



Using Ordinary Least Squares to Measure the Impact of the Factors Affecting Underground Economy: A Comparison between India and Turkey

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Keywords

Underground Economy, Ordinary Least Squares, Developing Countries.

Abstract

Underground economy is a source of concern since it distorts policy framework of a country and weakens its government. This paper sheds light on the underground economies of two developing countries namely India and Turkey by identifying the factors contributing towards their large size as well as measuring the impact of those factors.

Using secondary data from 2000-2013 and applying Ordinary Least Squares (OLS) regression model, this paper tests the impact of tax revenue, unemployment rate, Index of Economic Freedom, population and GDP growth rates, inflation and internet users on the size of underground economies of India and Turkey in absolute and comparative dimensions.

The first part of the paper explains the concept of underground economy and discusses its significance followed by the hypotheses that are put to test. Using OLS, impact of aforementioned variables on the size of underground economy are estimated. It has been found that high Index of Economic Freedom reduces the size of underground economy in both countries hence better institutions are pivotal. Wider tax base and a simple tax system will facilitate India while greater transparency in the usage of ICT will enable Turkey to reduce the size of its underground economy.

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1. Introduction

Underground economy, like all the black markets throughout the world, was created due to government rules and regulations. It is an output of income tax and of other taxes, of limitations in the labor market and of prohibitions on certain activities (Gutmann,1977:26) The rise of the underground economy started in 1970s when the presence of government activity became stronger in economies around the world. With the increase in the size of public sector, the financing of public sector programs began through taxation and the desire to escape taxes and regulations gained prominence (Chaudhuri,Schneider,&Chattopadhyay,2006:428) The rapid pace of inevitable globalization today has stimulated increasing volumes

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of global trade which has meant greater influence of countries on each other and while this has tremendous benefits, it is also one of the factors responsible for large shadow economies across the globe (Ucok,2015:9) This notion therefore invites greater attention of government and policy makers.

Although shadow economy exists in both developed and developing countries, it is relatively more prevalent in the latter due to which these countries are experiencing slow economic growth, eroded tax base, distortions in fiscal and public policies and an overall low quality of public goods and services (Dabla-Norris Gradstein & Inchauste, 2008:20).The literature on shadow economy has, however, paid more attention to the developed countries which is another source of concern since it is the developing countries whose shadow economies need to be looked at closely. Furthermore, main focus of researches to date has been on the measurement of shadow economy but its determinants also need to be looked at so that policies can directly target those root causes which can eventually curtail the size of underground economies. Consequently, from the extensive literature on underground economies of both developed and developing countries, this study has chosen a small set of economically emerging developing countries in Asia with the aim of inspecting some of the determinants of their underground economies.

Before diving deep into the pool of underground economy, it is important to explain what it means. There is no universal definition of underground economy (Schneider,2004:4) like there is no universal term for its concept. In the literature, underground economy goes by several names; shadow, informal, unobserved, unrecorded, black and unofficial economy that refers to all the activities which are out of government's reach (Chaudhuri et al.,2006:429) Like mainstream economy, underground economy produces goods and services, generates income and employs labor however unlike official economy, the output from this sector is neither taxed nor recorded or regulated (Weiss, 1987). Underground economy includes both legal and illegal activities. The types of activities which comprise underground economy are illustrated as under:

Table 1: Type of Activity

Type of Activity	Monetary Transactions		Non Monetary Transactions	
ILLEGAL ACTIVITIES	Trade with stolen goods; drug dealing and manufacturing; prostitution; gambling; smuggling; fraud; etc.		Barter of drugs, stolen goods, smuggling etc. Produce or growing drugs for own use. Theft for own use.	
	Tax Evasion	Tax Avoidance	Tax Evasion	Tax Avoidance
LEGAL ACTIVITIES	Unreported income from self-employment; wages, salaries and assets from unreported work related to legal services and goods	Employee discounts, fringe benefits	Barter of legal services and goods	All do-it-yourself work and neighbour help
1. Structure of the table is taken from Lippert and Walker ([1997], p. 5) with additional remarks.				

Source: Schneider and Enste (2000)

The existence of and an increase in the size of underground economy has given rise to several macroeconomic concerns. Since underground economy is unobserved, the social and economic conditions of individuals cannot be estimated with complete accuracy. If an individual is employed in underground economy, that figure will not be reported in official GDP and it will lead to overestimation of unemployment and underestimation of national income, drastically affecting macroeconomic and public policies. Since underground economy escapes taxes, it lowers tax revenue (Frey & Schneider, 2015:50) which has negative implications on the quality and provision of public goods and services. Furthermore, repercussions on the distribution of income is another adverse consequence (Gupta & Gupta, 1982:71). In order to compensate for the loss in tax revenue, governments are forced to raise revenue through tax rates which escalates the likelihood of tax evasion, thereby increasing the size of the underground economy further (Alkhdour, 2011:116). Hence, an economy gets traps in a vicious cycle which culminates in a weak state and adds to the lack of trust the public develops for the government.

Presence of a large underground economy weakens the monetary policy too since firms operating underground avoid using the banking system. The difficulty of raising funds from banks means that there is a focus on short-term gains only and hence larger scale, sophisticated investments are neglected. From a microeconomic perspective, a large underground economy also means distorted safety nets for underground economy labor since their health and safety at work is not guaranteed. In addition to this, due to absence of anti-competitive conduct, the economic surplus is likely to be transferred from consumers to equity owners, increasing inequality (Eilat&Zinnes, 2002:1235).

If we take a close look at the underground economies of the sample countries in this paper namely India and Turkey, it can be seen that the situation is alarming.

Studies conducted in India reveal that underground economy has grown from 9.5% of GDP in 1967 to 49% by 1978, owing to high taxes (Gupta & Gupta, 1982:73). Other studies attributed large shadow economy in India to low literacy levels and government regulations and suggested that shadow economy can be lowered if literacy levels are improved and there is a move away from government coalition to liberalization. Increased growth of newspapers is also likely to lead to cleaner governance (Chaudhuri et al., 2006:431). In comparison with the rest of the Asian countries, the size of the shadow economy in India is relatively lower (Schneider, Chaudhuri, & Chatterjee, 2003:16) but this sector could still be curtailed in order to speed up its economic development.

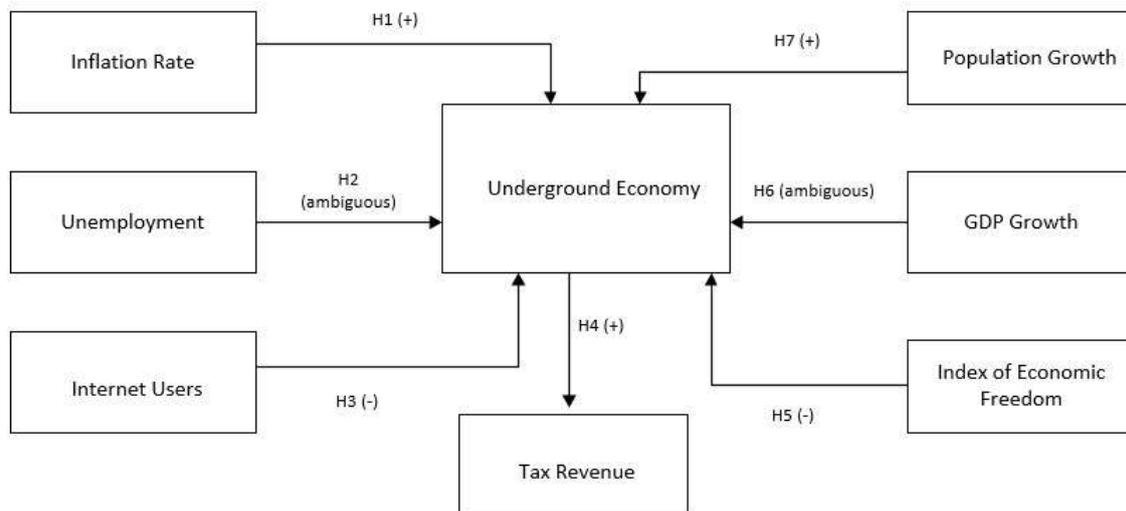
Studies conducted on underground economy in Turkey reveal that the size of underground economy is rising but at a decreasing rate. It was calculated to be 31% in 1991 and rose to 35.1% in 2005, owing to high tax burden, unemployment, GDP/capita, lack of enforcement with low probability of detection and inadequate punishments if detected. Lack of trust of population towards public institutions, earlier retirement and lower tax morale have also been identified as determinants of underground economy in Turkey (Davutyan, 2008; Erdiñç, 2012; Schneider & Savaşan, 2007). The 1980s was a turning point for Turkey's underground economy since structural changes took place which lowered its size (Savaşan, 2003:3) However, the size of Turkey's underground economy is still larger as opposed to other OECD and developed countries which is an indicator for the government to deal with this problem (Yıldız, 2013:10) Measurement of the size of underground economy in Turkey has been done through several techniques including currency demand approach, MIMIC, kalman filter technique and randomized response models (Karanfil, 2008; Savaşan, 2003).

These countries are in the process of developing their economies however the existence of underground economy has impacted their macroeconomic policies drastically. While there is sufficient research available on measuring the size of the underground economies in these countries, there is little information on what leads to the development of underground economy in the first place. Furthermore, bulk of the literature exists on the shadow economy in developed countries but there is a dire need to closely inspect the shadow economies of developing countries because those countries are in need of reforms for their betterment. It is therefore important to look at the factors which cause underground economy in the aforementioned countries and on the basis of the results, policies can then be developed in order to curtail the growth of shadow economy.

2. Hypotheses

The research model for this paper is as under:

Figure 1: Research Model



Source: Prepared by authors

The size of the underground economy in this study is determined by inflation rate, tax level, unemployment level, population growth, internet users, Index of Economic Freedom and GDP growth. The size of the underground economy is dependent while above mentioned determinants of underground economy are independent variables. The development of the hypotheses is done in the light of literature and economic theory. They are as under:

H1: There is a positive relationship between the size of the underground economy and the inflation rate, *ceteris paribus*

H2: There is a significant relation between the size of underground economy and unemployment level but the direction of relationship is ambiguous, *ceteris paribus*

H3: There is a negative relationship between internet users and the size of the shadow economy, *ceteris paribus*

H4: There is a positive relationship between the size of underground economy and tax revenue, *ceteris paribus*

H5: There is a negative relationship between Index of Economic Freedom and the size of underground economy, *ceteris paribus*

H6: There is a significant but ambiguous relationship between GDP growth and the size of shadow economy, *ceteris paribus*

H7: There is a positive relationship between population growth and the size of shadow economy, *ceteris paribus*

3. Research Methodology

This is a quantitative study and has made use of annual secondary data from 2000-2013. The countries included in the study are India and Turkey. Data on underground economy has been gathered from Mai Hassan and Friedrich Schneider (2016). Data on Index of Economic Freedom is gathered from The Heritage Foundation. Data on remaining independent variables is taken from The World Bank. Ordinary Least Squares analysis has been used to estimate the model.

The study in question will be using calculations of shadow economy which are conducted by Hassan Mai and Friedrich Schneider using MIMIC approach from 1999-2013. The study has measured shadow economy for 157 countries (including sample countries) and has provided the most recent estimates of the shadow economy from 1999-2013. Consequently in order to make use of the latest possible measures of shadow economy, data has been taken from this study.

The measurement of independent variables is as under:

Inflation: CPI has been used to measure inflation. This type of measure reflects changes in the cost to an average consumer of acquiring a basket of goods and services. This measure of inflation is employed by the study because it has been used widely in the literature as a suitable measure for capturing the change in prices overtime.

Unemployment: Unemployment refers to that part of labor force that is willing and able to work but cannot find a job. Unemployment as a percentage of total labor force is used in order to capture both male and female rates of unemployment.

Internet users (per 100 users): This measure comprises individuals who have used internet from any location in the past 12 months and is out of 100 users of internet. This measure is used to define the variable because this is the most relevant way to use this variable for the study in question and is used as it is in previous studies.

GDP growth: This refers to the annual growth rate of GDP at market prices based on local currency. Due to less usage of this type of GDP measure, this study has used it in order to check its impact on GDP growth. This variable, being more explanatory for the sample countries in this study, is also another reason of including it in the model.

Tax: Tax revenue as a percentage of GDP has been used due to unavailability of data on tax rates, particularly for Bangladesh, India and Pakistan. Due to similar issue, there were some missing values in the data for tax revenue too however those values have been interpolated for this study using Microsoft Excel.

Index of Economic Freedom: An overall governance index has been used comprising property rights, freedom from corruption, fiscal freedom, government spending, business freedom, labor freedom, monetary freedom, trade freedom, investment freedom and financial freedom. This is the most crucial determinant of shadow economies across the globe hence this cannot be ignored in this study.

Population growth: Annual population growth for a year is the exponential rate of growth of midyear population from previous to current year expressed as a percentage. Population is one of those variables that has strong implications for developing countries.

Previous studies which are mostly based on developed countries' shadow economies have not made use of this variable therefore population growth is included in the model for this study in order to see its impact on developing countries' shadow economies. Like tax revenue, the data on population growth had some missing values which have been interpolated using Microsoft Excel.

Using all the dependent and independent variables, the following model is arrived at:

$$Y = \alpha + \beta_1 \pm \beta_2 - \beta_3 \pm \beta_4 + \beta_5 - \beta_6 + \beta_7 + \mu$$

Where;

Y = Size of underground economy (% of GDP)

α = Constant

β_1 = Inflation (CPI)

β_2 = Unemployment (% of total labor force)

β_3 = Internet users (per 100 users)

β_4 = GDP growth (annual %)

β_5 = Tax revenue (% of GDP)

β_6 = Index of Economic Freedom (out of 100)

β_7 = Population growth (annual %)

μ = Error term

4. Results

The R-square for India is 0.61.

The rest of the results are shown as under:

H1: Inflation and underground economy (+)

Coefficient = 0.37, t-stat = 2.15, p-value < 0.1 s (at 10%)

H2: Unemployment and underground economy (ambiguous)

Coefficient = - 0.30, t-stat = - 0.26, p-value > 0.05 ns

H3: Internet users and underground economy (-)

Coefficient = - 0.05, t-stat = - 0.23, p-value > 0.05 ns

H4: Tax revenue and underground economy (+)

Coefficient = 0.36, t-stat = 1.13, p-value > 0.05 ns

H5: Index of Economic Freedom and underground economy (-)

Coefficient = - 0.57, t-stat = - 1.69, p-value > 0.05 ns

H6: GDP growth and underground economy (ambiguous)

Coefficient = - 0.09, t-stat = - 0.62, p-value > 0.05 ns

H7: Population growth and underground economy (+)

Coefficient = - 0.20, t-stat = - 0.02, p-value > 0.05 ns

From the results above, it can be seen that inflation is the only significant determinant of the size of underground economy in India. It is significant at 10%.

For Turkey, the R-square is higher than India at 0.88 which means that all the variables included in the model are most explanatory of the underground economy of Turkey. The estimated results are shown below:

H1: Inflation and underground economy (+)

Coefficient = 0.30, t-stat = 2.51, p-value < 0.05 s

H2: Unemployment and underground economy (ambiguous)

Coefficient = 1.71, t-stat = 2.96, p-value < 0.05 s

H3: Internet users and underground economy (-)

Coefficient = 0.63, t-stat = 2.87, p-value < 0.05 s

H4: Tax revenue and underground economy (+)

Coefficient = -1.66, t-stat = - 0.90, p-value > 0.05 ns

H5: Index of Economic Freedom and underground economy (-)

Coefficient = - 0.61, t-stat = - 2.33, p-value < 0.1 s (10%)

H6: GDP growth and underground economy (ambiguous)

Coefficient = - 0.09, t-stat = - 0.61, p-value > 0.05 ns

H7: Population growth and underground economy (+)

Coefficient = - 2.49, t-stat = - 0.43, p-value > 0.05 ns

Inflation, unemployment and internet users are significant for Turkey at 5% and Index of Economic Freedom is significant at 10%.

A comparative analysis between Turkey and India shows that for both of them, Index of Economic Freedom is pivotal to curtailing the size of underground economy. High quality institutions in both countries will enable them to lower the size of their underground economies.

Another common aspect in two countries is the negative relation between population growth the size of underground economy. A likely explanation for this could be the fact that India and Turkey have high levels of literacy and even if they experience a growth in their populations, a literate population is likely to be absorbed in the formal economy.

GDP growth and underground economy have a negative relation for both India and Turkey. This means that a growing GDP is an indicator of a prospering economy and high living standards lower the incentive to seek jobs underground.

With regards to internet users, it can be seen that India has an edge over Turkey. A possible explanation is the advanced information and communication technology (ICT) in India and greater transparency due to which an increase in internet users lowers corruption and the size of its underground economy.

In terms of tax revenue, Turkey has an edge over India since high tax revenue has a negative relation with its shadow economy whereas the opposite is true for India. This indicates existence of an efficient fiscal framework and a wider tax base in Turkey. Tax morality, too, is likely to be higher in Turkey which increases the willingness to pay taxes consequently less incentive to escape them by moving underground.

5. Conclusion

The first objective of this study was the identification of determinants of underground economy for emerging developing economies in Asia namely India and Turkey. Seven factors which determine the size of underground economy in these countries have been identified. There are several other factors which are significant determinants of their underground economies namely poverty and literacy rates but due to missing values in their data, those factors could not be incorporated in the model. Nevertheless future studies can integrate those variables.

The second and third objectives of the study have been achieved through using OLS regression model whereby the impact of seven variables namely inflation, unemployment, internet users, tax revenue, Index of Economic Freedom, GDP growth and population growth on the size of underground economy has been gauged. The results have been discussed along absolute and comparative dimensions.

The final objective of the study is to recommend policies which can curtail the size of underground economy. The countries included in this study have underground economies ranging between 25-35% which is a large number and it is therefore important to have certain policy recommendations which can eventually curtail its size. Keeping the results of the study in consideration, it can be recommended that India can improve the efficiency of its tax system by widening tax base and lowering tax rates. Widening tax base would mean that the tax burden would be spread out and more tax payers would curtail the size of underground economy and increase tax revenue which will ultimately benefit its economy. Furthermore, tax collection system should be simple and comprehensive so that common people can understand it. This is likely to lessen the chances of tax evasion. Tax collection units should have staff that is efficient and honest in order to ensure proper tax revenue collection. High Index of Economic Freedom has a negative impact on underground economies for both countries. It is therefore recommended that better quality institutions need to be in place that ensure that all the laws related to property rights, labor market, businesses, anti-corruption and trade and investment are properly enforced. This would create a favorable environment for

businesses to operate in formally and there will be little incentive to move underground. With regards to internet users and the size of shadow economy, it is recommended that better transparency systems need to be in place and proper monitoring needs to be carried out in order to track any informal activity online. Effective campaigns on honest usage of ICT should be developed and carried out.

It is important to understand that this study provides a base for future studies on underground economy in developing countries and should be treated as such. Like many other studies, this study also has time and financial limitations. Alongside, due to ineffective data collection units in the sample countries, many variables especially poverty, literacy levels and tax rates could not be included in the study. Nevertheless, a closer look at the developing countries' underground economies and making use of their most recent estimates is an addition to the limited literature in this area. The important variables have been found out and discussed and the insignificant variables have been identified the countries in question. The relationships which have been ambiguous to date have also been measured and tested differently to see if any new findings can be obtained. This research can further be developed by including a longer time period and adding more determinants of shadow economy for developing countries. New ways of measuring the same variables and using new models can also be a likely development.

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