal money (IM). Mathematically;

$$IM = \left[\left\{ \frac{CC + DD + FCA}{M_2} \right\}_t - \left\{ \frac{CC + DD + FCA}{M_2} \right\}_{wt} \right] * M_2 \quad (6)$$

Following Tanzi (1983), the difference between M_1 (i.e. CC+DD) and illegal money (IM) was then declared to be legal money (LM) calculated as *LM = M₁ – IM*.

The division of GDP on legal money will then give us the velocity of legal money.

$$V_{1m} = \left[\frac{GDP}{LM} \right] \quad (7)$$

By assuming that $V_{im} = V_{lm}$, the mathematical expression for the calculation of underground economy will become as follow:

Underground Economy (UE) = IM * V_{im}

Finally, the multiplication of underground economy with tax-to-GDP ratio will give us the tax evasion (TE) for that country which is given as follows:

$$Tax\ evasion\ (TE) = UE \left[\frac{Taxes}{GDP} \right] \quad (8)$$

4. Results and discussion

Following the monetary or liquidity demand approach, simple ordinary last squares (OLS) method is applied to models given in equations 2-5 and the results are presented in table 1. These models use the same dependant variable while different independent variables have been included to estimate their effects.

In table 1, the results from the various specifications of the underground economy models are presented. Results from model 1 shows that the coefficient of lagged tax-to-GDP ratio (TY_{t-1}) is positive and statistically significant at 1 percent, which gives an indication of high liquid money holding if the tax rate in previous year is high. This finding seems to confirm the main hypothesis that as the tax rate increases, people engage themselves in underground activities and prefer more liquid money holdings. The coefficients of banking services (*BS*) and annual growth rate of *GDP* (*Yg*) are negative and significant at 1 & 5 percent, respectively. It implies better banking services and economic growth can decrease the demand for liquid money holdings. Coefficient of inflation rate (*INF*) is positive and statistically significant at 1 percent, which implies that higher inflation will motivate people to hold more liquid money to sustain the same standard of living. The explanatory variables are significantly explaining the dependent variables because R^2 is 0.74 and F-statistic is also significant. The value of *DW*-test confirms no problem of autocorrelation.

In model 2, inflation rate variable is replaced with lagged dependent variable (*Dep_{t-1}*). Results suggest that the coefficient of the lagged tax-to-*GDP* ratio (TY_{t-1}) is once again positive and statistically significant at 1 percent. The coefficient of the *BS* is negative and lagged dependent variable (*Dep_{t-1}*) and real growth rate is positive, and

statistically significant at 1 percent, 1 percent and 10 percent respectively. Values of R^2, *F*-statistic and *DW*-test give the same results as discussed earlier.

In model 3, due to insignificance of the lagged dependent variable (Dep_{t-1}) at standard 1% and 5%, it was replaced with dummy variable (*D97*) just to see the impact of taxation reform to see if it had any impact on the underground economy and expected to have a negative sign. The coefficient of the tax reform dummy (*D97*) is negative, as expected, but turn out to be insignificant. The inclusion of this dummy was made on the ground that though statistically it is insignificant but still it has a negative relation with currency holding and the tax reforms of the 1997, which have not given any structural change to underground economy by decreasing its magnitude. The coefficient of TY_{t-1} and *INF* are positive and statistically significant at 1 percent, whereas the coefficient *BS* is negative but significant at 1 percent. Results regarding the values of R^2, *F*-statistic and *DW*-test are similar to that of previous models.

In this model 4, the lagged tax-to-GDP variable (TY_{t-1}) is replaced with the prevailing tax-to-GDP ratio variable (*TY*). Also, the insignificant variables D97 was also replaced with a single lagged dependent variable (Dep_{t-1}) and real GDP growth rate (*YG*). Results of the estimated model show that tax-to-GDP (*TY*) variable is insignificant, though has positive relation with liquid money holding. This may indicate that majority of the people engaged in underground economy are backward looking and that they make their decisions regarding involvement in such type of activities while learning from the past as the lagged tax-to-GDP ratio in the initial three models was statistically significant. The coefficients of the *BS* and *GDP* growth rate (*TY*) are negative and statistically significant at 5 percent. The coefficient of the *INF* is positive and statistically significant at 1 percent, as was in the first three models. The coefficient of the lagged dependant variable (Dep_{t-1}) is also positive and statistically significant at 10 percent.

Table 1: Effect of various factors on the liquid money holdings in Pakistan (1973-2016)

	Model 1	**Model 2**	**Model 3**	**Model 4**
Constant	0.560*** (0.042)	0.465*** (0.077)	0.598*** (0.020)	0.450*** (0.081)
Lag of tax-to-GDP ratio	1.73*** (0.611)	0.935*** (0.337)	1.285*** (0.464)	------
Tax-to-GDP ratio	----	----	----	1.152 (0.744)
Banking services (total amount of banks deposits/ total number of bank accounts	-487.79*** (157.516)	-1641.507*** (462.959)	-2109.062*** (429.686)	-402.126** (164.391)
Growth rate of real GDP (%) per annum	-0.005** (0.002)	0.012*** (0.002)	-----	-0.005** (0.002)
Inflation rate (%) per annum	0.013*** (0.001)	----	0.013*** (0.001)	0.011*** (0.001)
Lag of the dependent variable	-------	0.206* (0.115)	------	0.218* (0.122)
Dummy variable capturing impact of taxation reform on underground economy	-----	-----	-0.006471 (0.024515)	

(D97)				
R^2	0.74	0.76	0.74	0.75
Adj R^2	0.71	0.73	0.70	0.71
S.E. of regression	0.03	0.02	0.02	0.02
Sum squared resid	0.02	0.02	0.02	0.02
Log likelihood	79.24	80.91	79.18	80.22
Durbin-Watson	1.92	2.53	2.10	2.34
F-statistic	21.71	24.63	21.61	18.08

Note: * , **, *** represent the level of significance at 10%, 5% and 1 % respectively, Standard errors are in given parentheses.

The estimated results of the underground economy and tax evasion for all these models are reported in Table 2. Similarly, in figure 1& 2, the trend of the underground economy and tax evasion for various model specifications have been shown as well. Results of these models are different in values from each other but they are quite similar in trends. The derived estimates have shown an upward trend from 1974 to 1998 and then have shown a downward trend up-to 2016 with a little bit fluctuation in its path. Further, these estimates are highly sensitive to the value of tax evasion and velocity of money. The point at which these values were on their highest level, the values of shadow economy were also at their peak[2].

The significance of using four models in the current study can be viewed from the resulted values of these models. The trends of these estimates show that size of the informal sector and tax evasion change with change in specification of the model. The main significant variables in these models are inflation, banking services and tax-to-GDP ratio (with lag), which can also be seen from the values of tax evasion, where increase in tax has not only increased the tax evasion but has also increased the size of informal economy. Inclusion of lagged tax-to-GDP ratio has confirmed the cited preposition that the engaged portion of society in the underground economy is quite backward looking where they learn from the past while making their decision about involvement in such sort of activities.

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[2] The estimated value of the velocity of legal money in the current study is greater than its estimated value by State Bank of Pakistan. The reason is the difference in specification of formulas. Estimating its value, the State Bank has divided GDP by M_1, while in current study velocity of legal money is considered to be the ratio of GDP to legal money. Since legal money (LM) is less than M_1 that's why velocity of legal money in this study is greater than velocity of money calculated by State Bank of Pakistan, i.e. $V_{Lm} > V_{M1}$.

Table 2: Resulted values of velocity of money, underground economy and tax evasion

Years	As percent of GDP											
	Model 1			Model 2			Model 3			Model 4		
	VM	UE	TE	VM	UE	TE	VM	UE	TE	VM	UE	TE
1974	9.9	10.01	0.46	9.5	5.16	0.23	9.7	7.24	0.33	9.9	9.77	0.45
1975	11.7	13.24	0.61	11.1	7.93	0.37	11.3	9.49	0.44	11.4	10.91	0.5
1976	11.4	13.84	0.65	10.9	8.84	0.41	11	9.91	0.47	11.2	11.65	0.55
1977	10.4	13.72	0.66	10	8.87	0.42	10	9.83	0.47	10.2	11.61	0.56
1978	9.8	14.46	0.76	9.4	9.34	0.49	9.5	10.34	0.54	9.7	12.98	0.68
1979	9.1	15.66	0.83	8.7	9.93	0.53	8.8	11.16	0.59	8.9	13.1	0.69
1980	8.8	15.99	1.01	8.3	10.27	0.65	8.4	11.39	0.72	8.8	15.56	0.98
1981	8.3	18.58	1.25	7.7	11.47	0.77	7.9	13.15	0.88	8.1	16.11	1.08
1982	8.5	20.28	1.36	7.9	12.67	0.85	8	14.29	0.96	8.2	16.6	1.11
1983	8.5	21.44	1.37	7.9	13.59	0.87	8	15.06	0.96	8.1	16.88	1.08
1984	9	21.27	1.39	8.4	13.69	0.89	8.5	14.95	0.97	8.7	17.89	1.16
1985	8.7	21.23	1.3	8.1	13.48	0.82	8.2	14.92	0.91	8.3	16.48	1
1986	9	19.93	1.16	8.5	12.93	0.75	8.6	14.05	0.81	8.7	15.79	0.91
1987	8.9	17.89	0.96	8.4	11.67	0.63	8.5	12.68	0.68	8.6	13.96	0.75
1988	8.3	15.84	0.89	7.9	10.46	0.59	8	11.28	0.63	8.1	13.74	0.77
1989	8.7	16.01	0.92	8.3	10.29	0.59	8.4	11.4	0.66	8.6	13.56	0.78
1990	9	16.63	0.92	8.5	10.66	0.59	8.6	11.82	0.66	8.8	13.35	0.74
1991	9.3	17.14	0.89	8.8	11.12	0.57	8.9	12.17	0.63	9	13.39	0.69
1992	9.4	17.75	1.02	8.9	11.62	0.66	9	12.58	0.72	9.3	16.17	0.93
1993	9.9	22.13	1.26	9.2	13.78	0.78	9.4	15.52	0.88	9.6	18.04	1.03
1994	10.1	24.14	1.41	9.4	15.19	0.89	9.5	16.85	0.98	9.8	20.3	1.19
1995	11.1	24.75	1.47	10.3	15.49	0.92	10.5	17.25	1.03	10.8	20.59	1.23
1996	12.1	27.7	1.74	11.1	17.2	1.08	11.3	19.17	1.2	11.7	23.75	1.49
1997	13.3	34.92	2.23	12	21.06	1.35	12.2	23.75	1.52	12.7	28.68	1.79
1998	**13.9**	**38.69**	**2.35**	**12.3**	**23.23**	**1.41**	**12.6**	**26.08**	**1.58**	**13**	**29.48**	**1.83**
1999	10.8	26.6	1.48	10	16.85	0.93	10.1	18.46	1.02	10.3	20.1	1.12
2000	10.8	22.42	1.2	10.1	14.56	0.78	10.2	15.72	0.84	10.4	17.95	0.96
2001	11.6	22.96	1.24	10.8	14.74	0.8	11	16.07	0.87	11.3	19.11	1.03
2002	11.7	23.29	1.12	10.9	14.74	0.71	11	16.29	0.78	11.1	17.27	0.83
2003	10.6	18.74	0.87	10	12.35	0.57	10.1	13.25	0.61	10.2	15.04	0.69
2004	9.4	17.1	0.78	9	11.19	0.51	9	12.14	0.55	9.2	14.08	0.64
2005	8.8	17.01	0.81	8.4	11.03	0.52	8.5	12.08	0.57	8.7	14.67	0.7
2006	8.5	17.59	0.91	8	11.22	0.58	8.1	12.47	0.64	8.3	15.66	0.81
2007	7.8	17.54	0.9	7.4	11.07	0.61	7.4	12.44	0.69	7.7	15.39	0.85
2008	7.5	18.3	0.88	7	11.53	0.58	7.1	12.90	0.65	7.3	16.50	0.81
2009	7.3	17.3	0.86	6.7	11	0.6	6.9	13.1	0.62	7.0	16.10	0.78
2010	7	16.44	0.9	6.5	11.10	0.7	6.5	12.76	0.67	6.9	15.93	0.76
2011	6.8	16.25	0.85	6.3	10.93	0.67	6.1	12.53	0.7	6.5	15.47	0.8
2012	6.5	15.98	0.84	6.1	10.56	0.64	6.3	12.21	0.63	6.6	14.73	0.76
2013	6.3	15.12	0.82	5.9	10.42	0.61	6.1	12.10	0.6	6.4	14.13	0.71
2014	6.2	14.58	0.8	5.8	10.27	0.58	5.9	12.00	0.6	6.1	13.74	0.67
2015	6.1	13.75	0.71	5.7	9.83	0.54	5.7	11.93	0.58	6.1	13.65	0.64
2016	5.9	13.51	0.68	5.6	9.57	0.5	5.6	11.83	0.55	6	13.31	0.61

where velocity of legal money (VM), Underground Economy (UE), Tax evasion (TE)
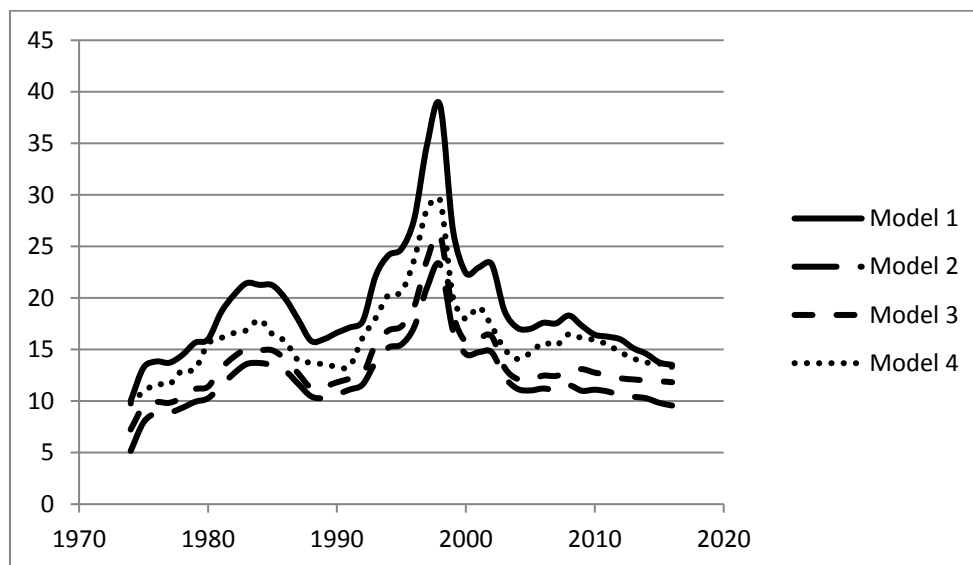
Figure 1: *Estimates of underground economy (1974-2016)*
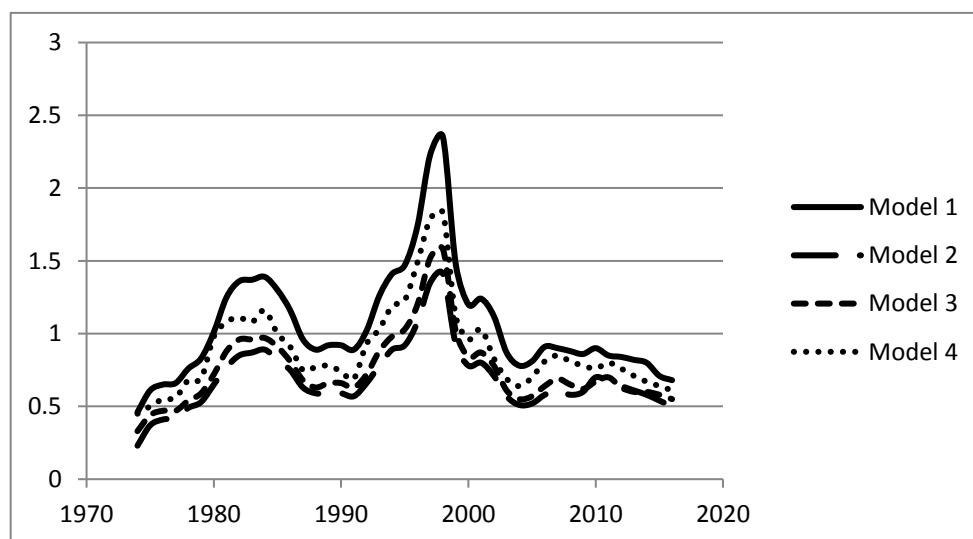
Figure 2: *Estimates of tax evasion (1974-2016)*

There could be various reasons of decrease in the size of informal sector and tax evasion after reaching to the highest level in 1998. For instance, rise in private investment level, increase in smuggling, taxation reform in, and better policies of the government like increase in the growth rate of GDP and ease in credit facility to the private sector played a vital role in shrinking the size of underground economy.

It worthy to mention here that the derived estimates of these models have not only found a single peak point for its maximum value but have also got smaller variation in the derived estimates by following almost similar trends. A possible explanation of the differences in results found in this study in comparison with other studies is the difference may be the specification of the models. The usage of tax-to-GDP ratio (with lag and

without lag) as an explanatory variable in these models has confirmed the preposition that the engaged portion of the informal economy are quite rational while making their decisions about involvement in the unregistered sector, because the lagged tax-to-GDP ratio variable was found statistically significant in the first three models, whereas without lag this variable was statistically insignificant in the last model only, though it has a positive relation with currency holding. At the end, the derived estimates of this study should not be considered as an accurate measure of the underground economy and tax evasion; rather, these estimates can be used as overall trends for better policy making.

5. Conclusion

This study is an attempt towards knowing the unknown part of the economy. The monetary approach is used to estimate its size and what determines it. A set of four models were presented for the extended time period of 43 years, from 1973 to 2016. These estimates show that the size of informal sector and tax evasion went on increasing from 1974 and attained the maximum level in 1998. However, in the coming years its magnitude went on decreasing with slight variation in its path. The decrease in underground economy and tax evasion may be caused by increase in private investment, increase in smuggling regulations, taxation reform, and better policies of the government like increase in the growth rate of GDP and ease in credit facility to the private sector. Increase in taxes, intensity of regulation, and inflation were found to be the driving force of underground economy and tax evasion, which should be focused and regularized by the policy makers so that people have little incentives to indulge in underground activities. These estimates are different from one another, with small variation, which shows the sensitivity of the dependent variables to the explanatory variables. Moreover, the derived estimates of this study should not be taken an exact measure of underground economy and tax evasion. These results should be treated carefully because they are sensitive to the assumptions made, equations specified, and data used.

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