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Exploring and Estimating the Size of Shadow Economy by Using Monetary Approach: Case Study of Pakistan

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ABSTRACT

The core purpose of present article is to explore and estimate the size of Shadow Economy of Pakistan. The study used annual Time series data from time span of 1980 to 2018. The present research introduced Lending Interest Rate as additional variable for the very first time to estimate the Shadow or dim Economy. The study also focused on Currency Demand Approach (CDA) which is the best way of estimation the size of S.E. The results of ARDL, Unit Root Test (ADF) and Bound Test have also generated for the purpose. The study investigated positive relationship between Currency Circulation to Money Supply Ratio and GDP, Inflation, Interest rate and Total Tax Revenue through ARDL and estimated the required Shadow Economy. The study also explored the Shadow Economy. The study also explored the Shadow Economy of Pakistan and estimated the size of S.E. Size of tax evasion community has also derived by present research which represent that taxes are not the only measures of Shadow Economy.

1. Introduction

The shadow or black economy alludes to entire action work and business transactions that happen 'underneath the radar' and intentionally disguised – a financial movement that is undeclared and for which burdens that ought to be paid are not paying. Otherwise called the casual area, the dark economy, the black economy, or the dim economy, Shadow Economy also involves various crimes, for example, drug dealing and sneaking, just as legitimate positions, such as cultivation(involve child labor), working in development(disguised employment), or offering items to road drivers at rush or traffic signal places. Such type of the economy additionally involves such conditions where people are forced to work as serves without remuneration, or conditions where work is done in recompense for material things except cash. When fiscal experts are ascertaining the (GDP) of a nation, they must keep out things which contribute in the Shadow Economy. This scenario shows that each nation around the world is presumably significantly cash-rich than the officials measurements propose.

Statement of the Problem

Pakistan is a developing country and being so it's facing so many economic problems like inflation, corruption, illegal activities etc. that's are some reasons also behind the lower GDP of Pakistan. Unfortunately these illegal activities contribute to an unofficial sector mostly known as "Shadow Economy". Reorganization and measurement of S.E has been always

remaining tough job for economist. In recent years there is a great debate about an Informal, Unparalleled and Unofficial sector all around the world, but in Pakistan, a few of piece of attempts are shown to estimate the Shadow economy and all have done along MIMIC or Electricity Approaches. Entire research which presented long-run estimation of shadow economy are sufficient till 2015.The need of the time was the computation of the extent of Shadow or dim economy through recent data and the use of advanced methods for best estimation.

Objective of the Study

The core objective of present study insists to explore and estimate the size of Shadow Economy (S.E) of Pakistan and to see the correlation between different macroeconomic variables. Present study also aims to analyze the effect of Lending Interest Rate (LEINT), Gross Domestic Product (GDP), Inflation (INF) and Total Tax Revenue (TTR) on the Currency Demand. Our paper also motivated to give the graphical representation of S.E and Tax Evasion community, and to give the policy recommendations on the behalf of the present research to contribute in the betterment of Pakistan Economy.

Significance of the Study

Present study estimates the size of Shadow Economy (S.E) of Pakistan and discusses the empirical aspect of the S.E and highlights the synchronous methodologies which used for obtaining the purpose. The study also analyzed the long run relationship among macroeconomic variables for the current time period and used Lending Interest Rate as an additional variable for estimation which is never used before for this purpose.

Scope and Limitation of the Study

The scope area of the study is to explore that sector of economy which is unofficial and not govern by any Government authority. This article attempts to point out Shadow or dim Economy of Pakistan, so that it can be merged in official economy and contribute in betterment of Pakistan economy.

2. Review of Literature

There are many studies about developing and non-developing countries in which concept of "Shadow Economy" have been discussed. These studies analyzed extent of Shadow Economy how tax evasion encourage the Shadow Economy. Some famous studies reviews are given below:

Tan et al., 2017 examined the area of the black economy for eighty countries for the time span of 1975-2012. The study involves Currency Demand Approach (CDA), Macroeconomic Uncertainty Index (MUI), Dynamic Factor Model (DFM) and Pooled Mean Group (PMG). The empirical results showed the presence of long run relationships between variables and in terms of the adjustment coefficient. There was a visible cross regional variation with the lowest of 0.182 and the highest of 0.414. The macroeconomic uncertainty index variable show positive relationship, suggested that public tend to hold more currency in an uncertain macroeconomic environment. The developing country had relatively growing shadow economy (ranging from 19.9% to 37.3%). On average, the world computed the shadow economy as share % of GDP about 23.1%.

Ashok et al., 2016 examined observational and hypothetical ideas that inferred the shadow exercises in the official economy. The strategy includes MIMIC, ARDL, Error Correction terms (ECM), Engle, and Granger approach. Itemized econometric examinations have been directed to assess area and/or elements of Pakistan's unofficial economy. Investigation utilized the ARDL technique in the money request model to get a point

assessor of the shadow economy which is utilized in the MIMIC model to comprehend the elements of shadow economy since quite a while ago run. The assessed width of the shadow economy depended on just a pointer taxation rate. The length of the shadow or dim economy is steady for the test timeframe around half of the official GDP. While in the 1990s abnormal enlargement of the shadow economy around 70% of official one has seen because of bountiful tax avoidance in this period. Shahid, 2014 examined the short-run relationship and since quite a while ago run the connection between workforce, net fixed capital, and monetary development in Pakistan. The technique utilized Augmented Dicky Fuller, Phillip Perron, Johnson co-joining test, and vector blunder adjustment model. The time arrangement information was utilized from 1980-2012.Asiedu and Stengos, 2014 determined the extent of underground economy in country of Ghana. The time series data has been used from 1983 to 2003. The study adopted currencydemand-approach to estimate the area of Shadow economy in Ghana. Results of the currencydemand model showed impact of the unofficial economy, this make interest rate statistically insignificant. The study estimated the average of underground economy which was approximately 35% of GDP from 1983 to 2003. In 1985 the average is high as 54% and in 1999 low as 25%. The long run average size of the Shadow economy to GDP for Ghana by time series data was 40%.

Schneider and Buehn, 2013 examined the Size of the black economy, Methodologies, Open Questions and hurdles driven by it. The examination focused on two points. The first is the nonappearance of the ideal method for evaluation of the area of shadow economy. The investigation similarly prescribed the MIMIC strategy used to get full-scale examinations of the size of the shadow economy. Also, the investigation underlined the definition and causal indicators of the shadow or black economy to assess the extent ofthe shadow economy using particular evaluation procedures. The finding showed that the genuine significance of the shadow economy is up 'til now missing. The association among the speculation and trial appraisal of the shadow economy is up 'til now unacceptable thusly a satisfactory endorsement procedure should be created for the observational results to make it less difficult to condemn their believability.

Schneider, 2011 inspected the turn of events and the size of the black economy, undeclared work of workforce in OECD. The examination has taken creating and progress nations additionally into thought. The most persuasive variables on the shadow economy or potentially shadow workforce are charge arrangements and state guidelines, which, if they rise, increment both. Ongoing examinations cleared the financial chances, the general circumstance on the work market, and joblessness are critical for a comprehension of the elements of the shadow economy and its workforce. 48 million shadow economy workforces in exceptionally created OECD nations (Austria, Denmark, France, Germany, Italy, Spain, and Sweden) work illegally from 1997 to 1998.

Farooq et al., 2010 investigated the estimation about the extent of black economy of Pakistan, long run r/p between currency demand and rest of concerned variables including tax to Gross Domestic Product ratio, financial sector development, interest rate and education. The study involved monetary approach, electricity consumption approach, and MIMIC model and ARDL model. The time series data used from 1966-2008. Findings showed ARDL technique for estimation of currency demand equation and education even as a –ive impact factor for unofficial economy. The ARDL approach and electricity consumption approach showed increased underground economy. The MIMIC mode reflects the size of informal economy, which is about 30%.

Buehn et al., 2010 analyzed that the elasticity for money for shadow economy and for official GDP of German economy. The study emphasized difference between recorded output and actual output in monetary approach. In the unofficial economy all business

transactions are typically carried out using payment method of cash. The findings proved that elasticity for money of shadow economy is much smaller than for official GDP. The second model which used to estimate money demand, is error correction model. The error correction model indicate that inclusion of shadow economy output measures can perform fast and better estimation of a money demand function.

Masood and Hussain, 2008 explored the connection between the dark economy and macroeconomic variables (charge changes).The examination said that it was the first complete exercise to apply duty and tax change of the 1990s, it turns out to be exceptionally attractive to measure its effect on the dark economy and tax avoidance rehearses. The dark economy in Pakistan ends up being most noteworthy in the mid-60s when the corporate and individual annual expense rates were high. Total corporate pay and super duty rate were dropped to 40 percent in the later piece of the 80s. During the 1960s the underlying degree of the dark economy was high, so its development rate was low, around 2%. The most extreme individual annual assessment rates making the dark economy stay well above 30% of GDP throughout the timeframe of 1960-64. All the outcomes appear to accord with financial instinct. They indicated the dark economy as a level of GDP is diminishing over the long haul particularly after the thorough time of expense changes from 1997. A decrease in charge income because of diminished duty rates may adversely affect the financial government assistance of society.

Kemal, 2007 estimated the black economy by utilizing K and Q technique, the fundamentally disparity technique essentially they have determined the absolute utilization in private areas, from the household review of populace then it is changed for net exchange and ascertain genuine gauge of GDP, which is contrasted with the GDP of National Income Accountability. The distinction b/w these two Gross Domestic Products is equivalent to the parallel economy. This investigation shows that size of the unofficial economy is ascending till the 1990s.

Alfredo et al., 2006 investigated the interest of the Currency Approach and the extent of parallel Economy. As per the investigation, a way to deal with estimation of the area of the parallel economy, refer as "the money-related technique" depends on econometric appraisals of the cash interest. Appraisals ascertain the abundance dissemination of cash held by financial operators for money enrolled exchanges. This measure gave the concealed estimation of GDP. The standard cash approach utilizes the 17 abundance of money duplicated by the speed of flow to quantify concealed GDP. It is just precise if the pay flexibility is one. Just money is utilized for exchanges in the black economy. The reasoning of technique depends on the possibility of various pay/cash proportions. Discoveries recommended that the suspicion normally made in applied works of equivalent speeds along with pay versatility gauges comparatively lower than one result in figures, one-sided upwards and vice versa for the shadow economy.

3. Theoretical Framework of the Model

The money demand approach was first used by Cagan, 1958 who considered the association between cash revenue and appraisal pressure (as one explanation behind the shadow economy) for the United States for the time span of 1919 -1955. Following 20 years Gutmann, 1977 applied a comparable technique anyway with no quantifiable systems. Cagan's philosophy was also advanced by Tanzi, 1980, and 1983 who evaluated a money demand work for the United States for the period 1929 to 1980 to discover the size of the shadow economy. His strategy anticipates that shadow (or concealed) trades are held onto as cash portions, to leave no discernible follows for the pros. Development in the size of the shadow economy will in this manner extend the premium in cash. To disengage the resulting

plenitude of premium for cash, a condition for money demand is evaluated after some time. All customary likely components, for instance, the progression of pay, portion inclinations, advance charges, credit, and other commitment cards as a replacement for cash, and so forth, are controlled for. Also, such factors as the prompt and circumlocutory tax collection rate, government rule, state associations, and evaluation soul, which are believed to be the principal contemplations making people work in the shadow economy, are associated with the appraisal condition. The fundamental backslide condition for the cash revenue, developed by Tanzi, 1983 going with:

$$ln\,(C\,/\,M2)t\;=\;\alpha O\;+\;\alpha 1\,ln\,(1\;+\;TW)t\;+\;\alpha 2\,ln\,(WS\,/\,Y)t\;+\;\alpha 3\,lnRt\;+\;\alpha 4\,ln\,(Y\,/\,N)t\;+\;ut \quad \ldots(3.1)$$

with α1 > 0, α2 > 0, α3 < 0, α4 > 0, where ln implies basic logarithms, C/M2 is the extent of cash property to current and store accounts, TW is a weighted ordinary evaluation rate (to middle person changes in the size of the shadow economy), WS/Y is an extent of wages and pay rates in broad daylight pay (to find changing portion and money quick pauses), R is the superior paid on saving finances stores (to get the open entryway cost of holding cash) and Y/N is the per-capita installments. Any "surplus" increment in real money or the aggregate unexplained by standard or run of the mill segments is then credited to raise the assessment rate and various reasons driving people to work in the shadow economy. Figures for the size and improvement of the shadow economy can be resolved in an underlying advance by differentiating the qualification between the headway of cash when the prompt and variant tax collection rate and government-rule have held all things considered diminished characteristics and the progression of money with the present higher load of duty evaluation and government-rule. Expecting in a second step a comparable compensation speed for money used in the shadow economy concerning genuine money in the official economy, the area covered by of the unofficial economy can be enlisted and diverged from the official GDP. This is one of the most typically accepted philosophies. It has been used for various countries wherever on the planet.

4. The Methodology of the Study and Sources of Data

4.1 Brief Explanation of Variable

Currency Circulation to Money supply ratio (CM):

CM is the proportion of cash course to cash gracefully proportion, which speaks to the interest in money. (Current possessions to M2 and stores accounts)

Gross Domestic Product (GDP):

Total national output per capita is GDP apportioned by mid-year people. Gross Domestic Product is the measure of gross worth adds up by all occupant suppliers of the economy notwithstanding anything costs and less any gifts rejected from assessment of the material things. It is resolved without making inductions for the disintegration of made assets or fatigue and defilement of trademark resources.

Inflation (INF):

Expanding as evaluates by the client esteem list reflects the yearly rate change in price for the ordinary customer of getting a container consists on items and endeavors that sometimes changed at decided schedules fixed in nature , for instance, yearly.

Interest Rate (LEINT):

The advancing rate is the percentage levied from the banks on credits to the private region. It is commonly the bank rate that by and large meets the short-term and also medium-term financial needs of the private territory.

Total Tax Revenue (TTR):

Hard and fast cost pay exhibits the part of a country's yield that is assembled by the organization through obligations. It will in general be one extent of how much the organization controls the economy's resources.

4.2 *Data Sources*

ARDL Research study focused on secondary type and time series data for the time span of 1980-2018. The sources of above mentioned data are official websites of "trading economics", "world development indicator" and "The Global economy.com".

4.3 *The general equation of ARDL*

The general equation of ARDL can be represented as:

$$\Delta(LCM)\alpha_0 + \sum_{i=1}^{A} \alpha 1i\, \Delta(LCM)_{t-i} + \sum_{i=0}^{B} \alpha 2i\, \Delta(GDP)_{t-i} + \sum_{i=0}^{C} \alpha 3i\, \Delta(INF)_{t-i} + \sum_{i=0}^{D} \alpha 4i\, \Delta(LEINT)_{t-i} + \sum_{i=0}^{E} \alpha 5i\, \Delta(TTR)_{t-i} \quad \ldots(4.3.1)$$

And

$$\alpha 6(LCM)_{t-1} + \alpha 7(GDP)_{t-1} + \alpha 8(INF)_{t-1} + \alpha 9(LEINT)_{t-1} + \mu_i \quad \ldots(4.3.2)$$

The above equation represents the general equation of ARDL that shows the long run and short run relationship between variables.

Where,

α_o = Intercept

$\alpha 1, \alpha 2, \alpha 3, \alpha 4, \alpha 5$ = Short term co-efficient of variables

$\alpha 6, \alpha 7, \alpha 8, \alpha 9, \alpha 10$ = Long term co-efficient of variables

μ_i = Error term

After ARDL equation, we are comparing the computed and tabulated F-Statistics to see the long run relationship. For this purpose, we are making null and alternative hypothesis to establish long run relationship between variables.

5. Hypothesis of concerned Study

Examination is attempting that theory of zero-effect of self-ruling components on a subordinate variable. It's undertaking to check whether the free factors hugely affect the subordinate variable or not so, there is Π to check whether it is equivalent to zero digit or not. The Mathematical form of this hypothesis is made as:

$\mu_0 = \alpha 6 = \alpha 7 = \alpha 8 = \alpha 9 = \alpha 10 = 0$

$\mu_1 = \alpha 6 \neq \alpha 7 \neq \alpha 8 \neq \alpha 9 \neq \alpha 10 \neq 0$

Null Hypothesis

$\mu_0 = \alpha 6 = \alpha 7 = \alpha 8 = \alpha 9 = \alpha 10 = 0$

(Long run relationship between variables does not exist)

Alternative Hypothesis

$\mu_1 = \alpha 6 \neq \alpha 7 \neq \alpha 8 \neq \alpha 9 \neq \alpha 10 \neq 0$

(Long run relationship between variables exist)

(Long run relationship exists)

As we see hypothesis testing, there will be long run relationship or the existence of co-integration in the variables if the computed F-statistics will likely to be excess of upper bound. However, if the calculated F-statistics are less than the specified lower bound, it shows the absence of long run relationship.

The null hypothesis of no long run relationship can be rejected if the computed value of F-statistics is greater than upper bound and we accept the alternative hypothesis that long run relationship exists. On the other hand, if the calculated F-statistics are less than the specified lower bound then null hypothesis cannot be rejected and we say that long run relationship does not exists. The results are inconclusive, if computed F-Statistics lies between upper and lower bound.

The long run relationship between dependent and independent variables has been shown in the given equation. In the previously defined equation, "i" denotes optimal number of lags that can be nominated by using AIC criteria.

$$LCMt = \alpha_0 + \sum_{i=1}^{a1} \alpha 1i\ (LCM)_{t-i} + \sum_{i=0}^{a2} \alpha 2i\ (GDP)_{t-i} + \sum_{i=0}^{a3} \alpha 3i\ (INF)_{t-i} + \sum_{i=0}^{a4} \alpha 4i\ (LEINT)_{t-i} + \sum_{i=0}^{a5} \alpha 5i\ (TTR)_{t-i} + ut \quad \ldots(5.1)$$

The short run dynamic parameters can be obtained by estimating following error correction model associated with long run elasticity's after estimating the long run model. The lag term of currency circulation to money supply ratio is included in this equation to adjust the data.

$$\Delta(LCM)t = \gamma_0 + \sum_{i=1}^{b1} \gamma 1i\, \Delta(LCM)_{t-i} + \sum_{i=1}^{b2} \gamma 2i\, \Delta(GDP)_{t-i} + \sum_{i=0}^{b3} \gamma 3i\, \Delta(INF)_{t-i} + \sum_{i=0}^{b4} \gamma 4i\, \Delta(LEINT)_{t-i} + \sum_{i=0}^{B5} \gamma 5i\, \Delta(TTR)_{t-i} + \lambda(ECM)_{t-1} + \mu_i \quad \ldots(5.2)$$

This equation shows the short run relationship between dependent and independent variables. In this short run equation, the lagged term of Error Correction model (ECM) t-1 is added to adjust the results. Error correction model shows the short run and long run effect on X and Y variable and speed of adjustment.

6. The Data Analysis, Empirical Results, and Interpretation

6.1 ADF

Above all conditions, we have applied the expanded Augmented Dickey-Fuller refer as ADF , unit root test for each factor that tested for criticalness of the free factors expecting that the preference of slacks is consisted to guarantee non-extra autocorrelation. After first differentiation results over entire the period and at the level both are represented in Table 6.1. The overall test exhibits that entire components contain mixes of unit root at the level as they were going to be fixed behind the chief qualification and at the level.

Table 1

Results of Unit Root test

(Augmented Dickey Fuller test)

Variables	On=Level		On 1st Difference		Conclusion
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	
LCM	--	- -	-4.486659 (0.0010)	- -	I(1)

GDP	-3.861527 (0.0002)	- -	--	- -	I(0)
INF	-4.961567 (0.0002)	- -		- -	I(0)
LEIR		- -	- -	-5.231087 (0.0007)	I(1)
TTR		-4.296982 (0.0082)			I(0)

The table above shows unit root tests. The notations: (LCM), (GDP), (INF), (LEIR), (TTR) indicate respectively the Demand for Cash, Gross Domestic Product, Inflation, Lending Interest Rate, and Total Tax Revenue.

6.2 Autoregressive Distributed Lag (ARDL)

This method of ARDL was created by Pesaran and Shin to decide the since quite a while ago run connection between factors. This brand-new testing has a preferred position over the past systems of Johanson that it might be applicable in specific circumstance when entire elements are composed at dual solicitation I(0) and I(1) instead of all elements should be at a similar solicitation of the fuse. ARDL results are given underneath:

Table 2

ARDL Results with TTR

Estimated=Long=Run=Coefficients=using=the=ARDL=Approach				
ARDL (1, 1, 1, 0, 5) selected based on Akaike info Criterion				
LMC is Dependent variable				
39 observations are involved for estimation from 1980 to 2018				
Regressors	**Coefficient**	**Standard Error**	**T-Ratio**	**Prob.**
GDP	0.000008	0.000002	3.384399	[0.0028]
INF	0.023307	0.014790	1.575901	[0.1300]
LEINT	0.032110	0.007640	4.202690	[0.0004]
TTR	0.327027	0.126046	2.594506	[0.0169]

In above Table, value of coefficient of Gross Domestic Product (GDP) shows that there is +to and significant r/p between the dependent variable MONEY CIRCULATION TO MONEY SUPPLY RATIO (CM) and Gross Domestic Product (GDP). Empirical result shows that in the long run, 1 unit change in GDP leads to 0.000008 percent (with tax) and 0.000004 percent (without tax) increase in the CM. This shows that an increase in GDP impacts CM positively and it seems to express that increase in GDP is efficient to increase the CM in the country. My study supports the results of Farooq et al., 2010 that there is an increase in Gross Domestic Product (GDP) that impacts Currency to Money Supply ratio positively. There may be different reasons behind this but the most ostensible reason is the increased GDP reflects the increased underground economic activities that are leads to more currency demand in society.

The value of coefficient of Interest Rate LEINT has positive and significant impact on Currency to Money Supply ratio. A unit increase in value of LEINT increases 0.032110(with

tax) percent point of CM. The positive sign of coefficient of LEINT indicates that the currency demand. People will earn money from illegal sources instead of borrowing from financial institution.

In our empirical testing, coefficient of Inflation (INF) shows a unit increase in Currency to Money Supply ratio (CM) will improve CM by 0.023307(with tax) percent. The coefficient's value of INF shows +to and insignificant impact. Our studies reinforce the findings of Sumeet et al., 2015 that Demand for cash is most affected in the presence inflation factor. When inflation rises up, people demand more cash for day to day transactions. Their tendency to earn money through unfair means will lead them to Shadow Economy.

The coefficient of TTR there is also found +to and significant impact. A unit increase in TTR will expend Currency to Money Supply ratio (CM) 0.327027 percent. The positive impact of TTR on CM demonstrates significant r/p and macroeconomic strength. Our results also found TTR an important causation of CM. An increase in direct and indirect taxation increases the shadow economy. Friedrich S, 2011 exhibit the +to r/p between TTR and our Shadow Economy also supporting our study. The theory demonstrates that a rise in Total Tax Revenue (TTR) contribute in the area of Shadow or dim Economy That leads to increased money circulation among people and demand for money.

All coefficients values indicate significant results except Inflation and exhibit +ve impact on Shadow or dim Economy in Pakistan.

Table 3

ARDL Results without Tax

Estimated Long Run Coefficients using the ARDL Approach

ARDL (3, 3, 5, 2) selected based on Akaike info Criterion

LMC is Dependent variable

39 observations are involved for estimation from 1980 to 2018

Regressors	Coefficient	Standard Error	T-Ratio	Prob.
LEIR	0.021716	0.006863	3.164267	0.0057
INF	0.003150	0.012810	0.245905	0.8087
GDP	0.000004	0.000001	3.583498	0.0023

6.3 The Empirical Results and Interpretation of the Regression

In above Table, value of coefficient of Gross Domestic Product (GDP) shows that there is +ive and significant r/p between the dependent variable Money Circulation To Money Supply Ratio (CM) and Gross Domestic Product (GDP). Empirical result shows that in the long run, 1 unit change in GDP leads to 0.000008 percent (with tax) and 0.000004 percent (without tax) increase in the CM. This shows that an increase in GDP impacts CM positively and it seems to express that increase in GDP is efficient to increase the CM in the country. My study supports the results of Farooq et al., 2010 that there is an increase in Gross Domestic Product (GDP) that impacts Currency to Money Supply ratio positively. There may be different reasons behind this but the most ostensible reason is the increased GDP reflects the increased underground economic activities that are leads to more currency demand in society.

The value of coefficient of Interest Rate LEINT has positive and significant impact on Currency to Money Supply ratio. A unit increase in value of LEINT increases 0.021716(without tax) percent point of CM. The positive sign of coefficient of LEINT indicates that the currency demand. People will earn money from illegal sources instead of borrowing from financial institution.

In our empirical testing, coefficient of Inflation (INF) shows a unit increase in Currency to Money Supply ratio (CM) will improve CM by 0.003150(without tax) percent. The coefficient's value of INF shows +ive and insignificant impact. Our studies reinforce the findings of Sumeet et al., 2015 that Demand for cash is most affected in the presence inflation factor. When inflation rises up, people demand more cash for day to day transactions. Their tendency to earn money through unfair means will lead them to Shadow Economy.

All coefficients values indicate significant results except Inflation and exhibit +ve impact on Shadow or dim Economy in Pakistan.

7. Estimated Size of Shadow Economy

After the predicted calculated value of the currency demand model, the magnitude of underground economy determined as follows. For every year the estimated values of currency demand model with taxes (CM)T and without taxes (CM)WT are determined by employing predicted regression equations

$LCM = \alpha^0 + \alpha^1 GDP + \alpha^2 INF + \alpha^3 LEINT + \alpha 4TTR$(with taxes) …(7.1.1)

$LCM = \alpha^0 + \alpha^1 GDP + \alpha^2 INF + \alpha^3 LEINT$ (without taxes) …(7.1.2)

The change of (CM) T – (CM) WT demonstrates the level of cash holding that is because of taxes alternatively have limit that total tax Revenue have influence people to hold higher amount of cash. The extent of increased demand for cash demonstrates the size of community of tax evasion which termed as "illegal money". The mathematical expression for illegal-money (IM) can be confined as;

$IM = \left[(CM)T - (CM)WT\right] * M2$ …(7.1.3)

Since Tanzi witnessed that legal money (LM) can be obtained with the difference between M1 and IM. M1 is the sum of currency and demand deposits that is total money supply and estimated illegal money. The mathematical form is stated follow.

$LM = M1 - IM$ …(7.1.4)

After obtaining the legal money, the income velocity(circulation velocity) of legal money can be computed , dividing the GNP by LM which mathematical elaboration is given below.

$IV = GNP/LM$ …(7.1.5)

As the basic assumption of the model considers the velocity of legal money and illegal money same-thing, thus the magnitude of shadow economy is the result of the product of illegal money and income velocity of money. Mathematically it can be stated; as

$SE = IM * IV$ …(7.1.6)

Figure 1

Size of Shadow Economy

The size of shadow economy is measured in million rupees and graphically presented as under in figure 1.

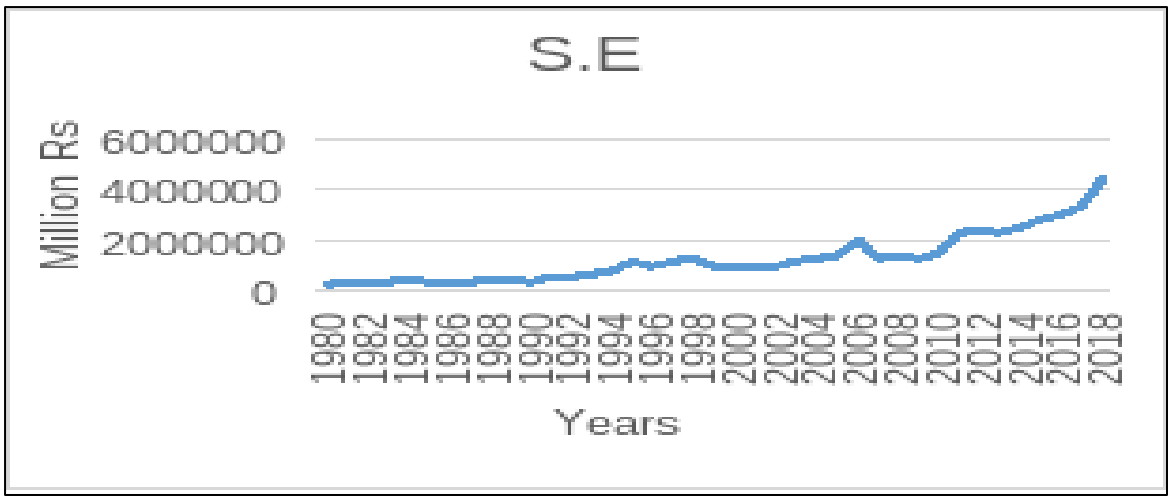

Figure 1: Size of Shadow Economy

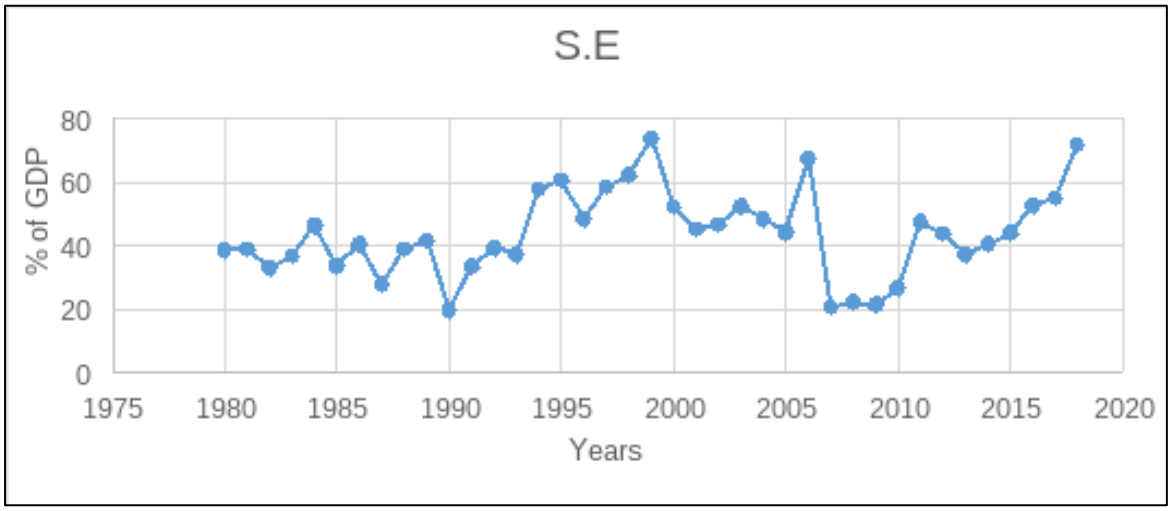

Figure 2: Shadow Economy as % of GDP

As we can see slope of these graphs are almost same but still there is difference between values. Shadow Economy has greater values and tax evasion represented comparatively low ones in corresponding years. The gap of these values is the reason that taxes are not the only reason of shadow economy, but other factors also contribute in it. Tax evasion as percentage of GDP is presented in figure 3.

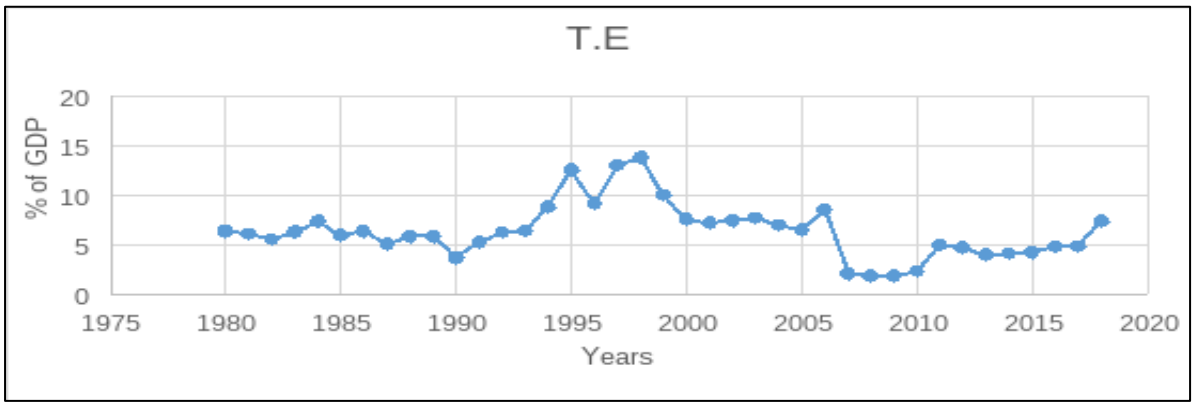

Figure 3: Tax Evasion as % of GDP

Taxes are one of the biggest reasons of Shadow Economy but we don't blame them for the cause of entire Shadow Economy, Shadow Economy even also exists when taxes are not levied on the people. According to an economist corruption, non-registered businesses beggars, hawkers etc. are also lied in the category of Shadow Economy and above graphs are reflection of this definition. As we can see slope of these graphs are almost same but still there is difference between values. Shadow Economy has greater values and tax evasion represented comparatively low ones in corresponding years. The gap of these values is the reason that taxes are not the only reason of shadow economy, but the other factors also contribute in it.

8. Conclusion and Policy Advices

Magnitude of shadow economy is highly responding to taxes, so government should make easy tax collection methods so that non tax payers can easily come in the category of tax payers. Good governance system and government check n balance may help in reducing magnitude of the black economy in Pakistan. As we know taxes are not the only measures of S.E and other factors are also involved so government should improve and update its record keeping system so that they can detect the hidden economic activities. An adoption of policy based on these findings would lead to a successful emergence of the shadow economy in to the official one.

Appendix 1

The Wald Test (F-Statistics)

The results of Wald Coefficient test on all lagged explanatory variables are reported in table 4 as follows:

Table 4

Results of Bound Test for Co-integration

Equation 5.1	F-Statistics	Upper Bound Critical Value	Conclusion
LCM/ GDP,INF,LEINT,TTR	**5.410**	**4.01(95%)**	**Co-integration exists**

Note: Computed result for F-statistic is 5.410 which is Significant at 95% and indicates the rejection of our null hypothesis i.e. no long run r/p exists. Here, critical values at k=5-1=4 is cited by Pesaran et al., 1999.

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