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**ESTIMATING THE BLACK
ECONOMY THROUGH
MONETARY APPROACH:
A CASE STUDY OF PAKISTAN**

SOCIAL POLICY AND DEVELOPMENT CENTRE

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through Monetary Approach:
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ABSTRACT

In recent years, the ‘black economy’ has held enormous appeal for policy makers. The presence of the black economy creates critical misrepresentation of macroeconomic variables in official estimates which lead to false determination and delusional impact of economic policies. Similarly, the black economy represents the unrecorded potential of the economy vis-à-vis resource generation and mobilization. The economy of Pakistan has undergone several minor tax reforms since the 1960s. However, the tax and tariff reform during the 1990s, exercised under international pressure, can be regarded as the first comprehensive exercise of its kind and therefore, it becomes highly desirable to gauge its impact on the black economy and on tax evasion practices. This paper, with some modifications, uses the standard monetary approach to obtain the latest estimates of the size of the black economy and its macroeconomic implications thereof.

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INTRODUCTION

An ample share of economic activities take place outside the official or recorded economy all over the world in general and in developing economies in particular. There are at least three major concerns associated with the existence of the underground or “black” economy. First, the possibility of biased evaluation of economic and social conditions of economic agents, and thus sub-optimal policies, if one disregards the hidden economy. Second, loss of precious tax revenue from the collection channels, thereby increasing the cost of providing public services. And third, indication of shaken trust between government and economic agents¹. Furthermore, evaded or lost income shows the potential of immobilized resources that should have been a part of the national income. If the underground economy is large and significant, there is a clear evidence of market distortions, poor governance and of disproportionate administrative regulations.

Albeit, there is a consensus on the existence of the black economy. The phenomenon has been discussed and defined in economic literature under many different names such as unofficial, informal, unregistered, unobserved, shadow, subterranean, parallel, hidden, invisible and irregular. Nevertheless, the purpose behind all these definitions is to link the underground economy to the official national income so as to compare and add these figures to the Gross National Product (GNP). Conceptually, there are four classifications of the underground economy according to the particular institutional rules they violate. These are: illegal economy; unreported economy; unrecorded economy and informal economy². Moreover, as Schneider and Frey (2001), point out, the notion of underground or the black economy should not be identified only with illegality. Most of the activities are perfectly legal but the taxes are evaded due to different reasons and due to loopholes in the economy itself.

The present effort addresses the issue of the size of the unreported economy in Pakistan and therefore, we are explicitly interested in estimating the resources that are lost due to tax evasion and its avoidance. In this regard, we use, with some modifications, the methodology adopted by Ahmed and Ahmed (1995). A revisit to this issue is of critical importance especially after taking into account the tax reforms exercise started during the early 1990s

¹ See Schneider and Frey (2001), for further discussion.

² See, for instance, Fiege (1990), for an account of this taxonomy.

under the influence of the International Monetary Fund (IMF). This exercise was stringently beefed up during the late 1990s.

This paper is organized as follows: Section 2 presents the review of the selected literature, Section 3 illustrates the methodology used, Section 4 elucidates the results and finally Section 5 concludes the discussion with some policy implications.

1. REVIEW OF THE SELECTED LITERATURE

Frey et al (1984), pointed out four approaches for measuring the size of the black economy. These are; (i) tax evasion approach, (ii) national accounts approach, (iii) employment approach and (iv) monetary approach. Out of these methods, monetary approach is by far the most widely used methodology in estimating the black economy due to its simplicity of application. The pioneering efforts in this area are of Gutmann (1977), Feige (1979) and Tanzi (1983). Gutmann (1977), estimated the size of the black economy of the United States and came up with the figure of \$200 billion. He first calculated the ratio of currency to demand deposits for the 1937-41 period (the benchmark period) and then for 1976. He then calculated the difference of ratios and thus the extra currency between these two periods. Multiplied by the ratio of the GNP to legal money, this extra currency gave the size of the black economy. Criticism on Gutmann's approach is on the use of demand deposits in the numerator. This approach assumes that the increase in ratio would attract people to hold more currency by withdrawing from demand deposits. However, they may instead convert their money from demand to time deposits. Feige (1979), presented his model based on the quantity theory of money by formulating;

$$PT = MV + M'V' \quad (1)$$

Where M and M' are the currency notes and demand deposits, respectively. V and V' are the Velocities (or average turnover) of money of currency notes and demand deposits, respectively. P is the composite price index of existing and newly produced goods and T is the volume of transactions. In this approach, the estimated PT is divided by the observed income to the GNP ratio to get the size of the black economy, where observed income is the product of price index of newly produced goods and real income of the economy. He formulized that the derived nominal GNP and the official GNP are the same in the absence of the black economy. Tanzi (1980, 1983), formulated his methodology based on Cagen's

(1958), work. Cagen explained that the long run behavior of currency-money-supply ratio depends upon expected real per capita income, volume of retail trade, volume of travel per capita, degree of urbanization and tax rate on transactions. According to him, the higher the tax rates, the more the transactions made by currency payments to avoid reporting to the tax collector. Tanzi (1980), re-hypothesized the same link between tax rate and currency-money-supply ratio to obtain alternative estimates of the US black economy. He assumed that currency is used to carry out transactions in the black economy and high taxes are the forces behind the size of the black economy. Tanzi (1980, 1983), postulated the currency in circulation to the money supply ratio ($C/M2$) as a function of top bracket statutory tax rate, weighted average rate on interest income, ratio of personal income tax to personal income net of transfers ($Ti's$), share of wages and salaries in national income (ws/ni), interest rate (r) and per capita income (Y_p). The expected signs for both Y_p and r are negative. This is because economic development in the country measured by per capita income, is assumed to lead to the replacement of currency by cheques, thus causing a fall in $C/M2$. Higher interest rates encourage people to invest currency holdings in time and other forms of deposits and thereby reducing the volume of currency in circulation. On the other hand, higher taxes motivate people to indulge in tax evading activities that are facilitated by the use of currency. Moreover, as the wages are paid in currency, especially of daily workers, an increase in wages will require more currency. Tanzi (1982), also estimated the extent of evaded taxes by multiplying the underground economy by tax-to-GNP ratio. Tanzi's methodology is considered to be the most sophisticated one in estimating the black economy through the monetary approach.

In the context of Pakistan, all attempts followed Tanzi's approach with some modifications. Shabsigh (1995), used the ratio of currency in circulation to demand deposits (M2 minus currency in circulation) as the dependant variable, while the independent variables were real per capita income, real interest rate, per capita banking services, taxes on imports, exports and domestic services. He concluded that the size of the black economy was 21 percent of the Gross Domestic Product (GDP) in 1975, and it declined slightly to 20.4 percent in 1990. Ahmed and Ahmed (1995), came up with the result that this size declined from 52 percent in 1960 to 35 percent in 1990. Iqbal et al (1998), used currency in circulation to M2 ratio as dependant variable while domestic tax-to-GDP ratio, international taxes-to-GDP ratio, real interest rate, real per capita income growth and banking services are used as explanatory

variables. They also used a dummy for the 1988 to 1996 period to capture the effect of the Structural Adjustment Program (SAP). They concluded that the underground economy increased from 20 percent of GDP in 1973 to 51 percent in 1996. Aslam (1998), introduced ratio of currency in circulation and foreign currency accounts to M2 as dependant variable. Independent variables include total tax revenue-to-GDP ratio, interest rate on time deposits and a dummy for the 1991-1998 period, in order to capture the effects of the foreign currency accounts after their introduction in 1991. He reveals that the underground economy has been increased from 29 percent of GDP in 1960 to 44 percent in 1990. Kemal (2003), used the same dependent variable as Aslam (1998), and the explanatory variables were tax-to-GDP ratio, banking services, GDP growth rate and a dummy for the 1990-2002 period. He came up with the results that the underground economy has increased from 20 percent of GDP in 1974 to 54 percent in 1998, and it then declined to 37 percent in 2002. He also used a lagged dependant variable to capture the inertia in variables. Yasmin and Rauf (2004), using similar methodology, found out that the growth rate of the underground economy remained at 12.7 percent and of tax evasion at 10.9 percent during 2001-2002, as against 5.9 percent growth of the GDP. They also ran two other equations with the GDP as dependant variables in both. Explanatory variables in the first equation were tax evasion and lag of the GDP and in the second equation the size of the underground economy and lag of the GDP. They confirmed significant negative effect of both tax evasion and underground economy on the GDP.

As evident, a comparison of these studies in the context of Pakistan reveals contradicting results vis-à-vis the size of the black economy. Econometrically, the bases of these alternative results may include (i) choice of variables, (ii) choice of the estimation period, and (iii) choice of the functional form and underlying assumptions. Short run fluctuations in the selected macroeconomic variables may also distort the inference. Moreover, despite the use of different dummies, no study tried to capture the impact of taxation reforms of the 1990s on the underground economy and this is one of the focuses of our study.

2. DATA AND ESTIMATION METHODOLOGY

The model subject to estimation is based on the methodology of Ahmed and Ahmed (1995), with a slight modification³. We formulate

³ Ahmed and Ahmed (1995), uses a dummy for the 1960-1971 period based on the separation of Bangladesh (former East Pakistan) in 1971, which is replaced by the tax reform dummy in the present exercise.

$$Lncm2 = \beta_0 + \beta_1 Ln(1 + tgr) + \beta_2 Lnr + \beta_4 d_{97} + e \quad (2)$$

where $cm2$ is the ratio of currency in circulation to money supply $m2$, tgr is overall tax-to-GDP ratio, r is weighted average rate of return on deposits and d_{97} is the tax reform dummy, taking the value of 1 from 1997 onwards. We hypothesize a positive link between tax-to-GDP ratio and currency to M2. An increase in the tax rate stimulates people to evade them through using currency transactions instead of bank cheques. On the other hand, increase in the rate of return would induce people to invest in deposits and thereby reducing the currency-money-supply ratio.

Besides the currency ratio equation, another dependant variable is used in a separate regression with the same explanatory variables. This dependant variable includes Bearer Bonds along with the currency in circulation. Bearer bonds were introduced during the mid 1980s to enhance savings and increase investment in the economy. However, these bonds became particularly attractive to those possessing black money since these could be obtained in unlimited quantities and without undergoing any cumbersome documentation procedure. Also, because these can be easily converted into cash at any time, they serve as ready currency. Therefore, the second regression is

$$Lncbm2 = \beta_0 + \beta_1 Ln(1 + tgr) + \beta_2 Lnr + \beta_4 d_{97} + e \quad (3)$$

Where $cbm2$ is (currency + bearer bonds' value)/(M2 + bearer bonds' value). Moreover, as mentioned above, most of the macroeconomic variables are subject to short run fluctuations and thus the resulting variance may distort the final results. To cope with this problem, we use the HP filter (Hodrick and Prescott, 1997), to remove cyclical variations from independent variables. More specifically, let y_t be a series composed of two components: a cyclical component (c_t) and a trend component (τ_t). HP filter isolates c_t from τ_t by minimizing the variance of y_t . To do this, HP filter uses a penalty parameter λ to control the smoothness of the series τ_t . The larger the value of λ , the smoother the series and τ_t becomes a perfect linear trend as $\lambda \rightarrow \infty$. There are various critiques on the use of HP filter for smoothing a series and researchers point out some of the undesirable properties associated with it (Ahumada and Garegnani, 1999 and Ravn and Uhlig, 1997). Ravn and Uhlig (1997, p.1), nonetheless, suggest that '*none of these shortcomings and undesirable properties are particularly compelling: HP filter has withstood the test of the time and the fire of discussion*

remarkably well'. Likewise, Ahumada and Gargnani (1999, p.18), conclude that the criticized drawbacks of HP filter 'do not appear to have had great effect on its wide use in empirical research'. Figures 1(a), 1(b) and 1(c) in the appendix-A compare the actual and filtered series used in regression. Different values of smoothing penalty λ are chosen for different variables depending upon the empirical practices⁴. Furthermore, we use the Moving Average (MA) technique to deal with the problem of autocorrelation in both equations.

Rest of the analysis follows the typical path. From equation 2, predicted value of ratio $cm2$ is computed for each year first with tax variable ($cm2_t$) and then without tax variable ($cm2_{wt}$). The difference between with tax and without tax ratio gives us an indication regarding the level of currency holdings stimulated by taxes. This difference is multiplied by M2 to obtain the level of illegal money. Mathematically:

$$\text{Illegal Money (IM)} = (cm2_t - cm2_{wt}) \cdot M2 \quad (4)$$

The size of the black economy can be obtained by multiplying illegal money by velocity of money. Velocity of money equals the ratio of the GNP to legal money. Moreover, total money in the economy can either be legal or illegal. Therefore, legal money is computed by taking the difference between total money supply and illegal money. Mathematically:

$$\text{Legal Money (LM)} = M2 - IM \quad (5)$$

$$\text{Velocity of Money (v)} = \frac{GNP}{LM} \quad (6)$$

$$\text{Black Economy (BE)} = IM \cdot v \quad (7)$$

Finally, level of tax evasion is obtained by multiplying the size of the black economy to the ratio of tax-to-GNP.

$$\text{Tax Evasion} = BE \cdot \left(\frac{\text{Taxes}}{GNP} \right) \quad (8)$$

The same process is applied for equation 3. Furthermore, we assume that the velocity of money is the same for both illegal and legal money. Rationally, when the black money is used in regular markets for transactions, it should behave in the same manner as white money does in order to appear regular and legitimate.

⁴ λ for tgr takes the value 50 and 10, respectively, in equation 2 and 3 while λ is 50 for r in both the equations. Empirically, Hodrick and Prescott (1997), suggest $\lambda \leq 100$ and Maravall and del Rio (2001), propose $6 \leq \lambda \leq 14$ in case of annual data.

The data for our analysis covers the 1960 to 2003 period and is obtained from various issues of the Pakistan Economic Survey and the State Bank of Pakistan's (SBP's) Annual Reports.

3. ESTIMATION RESULTS

Table 1 shows the results from regression equations 2 and 3. All variables are highly significant at 1 percent level. Moreover, goodness of fit and F-ratio are also quite high. In both regressions, tax-to-GDP ratio (tgr) possesses the

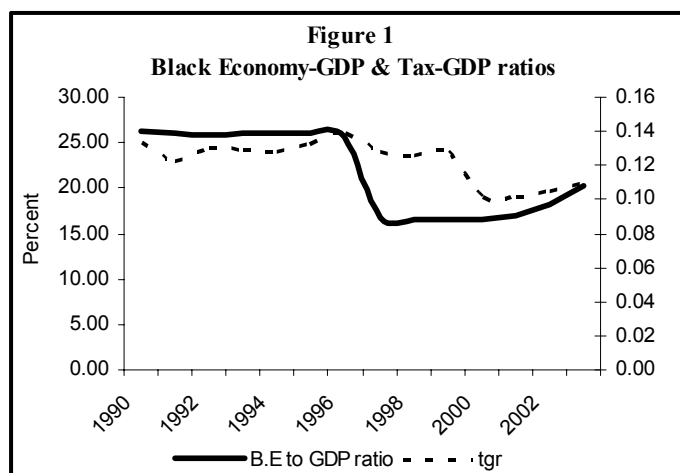
	Equation 2 Currency Ratio (cm_2)			Equation 3 Currency + Bond Ratio (cbm_2)		
	Coefficient	Standard Error	p -value	Coefficient	Standard Error	p -value
Constant	-1.100	0.170	0.0000	-1.229	0.162	0.0000
tgr	8.805	2.496	0.0011	10.311	2.346	0.0001
r	-0.597	0.075	0.0000	-0.584	0.072	0.0000
d_{97}	-0.344	0.057	0.0000	-0.233	0.059	0.0003
N	44			44		
R^2	0.88			0.85		
dw-statistic	1.77			1.70		
F-statistic	77.90			57.44		

positive sign of confirming the hypothesis of increasing currency-money supply ratio with increasing tax rates. Sign of weighted average rate of return (r) is negative, which also confirms our hypothesis that the higher the rate of return on deposits, the higher the savings and the lower the currency-M2 ratio. The coefficients of these two variables, especially tgr , are quite higher than Ahmed and Ahmed (1995). The reason is the use of filtered tgr and r , which removed the cyclical fluctuations, thus increasing the coefficients by making the trend components in both the series stronger.

Dummy variable for tax reforms (d_{97}) is also highly significant bearing the negative sign. The tax reform exercise reached its peak in 1997, after a few important steps were taken. These steps included, inter alia, the substantial decrease in the personal income tax rate to 20 percent, reduction in corporate tax rate, withdrawal of turnover tax and some of the withholding taxes, strengthening the tax administration and improvements in tax documentation. Negative sign of dummy in both the equations implies that these exercises were significant in reducing the cm_2 and cbm_2 ratios, and thus contracting the size of the black economy. After the estimation, we obtained the size of the black economy explained by Equations 4 through 8. The results are shown in Table 2 and 3. The black economy in Pakistan turns out to be at its peak during the early 1960s, when the corporate and personal

income tax rates were high. The corporate income tax rate was 30 percent including 30 percent super tax during that time. This (aggregate corporate income and super tax of 60 percent) rate was dropped to 40 percent during the late 1980s. Likewise, the maximum personal income tax rate was 75 percent during the 1960-64 period, which was the reason for the black economy to remain well above 30 percent of the GDP during the same period. The black economy kept declining during the 1965-75 period, when this rate was brought down within the 60-70 percent range (Qureshi, 1989, pp.23). Furthermore, this rate was 56 percent during 1980-1986, later brought down to 39 percent in 1988 and subsequently, to 28 percent in 1993 – the effect of which is consequently reflected by the shrinking black economy in the periods under review. However, it is interesting to note that Kemal (2003), reports an increasing trend of the black economy during 1995 and 1998 – which is contrary to our results. A possible explanation could be the tax reform effect, which was absent in Kemal (2003). Furthermore, results of Kemal (2003) are based on a special specification where lagged dependent variable is used as explanatory variable with a high positive coefficient.

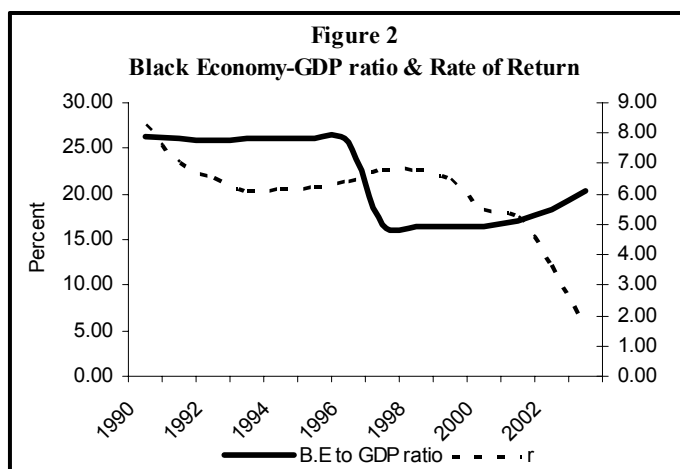
In the present study, the impact of tax reforms is dominating and evident from both Tables 2 and 3. The black economy as a percentage of GDP declined by nine percentage points in case of both currency ratio and currency bearer bond equation during 1996 and 1997. The corresponding decline in tax evasion as



percentage of GDP was 39 percent and 32 percent, respectively, for both methods. Figure 1 and 2, respectively, plot tgr and r against the black economy-to-GDP ratio estimated using equation 2⁵. The black economy remained relatively high during the early 1990s at around 26 percent of GDP. During that period, tax-to-GDP ratio was almost stagnant at 13 percent and the rate of return on deposits was falling - a disincentive to withdraw from activities

⁵ Plotting these two variables with the black economy-to-GDP ratio estimated using equation 3 brings the similar conclusion.

related to the black economy. Nevertheless, during 1996-97, tax-to-GDP ratio dropped to 12.7 percent after touching its peak at 14 percent, coupled with the increase in rate of return from 6.4 percent to 6.8 percent. Both these factors, especially the tax reform effect, played a significant role in slashing the black economy. It is



also imperative to note that the further decline of tax-to-GDP ratio during the 1999-00 period, which does not appear to have great impact on the size of the black economy, was actually the result of re-basing of the country's GDP. On the other hand, the sharp decline of rate of return on deposits from 1998 onwards, acted as a hurdle in reducing the size of the black economy.

The inclusion of bearer bonds with currency in circulation, as shown in Table 2, does not alter the direction of outcomes. It, however, is imperative to increase the magnitude of the black economy as a percentage of the GDP. This suggests that bearer bonds are quite a reliable medium of exchange in the underground economy alongside currency. Roughly, it can be seen that the inclusion of bearer bonds increases, on an average, the black economy as a percentage of the GDP by 5 percentage points each year. Bearer bonds were introduced during the mid 1980s to promote savings in Pakistan. Later on, they became a handy medium of exchange due to their limited physical quantity requirement for any transaction as against currency and also because of their hassle-free acquisition. It is quite interesting to note that the annual compound growth rate of currency in circulation and bearer bonds during the last two decades remained almost the same; i.e. at 12 percent. Moreover, also note that the size of the black economy has slightly increased from 2000 onwards. This is, perhaps, due to the reduction of rate of return on deposits, which declined by more than 30 percent during the 2000-2003 period, revealing the weak stance of the monetary policy. On the other hand, the effective coverage of indirect as well as direct taxes was increased during the same period. This brought some of the untaxed sectors into the tax net, causing the tax-to-GDP ratio to increase slightly by 0.26 percent during the same period.

4. CONCLUSION AND POLICY IMPLICATIONS

In this paper, we have attempted to estimate the size of the unreported part of the economy that is being caused by tax evasion. This becomes of special importance once the impact of taxation reforms is incorporated. Overall, the black economy has a declining trend as a percentage of GDP. This is due to the tax reforms involving rationalization of tax rates. Inclusion of bearer bonds as a medium of exchange significantly increases the size of the black economy. After their inception during the mid 1980s, the volume of bearer bonds has been growing almost at the same pace as currency in circulation. Despite the fact that the black economy as a percentage of the GDP has decreased, the annual compound growth rate of the black economy during the sample period remained more than 11 percent. At disaggregated level, this growth remained at 2 percent during the 1960s, 17 percent during the 1970s, 15 percent during the 1980s and 13 percent during the 1990s and onwards (see Table 3). Similarly, tax evasion grew at the rate of 12 percent. This growth remained at 5 percent during the 1960s, 19 percent during the 1970s, 16 percent during the 1980s and 11 percent during the 1990s and onwards. These results are approximately same for both equations. It is also worth mentioning that due to the strong underlying assumptions of Tanzi (1980, 1983), estimates of the black economy cannot be taken as precise measures. They can, nevertheless, be effectively used to deduce broad trends and directions.

In the light of above discussion, therefore, several suggestions pertaining to policy actions can be made. Although increase in the direct tax revenue is vital for a developing country because of its redistributive effects, the medium of this increase, nonetheless, cannot solely be the increase in tax rates since this gives rise to tax evasion. Instead, broadening the tax base would be an ultimate solution. To supplement these efforts, official administration regarding the detection and hammering of tax evasion should be improved. Tax reform process should be consolidated and integrated with other macroeconomic reforms. The presence of loopholes in the system and the prevailing corruption among the tax collection authorities cannot be neglected when dealing with the issue of evasion. These inefficiencies must be dealt accordingly in order to curb the tax deadweight losses and to reduce the cost of being part of the reported economy.

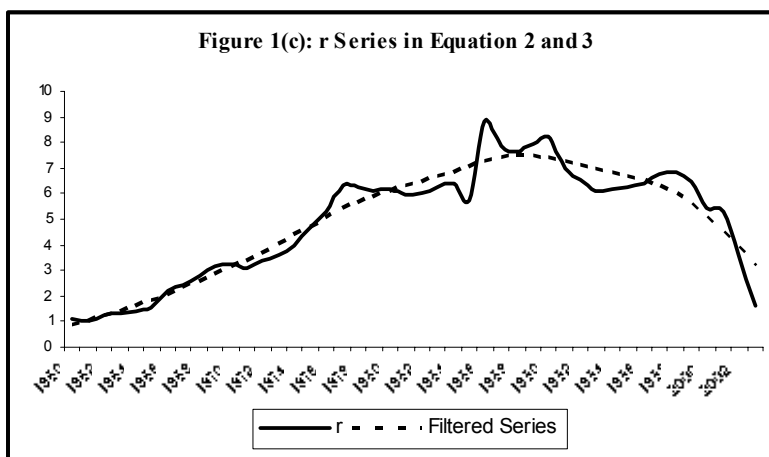
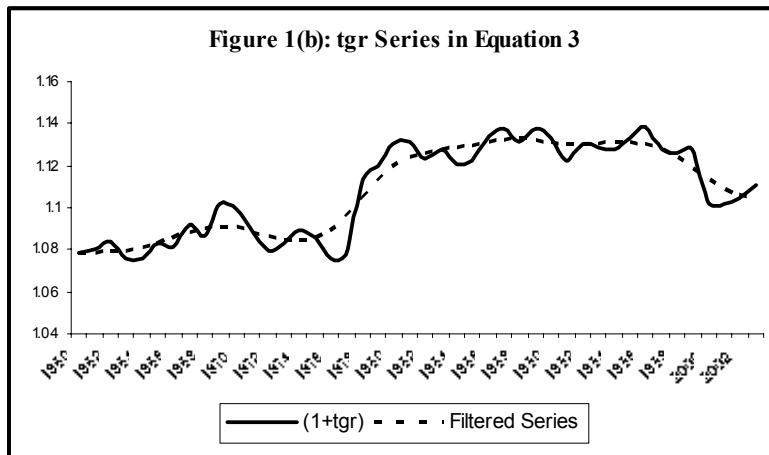
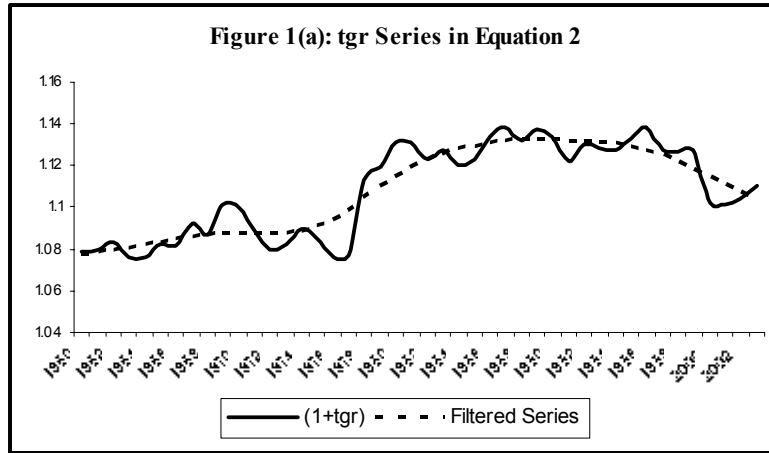
Table 2
Estimates of the Black Economy via Equation-2

Year	Illegal Money (Million Rs)	Legal Money (Million Rs)	Velocity of Money	Black Economy (Million Rs)	Black Economy as % of GDP	Tax Evasion (Million Rs)	Tax Evasion as % of GDP
1960	1,994	3,862	4.6	9,206	51.6	722	4.0
1961	1,820	4,058	4.8	8,784	44.8	705	3.6
1962	1,745	4,360	4.7	8,207	40.0	687	3.3
1963	1,863	5,124	4.3	8,000	36.3	611	2.8
1964	1,990	5,950	4.2	8,276	33.4	628	2.5
1965	2,043	6,578	4.3	8,752	31.0	726	2.6
1966	3,152	10,852	2.9	9,061	29.0	740	2.4
1967	3,355	12,279	2.9	9,698	27.3	894	2.5
1968	3,436	13,349	2.9	9,945	25.7	864	2.2
1969	3,599	14,849	2.8	10,015	24.2	1,019	2.5
1970	3,787	16,653	2.9	10,860	22.7	1,077	2.3
1971	3,845	18,068	2.8	10,792	21.2	960	1.9
1972	3,864	19,339	2.8	10,943	20.0	869	1.6
1973	4,313	22,755	3.0	12,879	18.8	1,072	1.6
1974	4,738	25,941	3.4	16,205	18.3	1,451	1.6
1975	5,035	28,039	4.0	20,173	18.1	1,705	1.5
1976	6,382	35,269	3.8	24,132	18.4	1,801	1.4
1977	8,163	43,610	3.6	29,057	19.3	2,174	1.4
1978	10,508	53,151	3.5	37,280	21.0	3,962	2.2
1979	13,658	64,954	3.2	44,083	22.5	4,936	2.5
1980	16,837	75,587	3.3	56,315	24.0	6,844	2.9
1981	19,790	84,831	3.5	70,193	25.2	8,517	3.1
1982	22,621	93,889	3.7	83,649	25.8	9,621	3.0
1983	28,812	117,213	3.4	99,254	27.2	11,424	3.1
1984	32,486	130,781	3.5	114,113	27.2	12,580	3.0
1985	36,733	147,172	3.5	127,409	27.0	14,457	3.1
1986	42,223	168,888	3.3	138,974	27.0	17,227	3.3
1987	48,057	191,966	3.2	152,420	26.6	19,764	3.5
1988	54,021	215,493	3.3	176,604	26.1	22,300	3.3
1989	58,338	232,119	3.4	200,262	26.0	26,519	3.4
1990	68,775	272,477	3.3	224,810	26.3	28,775	3.4
1991	81,192	319,452	3.3	264,487	26.0	31,595	3.1
1992	103,197	402,372	3.0	312,317	25.9	40,222	3.3
1993	122,315	473,075	2.8	347,238	26.0	44,336	3.3
1994	145,027	558,371	2.8	406,505	26.0	51,844	3.3
1995	169,971	654,761	2.9	488,024	26.2	64,394	3.5
1996	192,455	746,225	2.8	544,964	25.7	75,802	3.6
1997	151,794	901,439	2.7	405,646	16.7	52,316	2.2
1998	172,373	1,033,947	2.6	442,339	16.5	56,356	2.1
1999	182,318	1,098,228	2.7	483,563	16.5	62,267	2.1
2000	200,718	1,199,914	3.1	626,533	16.5	64,703	1.7
2001	223,955	1,302,089	3.2	706,590	17.0	72,668	1.7
2002	270,627	1,490,743	3.0	803,375	18.3	83,381	1.9
2003	342,507	1,736,262	2.9	981,029	20.3	105,340	2.2

Table 3
Estimates of the Black Economy via Equation-3

Year	Illegal Money (Million Rs)	Legal Money (Million Rs)	Velocity of Money	Black Economy (Million Rs)	Black Economy as % of GDP	Tax Evasion (Million Rs)	Tax Evasion as % of GDP
1960	2,202	3,654	4.9	10,743	60.2	843	4.7
1961	1,996	3,883	5.0	10,066	51.3	808	4.1
1962	1,899	4,206	4.9	9,258	45.1	775	3.8
1963	2,014	4,972	4.4	8,912	40.4	681	3.1
1964	2,157	5,783	4.3	9,231	37.2	700	2.8
1965	2,247	6,374	4.4	9,935	35.2	824	2.9
1966	3,545	10,460	3.0	10,572	33.8	863	2.8
1967	3,871	11,763	3.0	11,681	32.9	1,077	3.0
1968	4,045	12,741	3.0	12,264	31.7	1,066	2.8
1969	4,278	14,170	2.9	12,476	30.2	1,270	3.1
1970	4,456	15,984	3.0	13,313	27.9	1,320	2.8
1971	4,397	17,516	2.9	12,730	25.1	1,133	2.2
1972	4,263	18,940	2.9	12,327	22.5	979	1.8
1973	4,612	22,456	3.0	13,957	20.4	1,162	1.7
1974	4,954	25,725	3.4	17,085	19.3	1,530	1.7
1975	5,201	27,873	4.0	20,958	18.8	1,771	1.6
1976	6,641	35,010	3.8	25,294	19.3	1,888	1.4
1977	8,800	42,973	3.6	31,789	21.1	2,378	1.6
1978	11,967	51,692	3.6	43,651	24.6	4,639	2.6
1979	16,304	62,308	3.4	54,854	28.0	6,142	3.1
1980	20,658	71,766	3.5	72,774	31.0	8,844	3.8
1981	24,386	80,235	3.8	91,451	32.9	11,096	4.0
1982	27,530	88,980	3.9	107,421	33.1	12,355	3.8
1983	34,463	111,562	3.6	124,733	34.2	14,357	3.9
1984	38,284	124,983	3.7	140,721	33.5	15,513	3.7
1985	43,058	140,847	3.6	156,056	33.1	17,707	3.8
1986	49,645	161,466	3.4	170,918	33.2	21,187	4.1
1987	56,702	183,321	3.3	188,322	32.9	24,419	4.3
1988	63,679	205,835	3.4	217,946	32.3	27,521	4.1
1989	68,464	221,993	3.6	245,742	32.0	32,542	4.2
1990	80,064	261,188	3.4	273,025	32.0	34,947	4.1
1991	93,873	306,771	3.4	318,436	31.3	38,040	3.7
1992	119,473	386,096	3.2	376,814	31.3	48,529	4.0
1993	142,737	452,653	3.0	423,494	31.8	54,073	4.1
1994	171,428	531,970	2.9	504,352	32.3	64,323	4.1
1995	203,738	620,994	3.0	616,788	33.1	81,384	4.4
1996	232,542	706,138	3.0	695,855	32.8	96,791	4.6
1997	204,086	849,147	2.8	578,976	23.8	74,670	3.1
1998	228,704	977,616	2.7	620,712	23.2	79,082	3.0
1999	236,883	1,043,663	2.8	661,133	22.5	85,132	2.9
2000	254,500	1,146,132	3.3	831,687	21.9	85,889	2.3
2001	280,262	1,245,782	3.3	924,212	22.2	95,049	2.3
2002	339,024	1,422,346	3.1	1,054,809	24.0	109,477	2.5
2003	433,071	1,645,698	3.0	1,308,692	27.1	140,524	2.9

**APPENDIX A
COMPARISON OF FILTERED Vs. ACTUAL SERIES**



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