universität wien

MAGISTERARBEIT

Titel der Magisterarbeit

„THE SIZE OF THE SHADOW ECONOMY IN GDP: AN ESTIMATION FOR GERMANY AND USA"

Verfasserin

Fulya Türkler

Gemeinsam mit

Rabia Ceren Kabatas

angestrebter akademischer Grad

Magistra der Sozial- und
Wirtschaftswissenschaften (Mag.rer.soc.oec.)

Wien, 2012

Studienkennzahl lt. Studienblatt:	A 066 913
Studienrichtung lt. Studienblatt:	Magisterstudium Volkwirtschaft
Betreuerin / Betreuer	Univ.-Prof. Dr. Alejandro Cunat

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INTRODUCTION

Shadow economy is a total of economic operations and activities using inaccurate or illegal documents, which cannot be controlled by authorized public sector and not to taken into consideration of national income calculation. Also it can be named in the economic literature such as "**Informal economy**", "**Black Economy**", "**Unregistered Economy**", "**Underground Economy**", "**Hidden economy**".

In addition shadow economy has begun to be discussed in developed countries during 1960s, spread swiftly after the fast globalization process in 1980s and has become a serious economic problem all over the world. The effect and size of the illegal economy depends not only on the degree of development, and also the economic and social structures of the countries.

For that reason, the projects and studies to avoid the shadow economy and to take it under control can be different due to development degree for each country. Notwithstanding that it is propounded that the shadow economy has some positive aspects, but it is known mostly with the negative ones.

The informal economy has some positive effects in short term, but the negative effects are discussed to be permanent in long term on the growth of the Gross Domestic Product (GDP). Nevertheless, it causes unfair competition in official economy and leads to a decrease in tax revenues and an increase in deficit of the public finance. It also conceives inflationist effect.

It is important to gather the right statistics and to make the correct estimation for the efficient fiscal and monetary policies. The formal and informal economy recently seem to be engaged. In this case different procedures must be used to estimate the size of the shadow

economy. According to the method used, the calculation may vary even for same period and country.

In our study, first of all we try to explain the general causes of shadow economy from the viewpoint of the economic literature and public finance. After evaluating the potential advantages and disadvantages of shadow economy, the main methods for measuring the size of shadow economy are given. We also focus on the size of the shadow economy in two different countries such as Germany and United States of America. After analyzing the size of shadow economy in two case countries, the effects of shadow economy on their economic growth are measured and the comparison between the case countries is held.

In first chapter, it is essential to understand how the shadow economy is defined. We also explain interaction with the official economy.

In Second Chapter, we expressed the main causes of the shadow economy and outline several different approaches to measure the size of the shadow economy. In third Chapter, we use the common method named as “MIMIC Model Approach” and for calculation in our case countries. Afterwards, to analyze the effect of shadow economy on economic growth, we use the result the calculations in our regression model.

In Last chapter, we finally compare the results which are found by MIMIC Model Approach in Germany and USA and conclude.

1. CHAPTER

LITERATURE REVIEW

1.1. Defining the Shadow Economy

In economic literature there is a broad disagreement about definition of shadow economy. A definition of shadow economy, which is the one of the most widely used, is „... those economic activities and the income derived from them that circumvent or otherwise government regulation, taxation or observation.“[1]

According to Fleming et al. it is feasible to distinguish the definition of shadow economy in two. First one is the definitional approach, which examines that it is a non-official activity. Thomas specifies that „covers those activities which...are not recorded the national income accounts.“[2] Likewise Smith (1994) defines shadow economy as a „market-based production of goods and services, whether legal or illegal, that escapes detection in the official estimates of GDP.“ The second approach pronounced as behavioral approach underlines the relevance of institutional rules. It remarks that shadow economy is the reason of reaction by economic agents to institutional restriction. Feige informs that “The characteristics of each distinct informal economy are determined by the particular set of institutional rules that its members circumvent”[3], and also Loayza expresses that informal economy is not regulated by the institutions of society to regulate the similar activities in official and social environment.

[1] Roberto Dell’Anno, “Estimating the shadow economy in Italy: A structural equation approach”, Working Paper, Department of Economics, University of Aarhus, (2003),p. 4

[2] Jim J. Thomas,”Quantifying the Black Economy: .Measurement Without Theory. Yet Again?”, The Economic Journal, 109, no. 456 (June 1999).p.387

[3] Matthew H. Fleming, John Roman, and Graham Farrell,” The Shadow Economy“,Journal of International Affairs,53, no. 2. , (Spring 2000), p. 390

On the other hand, Tanzi specified in one of his paper that there are two definitions and measuring methods of shadow economy. One being national production or income that is missed by the statistical offices when they calculate the value of the national product, the other is revenue not reported to and not discovered by the tax authorities produced in underground activities. [4] According to his definition of shadow economy, in the first measuring method the country seems much more well off than the formal statistics (informs) indicates. In the second one, it is expressed that government obtains less revenue than it should.

Schneider (1986) defines shadow economy from another point of view as,, all economic activities that contribute to the value added and should be included in national income in terms of national accounting conventions but are presently not registered by national measurement agencies.“ Feige defines the differences between formal activity and shadow activity as „whether the activity adheres to the established, prevailing institutional rules of the game.. adherence to the established rules constitutes participation in the formal economy. Whereas noncompliance or circumvention of the established rules constitutes participation in the informal economy.“[5] On Table 1 it may be helpful to describe what illegal activities are and their differences from the legal activities.

Table 1.1. The Definition Form of Shadow Economy

Type of Activity	**Monetary Transactions**		**Non Monetary Transactions**	
Illegal Activities	Trade with stolen goods; drug dealing and manufacturing; prostitution; gambling; smuggling and fraud		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 neighbor help

[4] Vito Tanzi,” Defining and Estimating Underground and Informal Economies: The New Institutional Economics Approach”, The economic Journal (1994), p.344

[5] Edgar L. Feige, .Defining and Estimating Underground and Informal Economies: The New Institutional Economics Approach,. World Development, 18, no. 7 (1990)

Source: Lippert and Walker, The Underground Economy: Global Evidence of its Size and Impact. Vancouver, B.C., The Frazer Institute, 1997.

As is seen on the table 1, the contents of the shadow economy cover unreported income related to legal activities and services, either from monetary or barter transactions, therefore the all economic activities were announced to the tax authorities.

Furthermore, there are various reasons why the authorities should be concerned about rising of the shadow economy. The highly important ones are denoted as;

i. A rise in shadow economy might be seen as a reaction of economic agents and individuals to a restriction by state or government and therefore they may choose not to report their incomes. And if the increase of the shadow economy is caused by the gross tax and social security burdens, then the "consecutive flight" makes tax and social security worse. As a result, there may be an increase in budget deficit, and a growth in shadow economy.
ii. A growing or booming shadow economy may cause various difficulties for policy makers, since the formal indicators like on unemployment, labor force, income are uncertain.
iii. The effects of a growing shadow economy on the official economy must be analyzed. From one point of view a booming shadow economy may be attractive to workers of the informal economy and create a competition with the official firms. On the other side, at least two-third of income earned in informal economy is directly spent in official economy, therefore it also has a positive effect on official economy.

Harding and Jenkins (1989) order the activities of shadow economy under three criteria as political, social and economic. The political criteria are divided three subgroups. 1) administrative relation; 2)unofficial activities; 3)national statistics. In spite of the political aspects that affect shadow economy, the economic criteria are most used criteria to define and analyze the shadow economy. The principle criteria are: 1) labor situation; 2) tax avoidance; 3) size of the activity; 4) professional position; 5) administration of the activities; 6)national accounts. The last criteria used are the social dividing. These are: 1) social relationships; 2) autonomy and flexibility; 3) survival of the activity. Despite of theoretic view, there are some differences when it comes to empirical outlooks. For instance, political criteria to define the shadow economy are used in developing countries less than developed countries.

Illegal activities attain a new point on the process when illegal labor force is entailed either in working in a second job or including illegal employment. In that respect government reaction through regulations turns strongly marked as illegality has changed its fields and shift from the product market to the more exquisite labor markets and penalties might become heavier than before. The negative end of continuum for which the symbol of black economy is used, includes activities which are explicitly banned and prosecuted by the government, such as organized crime, drug dealing, trafficking of human beings, prostitution and illegal arms dealing i.e. activities which seriously undermine the legitimacy of the state institutions and which may even put the survival of the state in question.[6]

The starting points of nearly all controversies are different estimates of the size of the shadow economy which makes the assessment of the validity of the finding really hard.

Another point to specify is that empirical studies occur measuring the size and development of shadow economy, the causes and consequences of shadow economy are derived from theoretically should be confirmed by these methods.

Various ideological preferences influence often the discussion about sufficient economic policies. One can happen upon opposing ranging from a compulsory denial of the fact shadow economy to inventive exaggerations of its size and impact. The initial points of approximately all controversies are various estimates of the size of the shadow economy that the validity of the finding assesses really hard.

1.2. The Interaction between official and unofficial economy

There exist three well-known schools to determine the linkage between official and unofficial economy. These are; the dualists, the legalists and the structuralists. The views of these three schools can be defined as below;

Dualists explain the unofficial economy as a totally separate unofficial sector; what means the unofficial economy is not directly linked to the official one. They argue that the informal sector appears because of the failure of the economic growth and industrialization.

[6] Belev,Boyan," The Informal Economy in Central and Eastern Europe – Obstacle to European Integration or Bridge Between the EU Member States and the Accession Countries?" THE INFORMAL ECONOMY IN THE EU ACCESSION COUNTRIES Size, Scope, Trends and Challenges to the Process of EU Enlargement, p.5

Legalists view the unofficial work arrangements (or the unregistered businesses) as a rational response to over-regulation by bureaucracies. For their argument, those who run informal businesses do that to reduce their own costs of production.

The structuralists view the unofficial economy as being subordinated to the official economy. For their opinion, the privileged capitalists of the official economy seek to erode the employment relations and subordinate those who work in the unofficial sector in order to reduce the production costs and increase their competitiveness.

What differs between of these schools is their underlying model of power or power relationships. The dualists defend the notion that there are few power relationships between those who work in the official and the unofficial economies. The legalists defend the notion that unofficial entrepreneurs exercise their own power – or choice – to operate unofficially as a response to unreasonable bureaucratic controls. The structuralists defend the notion that the official economy exerts a dominant power relationship over the unofficial economy in its own interests. The other observers would argue for a comprehensive framework that recognizes that the linkages and power relationships between the unofficial economy, official sector, and the public sector differs by which segment of the unofficial economy one is talking about. To illustrate, street vendors often have to vend informally because they are not incorporated in existing regulatory frameworks or because existing regulatory frameworks are too punitive or constraining. Industrial outworkers typically have little bargaining power with those who put out work to them. And self-employed garment makers often have relatively little market knowledge, market access, or bargaining power compared to large garment manufacturers.

The interaction between official and unofficial economy seems to take a significant part in daily life e.g a citizen working unofficially and buying taxed commodities or exactly the opposite; a citizen working officially and buying non-taxed commodities. By non-taxed transactions, buyers and seller s share the deferred tax of the market and form the contumacy against the government. As a result, we see the table below;

Loss of taxes→ Debt for requirement of public expenditures→ High interest rates caused by debts→ Public deficit→ Inflation

The unofficial economy starts to damage the official economy by absorbing it. We classify the connection between unofficial and official economy in three groups:

1. Direct and indirect; backward and forward production linkage
2. Consumption linkage

3. Technological linkage

Backward links are formed in raw material and machinery supply from official and unofficial economy. Forward links are emerged in use of informal productions as inputs in official economy. Consumption links indicate the direct connections established with the final consumers. Technological links are constituted with the labor force improving material and technological information transactions from official to unofficial economy.[7]

Healing of the international shipping and growth of the global trading volume eased the work of the crime organizations in the global area and there has been a huge increase in the trading of the prohibited goods. Although advances in the communication technology eased the shifting of individuals, companies and financial instruments quickly, sometimes even without transactions costs, improved the global economy. But it has also caused a huge increase in the unofficial economy. For example, even with a phone call, a money launderer would get into the stock market. The principle of confidential banking eases the work of the money launderer in getting into official economy.

According to Ranis and Stewart (1999), the modern informal and formal sectors are complementary on the producer market: the formal sector is a destination of modern informal output through direct sales and outsourcing. In this framework, the growth of the modern segment of the informal sector is positively related to the growth of the formal sector due to production linkages between the two. Pieters, Moreno- Monroy and Erumban (2011) argue that Indian manufacturing sector gives an exact example to show the linkage between formal and informal economy. In India accounting of about 80% of the employment and 20 percent of value added in manufacturing in 2005 and 2006. Labor regulation is an important feature in the Indian economy and it has been associated with lower manufacturing output and employment ad higher informal manufacturing output. However, also outsourcing has been described as for firms in formal economy to cut the costs.[8]

Fraudulency, an element of unofficial economy also shapes by the official economy. It is estimated that the income of the fraudulent activities to be 512 million dollars, and it figures 7% of the global economy. In developed countries, e.g in USA; the counterfeit product trade was estimated as 34 billion dollars in NYC and the effect of this amount on loss of taxes was 1.6 billion dollars in 2003. In CEE Countries, e.g in Romania; The National Statistics Institute

[7] Kerem Kaptangil, 'Kayitdisi Ekonomi ve Turkiye', (Unpublished Master Thesis, Abant Izzet Baysal University) 2003, p: 8

[8] Pieters, Moreno-Monroy, Erumban ''Formal-Informal Production Linkages and Informal Sector Heterogeneity: Evidence From Indian Manufacturing''; Unıversity of Groeningen; 2011:4

estimates the value of hidden economy at approximately 20 billion Euros annually taking into consideration only black labor, the TVA fraud and the domestic industry, the weight being held by the first two.[9] The average size of the informal economy, as a percent of official GNI in the year 2000, in developing countries is 41%, in transition countries 38% and in OECD countries 18%.[10]

The unofficial economy may occur due to the social, legal, moral and cultural differences of different economic systems of the countries. Regardless, countries apply different methods to prevent unofficial economy and reduce it to an acceptable level.

Measurement of shadow economy is a difficult issue to research because of the lack of definition and emerging reasons. The result of studies for the same country using different methods, may even differ for a certain period. Though the differences between countries, it is possible to get an idea about the dimensions of the shadow economy.

The studies that were made to determine the interaction between informal activities and economic growth obtained similar results. Giles (1997) surveyed the relationship between registered and unregistered economic activities in New Zealand. As a result of Granger Causality Test, he obtained the findings of a causal relation as business cycles in both economies. Giles, Tedds and Werkneh (1999) made the Granger Causality Test to investigate the interaction between both economies in Canada and they found out that there is a causality relation registered towards unregistered economy. Although there is not a deal that unregistered economy affects the registered economy negatively or positively in the literature, while some analysts found out that informality has a negative effect on economic growth. Others' findings are quite opposite. It is submitted that while the informal economy rises by 1%, the formal economy decreases around 5%. In developing countries, that shows us a presence of negative relationship. On the other hand, some studies prove that while the informal economy rises by 1%, the formal economy increases between 8% and 10% in developed countries; this also shows us the presence of the positive relationship between the formal and the informal economy[11].

[9] Criveanu Maria; Mihai Magdalena, ''Methods used for treating the underground economy in Romania'', University of Craiova, Faculty of Economy and Business Administration, Craiova, A.I.Cuza nr.13, 1997

[10] Friedrich Schneider, '' Size and The Measurement of Informal Economy in 110 Countries Around The World'', July 2002,p.12

[11] Sukru Kizilot ve safak Ertan Comakli(2004), "Vergi Kayıp ve Kaçaklarının Kayıtdışı Ekonomi İlişkisi ve Boyutlarının Mevzuat Açısından Değerlendirilmesi", 19. Maliye Sempozyumu, Türkiye'de Vergi Kayıp ve Kaçakları ve Önlenmesi Yolları, Uludağ Üniversitesi İktisadi ve İdari Bilimler Fakültesi Yayını,(2004), pp.115 vd.

Estimates of the aggregate shadow economies of different countries vary widely. The empirical studies in Austria and Germany prove that the 60% of gains from the formal sector is spent on the informal sector and these results show us that the informal economy has a significant impact on the formal economy. Results in United Kingdom show that the shadow economy triggers off the consumption significantly. Similarly, in Peru 35% of the wealth comes out from the shadow economy[12].

Adam and Ginsburg (1985) focus on the implications of the shadow economy on official growth in Belgium and due to the empirical results; they found out that the shadow economy has a positive effect on the registered economy.[13] The shadow economies of Thailand, Nigeria and, and Egypt amount to about 70% of their respective GDP. Similarly, the shadow economies of Latin American emerging economies such as Guatemala, Panama and Mexico amount to 40 to 60% of their respective GDP. The shadow economies of South Asian emerging economies such as Philippines, Malaysia and South Korea amount to 30 to 50% of their respective GDP. In OECD countries the result changes between amounts to 8 to 30% of their respective GDP. [14]

[12] Cetintas & Vergil, Estimation of Underground Economy in Turkey', Journal of Dogus University, 4 (1), 2003:19

[13] Adam M.C. ve Victor A. Ginsburgh (1985), "The Effects of Irregular Markets on Macroeconomics Policy: Some Estimates for Belguim", European Economic Review Vol.29 No.1 ss.15-33.

[14] Brian K. Edwards & Silvio J. Flaim, 'Measuring and Integrating The Shadow Economy: A Sector- Specific Approach', Los Alamos National Laboratory, June 30, 2008

2. CHAPTER

THEORETICAL BACKGROUND

2.1. The Main Causes of Determining the Shadow Economy

Nowadays, one of the main problems in developed and developing countries is the reasons of the emergence of the shadow economy, which based on very complex in some cases. In this study we will try to explain the reasons and determinants of shadow economy under different categories.

2.1.1. Economic Reasons

2.1.1.1. Inequitable Distribution of National Income

In developing countries there is quite an inequitable distribution of income. And this situation may be used as a tool for financing of development by the administration of share of income and also may cause instability in the economy. As known, providing the economic growth is one of the goals of the economic policy. Applied economic policy tools may affect the share of income inadequately in order to accomplish this goal. In addition, with the inadequate share of national income would cause an increase in shadow economic activities in the lowest income group of individuals.

Another problem observed in developing countries is that the income of employees of public sector remains very low when it is compared with other sectors. This situation leads the employee of public sector to work in a second even a third job. The situation increases the informal economic activities.

2.1.1.2. Aim of reducing the Production Costs

The main purpose of the enterprises which act economic is to provide the cheapest production. In order to accomplish this, they attempt to provide the input from the cheapest sources. Especially, the unemployment in the developing countries cause that the individuals

are willing to work without any social security in informal sector. Therefore, enterprises try to provide the labor and other instruments of production from the informal sector to reduce the costs of production.

Furthermore, in some sectors the supply of labor is subject to a certain restriction that actualizes covertly. The reason of this situation is either the lack of competition in the labor market or a restriction for some work entrance. In this case, the employees in the relevant sectors gain higher incomes.[15]

2.1.1.3. High Inflation

Particularly starting from the 1970s the high increases in oil prices has led to an increase in the level of prices. Under the inflation effect the individuals tried to adapt the working conditions of their contracts among them, therefore, the contract details are kept confidential. Hiding or incomplete reporting of financial transactions from the state shows the growth in the shadow economic transactions.

2.1.2 Fiscal Reasons

2.1.2.1 Increase in Taxes

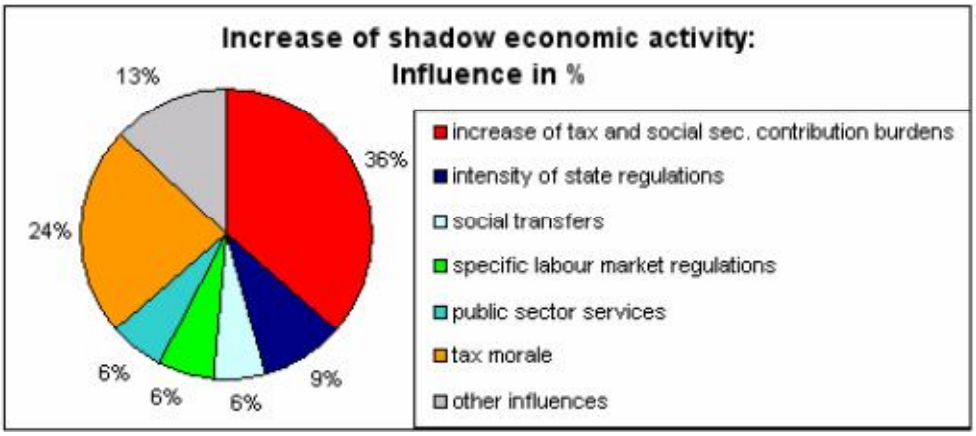
The existence of taxes did not cause shadow economic activities when the taxes were connected with reasonable and substantially visible activities or taxes contain also the poll taxes. Nevertheless, such as contemporary states, taxes came to be heavier than before, taxpayers tried to avoid from the high taxes by showing their activities in the shadow. Therefore, a kind of developed between taxpayers and the tax administrators that had to work harder to make the taxpayers comply with their tax obligations.[16] Higher tax levels and rates increased the efforts of taxpayers to avoid it.

Moreover, as seen severe studies, an increase in burden of social security cause a growth in the shadow economic activities. Due to a strong influence of the fiscal intervention

[15] Bruno Dallao, The Informal Economy, The Underground Economy and the Black Labour Market , England, 1990,p.100

[16] Vito Tanzi, The Shadow Economy, Its Causes and Its Consequences, Brazilian Institute of Ethics in Competition (12 March 2002),p.3

on cost-benefit choices individuals choose to shift their official economic activities to the shadow economy because of the increasing the opportunity cost and it reduces the productivity of the official work.[17] Since the difference between total cost of labor in the official economy and after tax earnings from work come to be larger, the reason working in the shadow economy also grows. Nevertheless, the tax reforms such a deduction in the tax rate may make stable the size of the shadow economy but not lead to an important decrease in the shadow economy.



Source: Schneider and Hametner (2007)

Figure 2.1: Main causes for the increase of shadow economic activities

Figure 1 explains that the tax and social burden responsibilities of individuals have an important influence on the size and development of the shadow economy. A strong effect of indirect and direct taxation on the shadow economy is pointed out by statistical evidence in further studies. (Schneider and Hametner, 2007)

2.1.2.2. Regulations

Regulations are substantial tools for governmental economic policy. And it often takes a place of taxing and public spending to obtain particular governmental function. The economic activities of individuals and companies are connected with several areas by the government. Some of the regulations which include for instance minimum wages, pension contributions or vacation time etc. raise the cost of operating in some services or make it

[17] Friedrich Schneider, "The Shadow Economies in Central and SouthAmerica with a Specific Focus on Brazil and Columbia: What do we know?",2008, p.5

difficult to work formally in them. Consequently, many activities are shifted to shadow activities to avoid consenting to these regulations and to evade from paying taxes.

Countries that have many rigid regulations- that are overregulated- tend to have large shadow economies. Rankings of countries on the ground of the use of "red tape" or "bureaucratic constraints" has occasionally placed Brazil among the more regulated countries, thus creating stronger incentives for enterprises and individuals in Brazil to operate underground or in the shadow.[18]

In order to observe the intensity of regulations the administrations set laws and procedures such as license requirements or trade barriers, labor market regulations for foreign workers and companies. Johnson, Kaufmann, and Zoido-Lobatòn have shown there is empirical evidence that the influence of labor market regulations is significant on shadow economy. Regulations cause an important increase of labor costs in the formal economy. When it starts the costs of labor to be shifted to the workers or employees, they choose an alternative work in the shadow economy, where they can evade from these costs. Johnson, Kaufmann, and Schleifer (1997) discussed in their paper the relationship between regulations and unofficial economy. Empirical analysis resulted that the economies which have relatively fair taxes, light regulations and high tax revenues in the formal sector have a lower share of the shadow economy in GDP than the economies that have low tax collection, unfair taxes and relatively poor public goods.

The Heritage foundation measures the intensity of regulation on a scale of 1 to 5 for countries. The table shows one point increase in this index is associated with an 14.7 percentage point increase in the share of the shadow economy.[19] As a result governments should underscore more on implementation of laws and regulations rather than increase the number of laws. On the other hand some administrations prefer still more regulations and laws, because it causes a higher rate of employment in the public sector.

[18] Tanzi, loc. cit, p.8

[19]Simon Johnson, Daniel Kaufmann and Pablo Zoido-Lobaton, Corruption, Public Finances and the Unofficial Economy, MIT, The World Bank, The World Bank (1998),p. 18

2.1.3. Public Sector Services

An expansion in the shadow economy can cause to reduced state revenues which in turn decrease the quality and quantity of publicly contributed goods and services. Fundamentally, this can lead to an increase in the tax rates for firms and individuals in the formal sector, pretty often combined with a disintegration in the quality of the public goods (such as the infrastructure) and of the management, with the outcome of even robust incentives to join in the shadow economy. Johnson, Kaufmann, and Zoido-Lobatón (1998a/b) present a simple model of this connection. Their results show that smaller shadow economies appear in countries with higher tax revenues if obtained by lower tax rates, fewer laws and reglements and less bribery facing enterprises.

Countries with a better rule of law, which is financed by tax revenues, also have smaller shadow economies. Transition countries have higher levels of regulation leading to a significantly higher incidence of bribery, higher effective taxes on official activities and a large discretionary framework of regulations and consequently a higher shadow economy. The general conclusion is that "wealthier countries of the OECD, as well as some in Eastern Europe, find themselves in the 'good equilibrium' of relatively low tax and regulatory burden, sizeable revenue mobilization, good rule of law and corruption control, and a smaller unofficial economy. By contrast, a number of countries in Latin American and the former Soviet Union exhibit characteristics consistent with a 'bad equilibrium': tax and regulatory discretion and burden on the firm are high, the rule of law is weak, and there is a high incidence of bribery and a relatively high share of activities in the unofficial economy."[20]

2.1.4. Changes in individual values and general attitude towards shadow economic activity

[20] Simon Johnson; Daniel Kauffman and Pablo Zoido-Lobatón, 'Corruption, public finances and the unofficial economy' Washington, D.C.: The World Bank, Discussion Paper,(1998b) p:1

In a „civilized" society, politicians concern in the economy in order to "fix" the boundaries between legality and illegality and to govern the working of economic life. These involvements may not be appropriate to everybody's' idea of morality and grasp of justice. This means, people do not oppose towards „normal" shadow economic activities; people commonly may find it better to justify their unofficial supply or demand for goods and services because friends and family members just "do the same" . The term „changes in individual values "generally consists of all possible changes in morality of a certain group or a whole country's population relating to their agreeableness to accept state reglements.[21] In general, if trust of the public authorities is high dealing with their actions and if the population shows a positive action towards fiscal interferences, one normally expects lower shadow economic activities[22]. For example a change in individual values may occur, when taxpayers believe that they no longer receive enough social services or benefits for the revenues paid to the government. Such events may decrease the agreement and the confidence in public authorities and increase the incentive to commit in the shadow economy, partly because in such situations people may need to balance subjectively felt individual welfare losses out themselves.

2.1.5. Changes in labor market conditions and the employment system

A rationing (i.e. strong policy interference) on the official labor market, e.g. decrease of working hours per week, or a decrease of the age for retirement have the effect that people have much more time to be used for shadow economic activities. An economic crisis may also lead to a decrease of the work force needed in the official labor market; hence it is frequent that during recessions the official demanding of work force decreases and unemployment increases. However, it is not normal that during the worldwide recession in the 70s a general increase in the extent of shadow economic activity was observed.[23]

An increase in transfers (e.g. unemployment benefits, pensions, etc.) reduces the incentives to work in the official economy as well. As a result, people have willingness to

[21] F. Haslinger, Illoyalität und die Ausbreitung der Untergrundwirtschaft – Eine theoretische Analyse; in Gijsel, P. (Ed.): Schattenwirtschaft und alternative Ökonomie: Eine Herausforderung für die politische Ökonomie?; Regensburg: Transfer Verlag, (1984)
[22] Kirchgässner,Steuermoral und Schwarzarbeit; in Enste, H. D., Schneider, F. (Ed.): Jahrbuch Schattenwirtschaft 2006/2007; Berlin: LIT Verlag, (2006)
[23] Peter De Gijsel, ‚Schattenwirtschaft und alternative Ökonomie : e. polit. Herausforderung für d. polit. Ökonomie?' (1984)

work less in the official economy and as a result that may increase their shadow economic activities. Another encouragement for working in the shadow economy is an increase in the wage rate in the informal sector (e.g. caused by higher demand for unlawful work) as this increases the profitability of unlawful work relative to employment in the formal sector. To some extent, a decrease in the net wage rate in the formal economy (e.g. Due to an increase in payroll tax) decreases the profitability of work in the official economy or the marginal utility of the expansion in formal work time which may also cause to an increase of shadow economic activity. Besides, this discussion is only valid for considerations on a microeconomic basis. According to macroeconomic theory, lower wages lead to higher employment as demand for labor increases and lower unemployment implicates, ceteris paribus, lower activity in the shadow economy.[24]

2.1.6. Prohibitions

Some activities are prohibited in some countries while they may be allowed in others. Prostitution is a classic example. Prohibitions are special forms of disposition so that they could also be classified together with the category of regulation. They play an important role in pushing people and resources off the formal economic track. There are some operations that are forbidden so that those who engage in them are engaging in unlawful or even criminal activities. They do so because, often, the outputs of these operations are in great demand so that high profits can be made. In a private cost benefit evaluation, those who engage in them determine that the benefits in the form of potential high gains exceeding the costs that include the possibility of being caught and being sentenced. Major forms of these activities are the production and distribution of drugs, engaging in illegal gambling, lending of money at high return rates, the production and sale of dangerous or forbidden substances various services, including prostitution, and others.

Reported estimates of the earnings in these prohibited activities are enormous. There is some disagreement among statisticians and other experts on whether the proceeds of these activities, or at least of some of them, ought to be counted toward the estimates of national incomes. Some argue that as long as people demand these "services" and are willing to pay

[24] G. Kirchgässner, Steuermoral und Schwarzarbeit; in Enste, H. D., Schneider, F. (Ed.): Jahrbuch Schattenwirtschaft 2006/2007; Berlin: LIT Verlag (2006)

for them, they ought to be counted. Others disagree. One difficulty is that some countries allow at least some of them, while others forbid them. For example Germany allows prostitution and the German tax authorities expect prostitutes to report fully their "incomes" and pay taxes on them. The Netherlands allows the sales and the consumption of some drugs that are illegal elsewhere. In both of these countries those activities are counted in the countries' national incomes. Thus, important questions are raised by prohibition and criminal activities for the definition and the measurement of the shadow economy. Because of the large estimates of these activities, their inclusion or exclusion can make a significant difference to that measurement.[25]

2.2. Methods of Estimating the Shadow Economy

Table 2.1. The Estimating Methods

Direct Approaches	**1. Survey Approach** **2. Integrated Approach** **3. Tax Audit and Investigation Approach**
Indirect Approaches **Physical Output Approaches** **Monetary Approaches**	**1. Comparison of the size of GNP calculated with different approaches** **2. Employment Approach** **3. Electricity Consumption Approach** **a. Basic Electricity Consumption Approach** **b. Revised-Electricity Consumption Approach** **c. Integrated-Electricity Consumption Approach**

[25] Vito Tanzi, 'The Shadow Economy, Its Causes and Its Consequences', (1999), p:13

	4. Basic Monetary Rate Approach **5. Trading Volume Approach** **6. Currency Demand Approach** **7. MIMIC Approach**

2.2.1 Direct Approaches

These approaches are also mentioned as 'micro approaches'. Surveys have been used in many studies. But it has a big disadvantage of the reliability of the respondents' answers. If respondent answers the questions honestly, the survey would yield reliable determinations. This method can surrender enumerated information about underground economy when detailed questions are answered correctly. That is the most important advantage in favor of the direct method. Underground economy can be estimated by comparing the declared income for tax purpose and measured income by bills or checks. The analyst aims to calculate unofficial economy by getting the amount of undeclared taxable income. But as it can be thought, to obtain correct or reliable data for undeclared taxable income is not a frugal task. Since, in general, auditing compliance initiatives are not random but based on characteristics of filed tax returns, such a sample is not necessarily random and therefore is not representative of the whole population. This factor is likely to bias compliance–based estimates of the shadow economy. Secondly, estimates based on tax audits reflect that portion of shadow economy income that the authorities succeeded in discovering and this is likely to be only a fraction of total hidden income.[26]

2.2.2. Indirect Approaches

2.2.2.1. Comparison of the size of GNP calculated with different approaches

In national reports the income measure of GNP and the expenditure measure of GNP should be equal. Thus, in case of a difference, the gap between expenditure and the income

[26] C. Bajada;F. Schneider, 'Size, causes and consequences of the underground economy: an international perspective',Ashgate Publishing, Ltd., 2005, p:76

measure can show the evidence to the existence of the shadow economy. If all the constituents of the expenditure were rightly measured, then this approach would in fact capitulate a good estimate of the size of the shadow economy. These estimates may therefore be very crude and of questionable reliability.[27]

2.2.2.2. Employment Approach

This approach studies the differences between the registered unemployment and the labor force. A decline in labor force participation in the official economy can be seen as an indication of increased activity in the underground economy, if total labor force participation is assumed constant.[28] The disadvantage of this approach is that dissimilarities in the rate of participation may also have other causes. In addition, people can have a second job in the unofficial economy and a 'real' job in the 'official' economy. Therefore such estimates may be viewed as weak indicators of the size and development of the unofficial economy.

2.2.2.3. Electricity Consumption Approach

The physical output approach firstly was used by Lizzeri (1979), and then del Boca and Francesco (1982), Portes (1996) and Kaufmann and Kaliberda (1996). Electricity consumption or Kaufmann- Kaliberda approach as well, th shadow economy is the difference between the rate of the electricity consumption and the rate of official GDP. Moreover, this method has been criticized as;

- Not all shadow economy activities require electricity, the other energy sources can be used as well.
- Technological changes have made the production and the use of the electricity more efficient.

[27] C. Bajada, F. Schneider, 'Size, causes and consequences of the underground economy: an international perspective',Ashgate Publishing, Ltd., 2005, p:82
[28]Park No-Wook, 'Underground economy: Size and Causes', Korea Institute of Public Finance, (2005)

- The changes in the electricity/GDP electricity may differ over time and across countries.[29]

2.2.2.4 The Monetary Approach

Associating between shadow economy and development in monetary aggregates the monetary approach tries to estimate the size of the shadow economy. Since the shadow economic transactions is suitable for concealing and abducting from the inspection; in general it is assumed that the payments are made with cash and these activities affect the size of the monetary aggregates. By analysis of these effects the size of the shadow economy is tried to be estimated. The monetary approaches can be classified under three main titles:

2.2.2.4.1 Basic monetary Approach

In this approach is considered in order to identify the size of the shadow economy the assumption following the activities in money market and using only the cash to make all transaction payments in shadow economic activities. Moreover, in official economy is assumed that the ratio of circulation of money and total deposits remain constant. An increase in this ratio over time indicates that there is an increase in demand of currency and thus shadow economy increases.

It is admitted that the changes in the ratio of the total amount of money in circulation (C) to total deposit (D) due to changes in shadow economy and the rise of this ratio causes increasing in the shadow economy. In the simple monetary ratio the informal income is calculated based on the following formula:

$$Y_H = [Y_R (C - k_R D)]/[(k_R +1)D]$$

where Y_H denotes informal GDP, Y_R is recorded GDP, C is currency in circulation, D is current deposit, k is the ratio of C/D.

[29]G.L. Miriela and Lennie Pa, 'The Shadow Economy in the Netherlands Antilles ', Social and Economic Studies, Vol. 56: 4, December 2007, Special Issue on Crisis, Chaos and Change, p: 1

The assumption of this method is that the income-velocity of circulation (Y /C + D), *v*, is equal to registered and shadow economies. As a result of this the size of the shadow economy is *v* times extra currency. The base year considered the size of the shadow economy is zero might be indicated the lowest value of the ratio k_R.

2.2.2.4.2. Transactions Approach

This method was developed by Feige (1979). Feige presumed that there is constant ratio between official GDP and trading volume. This method is based on Fisher's quantity theory of money.

MT=pT, where M denotes amount of money, V is velocity of currency, p is prices, T is total transactions.

Relating total nominal GNP to total transactions, the GNP of the shadow economy is calculated by subtracting official GNP from total nominal GNP. However, Feige has to assume a base year in which there is no shadow economy, and therefore the ratio of pT to total nominal (official = total) GNP was normal.[30]

2.2.2.4.3. Currency Demand Approach

This approach was first used by Cagan, who examined correlation between currency demand and U.S. tax pressure among the period 1919-1955. In this method it is assumed that currency/ current deposit ratio is remained over time. A proportional increase in the amount of the currency relatively to the current deposit is deemed a sign of increasing in shadow economic activities.

This method is extended by Gutman(1972) based on Cagan(1958). Gutman method's is based on four key assumptions:

- High taxes and government regulation,

- Only cash is used to make transactions in the shadow economy,

[30] Scheneider,F and Enste, "Shadow Economies: Size, Causes, and Consequences", p.93

- The ratio of currency to demand deposits (C/D), only influenced by changes in taxes and regulations and,
- There was some point in time in the past when no shadow economy existed.[31]

Increase the size of the economy cause an increase the demand for currency. In order to isolate this consequent increment demand for currency an equation for demand is observed. Furthermore, variables, like direct and indirect tax burden, government regulation and complexity of tax system, which are deemed the main cause working in the shadow economy, are counted in the estimation equation.

Cagan's approach was developed in order to estimate the shadow economic activities by Tanzi (1980). He calculated a currency demand function for the U.S. this approach presumes that the transactions in shadow economy are paid in the procedure of cash payment not to leave any traces for the authorities. Also such as the growth in revenue, the habits of consumption, interest rate are considered in this method. Furthermore the main reasons to force people working in the shadow economy such as direct or indirect tax burden; government regulations and complexity of tax system are included to the equation. The basic regression model for currency demand by Tanzi(1983) is following:

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

and in this model should be provided $\beta 1>0$, $\beta 2>0$, $\beta 3<0$, $\beta 4>0$ and ln is natural logarithm.

$C/M2$: is the ratio of cash holdings to current and deposit accounts.

TW : is a weighted average tax rate (to proxy changes in the size of the shadow economy)

WS/Y : is a proportion of wages and salaries in national income (to capture changing payment and money holding patterns)

R: is the interest paid on savings deposits (to capture the opportunity cost of holding cash)

Y/N: is the per capita income.

Extreme increases in currency of demand, increasing tax burden and other reasons push the individuals to informal economy. The size and development of the shadow economy is initially calculated by comparison between the currency demand corresponding to the lowest value of direct and indirect tax burden and currency demand corresponding to the current tax burden. Assuming the income- velocity of currency of circulation is the same for

[31] Ahumada, H., Alvaredo, F., Canavese, A. J.," The Demand for Currency Approach and the size of the shadow economy: a critical assessment",p.6

the recorded and shadow economy; the shadow economy can be calculated and compared with the official GDP.

All monetary approaches use the standard quantity theory to measure the size of the shadow economy. It is explained with the equation of the quantity theory MV=Y, where M denotes money supply, V is velocity of money and Y is the nominal national income.

$V_H = V_R = V$

V_H is the velocity of currency in shadow economy; V_R is the velocity of currency in official economy.

$M_H V_H = Y_H$

Y_H is the amount of income created by the shadow economy; M_H is the amount of currency held in shadow economy.

Through the equations above total income in the shadow economy can be calculated. According to Cagan(1958), one of the basic determinants of the ratio of the currency demand to total money supply is the tax burden behind the shadow economy. Consequently, the cash holding money is used as the basic variable to determine the size of the shadow economy. In the literature of currency demand there are many variables such as tax burden, interest rate, inflation, exchange rate etc.

The increment increase in currency, which is the amount unexplained by the conventional or normal factors mentioned is then attributed to the rising tax burden and other reasons leading people to work in the shadow economy.[32]

Currency demand approach is one of the most commonly used methods. According to Schneider the approach that has been used in many OECD countries has different aspects to the critics are following:

- Not all transactions in the unofficial economy are paid in cash. Some studies seek the method to attain whether all transaction in the shadow economy were paid in cash or not. The findings of Isachsen and Strom (1985) showed that in Norway, in 1980, approximately 80% of all transactions included paid in cash.
- Most studies regards only tax burden as main factor of the shadow economy. Because of the unreliable data for most countries other studies are not attended. If,

[32] Schneider,F.,"The size and development of the shadow economies and shadow economy labor force of 22 transition and 21 OECD countries: what do we know?" p. 48

since it appears possible, these other factors also influence the size of the shadow economy then it can be higher than stated in most studies.

- When this approach is applied at least to the United States, Garcia (1978), Park(1979) and Feige (1996) elicited a another weak point is that increases in cash/ current deposit is derived from the reduction in current deposit caused by informal economic activities rather than an increase in the cash.
- Another weak point of transactions, as in most studies, is to assume the currency-velocity of circulation is the same. As Hill and Kabir (1996), in Canada, and Klovland (1984),in Nordic countries, claimed, there is significantly uncertainty about the velocity of money in formal economy and the velocity of money in shadow economy is even more difficult to estimate.
- Lastly, the assumption of the no shadow economy in base year opened to critism.

2.2.2.5. Structural Equation Models

The structural equation models (SEM) became very popular in some sub-disciplines of Business Administration. The terms, "unmeasured variable models" and "latent variable models" refer to types of structural equation models that explicitly incorporate measurement error into the estimation of structural equation parameters, and treat observed ("manifest") variables as indicators of underlying constructs rather than perfectly measured representations of these same constructs.[33]

The Structural Equation Models (SEM) are statistical relationships among latent (unobserved) and manifest (observed) variables. It implies a structure of the empirical covariance matrix which, once the parameters have been estimated, can be compared to the resulting model-implied covariance matrix. If both matrices are consistent, then the structural equation model can be considered as a likely explanation for the relations among the examined variables. The structural equation models are "regression equations with less restrictive assumptions that allow measurement error in the explanatory as well as the dependent variables". So the method is theoretically superior than regression analysis as it explores all information contained in the covariance matrix and not only in the variance, and

[33] Douglas Baer, 'Structural Equation Models with Latent Variables', University of Victoria, (2008), p: 2

also because it allows variables to be measured with error, but compared with regression and factor analysis, SEM is a relatively unknown tool in economics[34].

LISREL is one of the many computer programs now available to estimate SEM models. It is common in general structural equation models such as the peer-influences model to distinguish between
two sub-models as;

1. A structural sub-model which relates endogenous variables to exogenous ones. In the peer- influences while models the endogenous models are unobserved the exogenous ones are observed.
2. Latent variables are separated in two groups by the analyst as causal (exogenous) variables (ξ) and indicator (endogenous) variables (η).

These models enable the unobservable variables to take place in the model. The software was developed by Jöroskog and Sörbom (2006) and it is still used in social sciences.

2.2.2.5.1. The MIMIC Model

The shadow economy cannot be observed directly so the size of it can only be estimated. MIMIC stands for ''Multiple Indicators Multiple Causes'' and it is a special case of the general LISREL model. The MIMIC Model has the origins from the factor analysis literature of psychometrics. The first application of MIMIC Model on measuring the magnitude of the shadow economy was made by Frey and Weck-Hanneman in 1984. They used a pooled data set of 17 OECD countries. The application was improved by Aigner, Schneider and Ghosh in 1988 by allowing some adjustment in a dynamic MIMIC Model and they applied the method for United States. Giles modified the approach as he was using it on New Zealand's hidden economy especially with unit root and cointegration analysis. Also Bajada and Schneider (2005) used the approach by analyzing Australia and Pacific nations, meanwhile Dell'Anno and Schneider (2003) estimated the shadow economy of Italy and other OECD countries.

The specific case of structural equation models is used, the multiple indicators and multiple causes model. These models are constituted by two kinds of equations like the

[34] R. Dell'Anno, M. Gómez, A.Pardo, 2004. Shadow Economy in three very different Countries: France, Spain and Greece. A MIMIC Approach, www.unisa.it, WP April

structural and the measurement equations system. The structural model takes the relationship between the latent variable (η) and the causes (X_q) and the measurement model links the indicators (X_p) and the latent variable.

In the MIMIC model, shadow economy is the latent variable (η) and is linearly determined, subject to a disturbance ζ by a set of observable exogenous causes as;

$$\eta = \gamma_1 x_1 + \gamma_2 x_2 + \ldots\ldots + \gamma_q x_q + \zeta \qquad \textbf{(1)}$$

Latent variable η linearly determines, subject to a disturbances ε_1, ε_2, ……., ε_p, the set of observable indicators as y_1, y_2, …….., y_p:

$$y_1 = \lambda_1 \eta + \varepsilon_1 \ , \ y_2 = \lambda_2 \eta + \varepsilon_2 \ , \ldots\ldots\ldots\ldots\ldots\ldots, y_p = \lambda_p \eta + \varepsilon_p \qquad \textbf{(2)}$$

Structural disturbance ζ and errors ε are normal distributed, independent and the expectation of the variables are zero.

$x' = (x_1, x_2, \ldots, x_q)$ observable exogenous causes

$\gamma' = (\gamma_1, \gamma_2, \ldots, \gamma_q)$ structural parameters in the structural model

$y' = (y_1, y_2, \ldots, y_p)$ observable endogenous indicators

$\lambda' = (\lambda_1, \lambda_2, \ldots, \lambda_p)$ structural parameters in the measurement model

$\varepsilon' = (\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_p)$ measurement errors

$\upsilon' = (\upsilon_1, \upsilon_2, \ldots, \upsilon_p)$ standard deviations of the measurement errors

We can rewrite equations (1) and (2) as;

$$\eta_t = \gamma' x_t + \zeta_t \qquad \textbf{(3)}$$

$$y_t = \lambda \eta_t + \varepsilon_t \qquad \textbf{(4).}$$

$E(\zeta \varepsilon') = 0$ and $E(\zeta^2) = \sigma^2$ and $E(\varepsilon\varepsilon') = \theta^2$. Here, $\theta_{(pxp)}$ is the diagonal matrix with υ, shown on its diagonal. We can write the reduced form of the function of the observable variables as;

$$y = \lambda (\gamma' x + \zeta) + \varepsilon = \Pi' x + v \qquad \textbf{(5)}$$

So;

$\Pi = \gamma \lambda'$ and $v = \lambda \zeta + \varepsilon$

Expressing the model in terms of covariances shows us;

$$\Sigma = \begin{pmatrix} \mathrm{Var}(y_t) & \mathrm{Cov}(y_t, x_t) \\ \mathrm{Cov}(x_t, y_t) & \mathrm{Var}(x_t) \end{pmatrix} = E\left(\begin{bmatrix} y_t \\ x_t \end{bmatrix} \begin{bmatrix} y_t \\ x_t \end{bmatrix}' \right)$$

So, the model's covariance matrix gives;

$$\Sigma = \begin{pmatrix} \lambda(\gamma' \Phi \gamma + \psi) + \Theta_\varepsilon & \lambda \gamma' \Phi \\ \Phi \gamma \lambda' & \Phi \end{pmatrix}$$

Σ is a function of parameters. λ, γ and the covariances contained in Φ, θ_ε and ψ. The latent variable is not observable so, it's size is unknown. Therefore the model's parameters must be estimated by using the links between the variances of the observed variables and the covariances. The purpose of the procedure is to find the values of the parameters and covariances that produce an estimate for Σ.

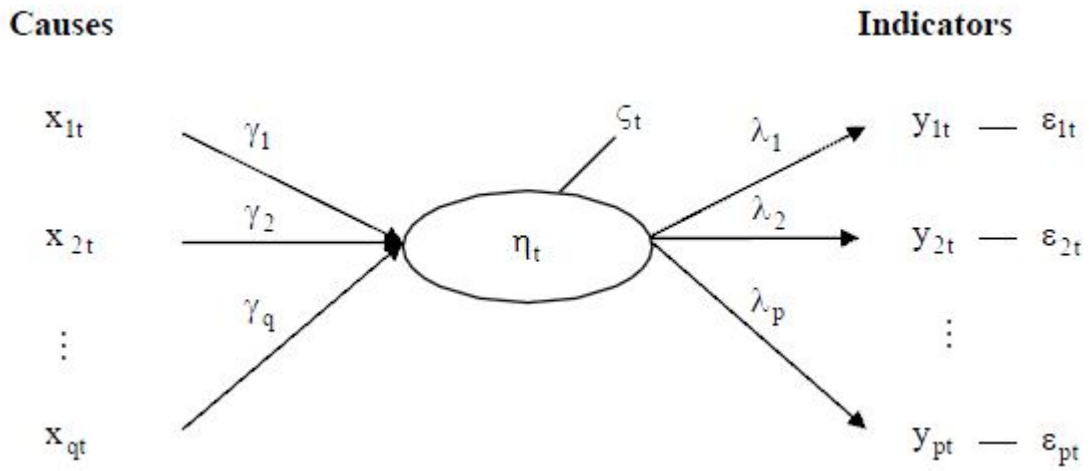


Figure 2.2.General Structure of a MIMIC Model

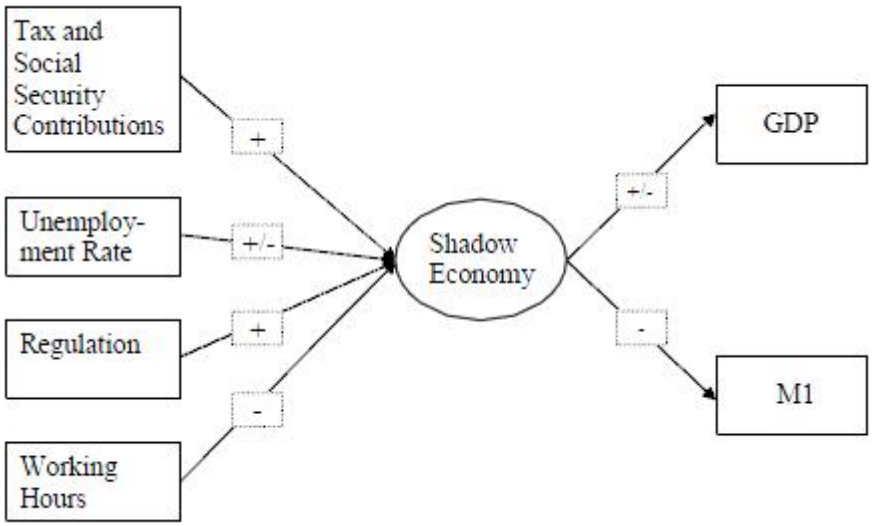


Figure 2.3. Hypothesizes Relationships in the MIMIC Model

Most analyses of the shadow economy come to the conclusion that tax and social security burdens and the intensity of regulation are the two main causes affecting the size and development of the shadow economy. Taxes affect labor-leisure choices and stimulate labor supply in the shadow economy since the greater the difference between the total cost of labor in the official economy and the after-tax earnings from work, the greater the incentive to avoid this difference and to work in the shadow economy. An increase in the intensity of regulations, such as trade barriers and labor restrictions for foreigners, reduces the freedom (of choice) for individuals engaged in the official economy and leads to a substantial increase in labor costs in the official economy. Since most of these costs can be shifted onto employees, there is further incentive to work in the shadow economy – where they can be avoided.

Unemployment and the hours worked per employee in the official economy also affect the shadow economy. While it is clear that a reduction in working hours in the official economy increases hours spent working in the shadow economy, unemployment's effect on the shadow economy is ambiguous.

Another variable we use in measuring the shadow economy with the MIMIC Model is the inflation rate based on the consumer price index. First of all, inflation distorts the price mechanism by making it difficult to separate varies in relative prices from varies in the general level and creates uncertainty. Consequently, there may be redistribution over where

resources and production are cheaper.[35] So, the inflation rate becomes the suspect as the consumer basket of goods and services which is CPİ is calculated may not sufficiently cover up the items that consumers have to buy from the unofficial markets at lower prices.[36]

The lower the officially measured GDP, the fewer possibilities people have to earn money in the official economy, and the likelier they are to be driven into the shadow economy. In the short run, we expect this negative relationship to exist. In the long run, however, the official and the shadow economy are complements rather than substitutes, and the variables will thus exhibit a positive relationship.

The application of the MIMIC model also has its critiques. Helberger and Knepel (1988) show that the leading conclusions of Frey and Weck-Hannemann are not constant in the face of small changes in either the data period or the group of countries taking place in the study. They also argue that the lists of causal and indicator variables are unpersuasive for the purpose. Smith (2002) and Hill (2002) criticize the modeling in the Giles and Tedds book, especially the absence of economic theory to guide the specification and the complexity of the estimation strategy. In the critique of Helberger and Knepel, they also examine the relevance of the causal and indicator variables that are used. The specification and conclusions of Giles and Tedds are examined in Breusch (2005a), where it is shown that the time path of their estimate for Canada has little to do with any underground activity, but mostly reflects price inflation and real growth in the observed economy. Moreover, the level of their estimate is a numerical accident with no connection to any evidence in the data.[37]

Indicators of the MIMIC Model

Activities in shadow economy have the effect on the official sector through their effect on the production, capital and labor markets. These factors are able to obtain the changes in the size of the unofficial economy relative to the official economy. In MIMIC model we include monetary indicators (Y1) (which is the ratio of narrow money to broad money), formal economic production (Y2) (measured by the Real GDP) and the work force participation rates (Y3).

In terms of monetary indicators, most transactions in the shadow economy come about as cash. However an increase in shadow economy would increase the demand for cash.

[35] JayKaplanhttp://www.colorado.edu/Economics/courses/econ2020/section6/section6-main.html
[36] U Myint, ''Corruption; Causes, Consequences and Cures'', Asia-Pacific Development Journal 7(2) (2000) p.46
[37] T. Breusch, 'Estimating the Underground Economy using MIMIC Models',School of Economics, Faculty of Economics and Commerce, The Australian National University, (2005), p:2

In terms of the work force, as the size of the shadow economy increases, that would occur as a decrease in the formal labor force participation rates. As the work force in shadow economy increases, the number of people who work in the formal economy decreases. There would also be an decrease in working hours in official economy.

In terms of the product market, growth of the shadow economy encourages the movement of inputs from the formal to the informal sector. However this situation would depress the productivity in the formal sector, which is measured by the official growth rate. As the production in the shadow economy increases would reflect the official growth rate as well. This is because during a recession, inputs such as labor and capital move out from the formal economy into the shadow economy. Thus we can say that there is an inverse relation between official and shadow economy. From the other point of view, some economists claim that formal economy causes growth in the shadow economy. This may occur in economies with the significant linkages between the official and shadow economy. For example In Nigeria, the presence of forward linkages in which certain aspects of production in the formal economy are subcontracted to the SE. Thus an increase in official growth rate increases the relative size of the SE as a result of increased demand for goods and services decrease in the growth of the shades by firms in the formal economy. A recession in the growth of the formal economy would lead also lead to a reduction in the growth of the shadow economy. The results show the existence of a direct linkage between the sizes of formal and shadow economy. Schneider and Klingmair find a pro-cyclical relationship between activity in the legitimate and underground economy for developed countries but countercyclical for developing economies. Although several comparative and single country studies have shown significant findings, they have not been able to provide absolute results on the relationship between official to shadow economy.

2.3. Studies for Estimation of the Shadow Economy in the World

Defining the shadow economy as an international case was coincided the beginning of the 1980's. In 1983 an international conference was organized to constitute a general rules associated with definitional issues of concept of shadow economy. The joint decision of this conference is: The shadow economy comprises a large part of the world economy and subjects a danger for the international accounts.

The first scientific study was the article which Gutmann examined the shadow economy of U.S.A.

2.3.1. Estimation Shadow Economy in Developed Countries

Analyzing of the U.S. economy Gutmann (1977) has estimated the share of the size of the shadow economy in official national income 176 billion dollars in 1976 and 195 billion dollars in 1977. Another survey in 1981 he has indicated the size of the shadow economy constituted 15% of national income.

Schneider (1997) has observed in econometric estimations using the currency demand and MIMIC approach that especially between 1970 and 1990 the shadow economy in West European Countries is increased. In 1990 the share of the shadow economy in total GDP in OECD countries was %10. Also in 1994, the estimated of the size of the shadow economy in 17 OECD countries is shown that the share of the size of the shadow economy in GDP was around %15 and the share of Canada were too close to the international average. The analysis estimated by Schneider (1997) point that the basic causes of the shadow economy consist of direct and indirect tax burden and the density of government regulations.

In order to estimate the shadow economy in Canada Tedds (1997) applied in his survey the MIMIC model in which the shadow economy is defined as a latent variable. MIMIC model contains causal and indicator variables to estimate the size of the shadow economy 1960/1995 periods. Accordingly, the size of the shadow economy covered about 15% of GDP in 1995.

Giles (1999) has concentrated his researches on New Zealand. He estimated the size of the shadow economy using both MIMIC and currency demand model. The estimated latent variable method is used to create the times series index of the shadow economic activities calculated by the results of the currency demand approach.[38] The size of the shadow economy in New Zealand is between 6.8% and 11.3% of the GDP in periods 1968/1994.

Giles and Tedds have made in a study published in 2000 a comparison of the shadow economy between Canada and New Zealand; and for this comparison the MIMIC approach is

[38] Nüket Kırcı ,"Türkiye'de Kayıt Dışı Ekonominin Tahmini: Ekonometrik Bir Yaklaşım" ,Master Thesis (2006),p.7

applied. In this study they examined the effect of the taxes between 1986-1991 on the shadow economy in Canada and New Zealand.

Bhattacharya estimated in his study published in 2000 the shadow economy using the econometric method in U.K. for the period 1960-1984. The share of the shadow economy in GDP was 3.8% in 1960 and 8% in 1984. Unlike the method of Tanzi, he has not included the tax variables. This method has an advantage testing tax evasion theory.

Table 2.2. The Size of the Shadow Economy in Developed Countries

Coun/Yea	1960	1978	89/90	90/93	94/95	96/97	99/00	2000/01	2002/03	2003/04	2004/05
Sweden	5.4	13.2	15.8	17.0	18.6	19.5	19.2	19.1	18.3	17.9	17.5
Belgium	4.7	12.1	19.3	20.8	21.5	22.2	22.2	22.0	21.0	20.5	20.1
Denmark	3.7	11.8	10.8	15.0	17.8	18.2	18.0	17.9	17.3	16.9	16.5
İtaly	4.4	11.4	22.8	24.0	26.0	27.2	27.1	27.0	25.7	25.1	24.4
N.lands	5.6	9.6	11.9	12.7	13.7	13.8	13.1	13.0	12.6	12.3	12.0
France	5.0	9.4	9.0	13.8	14.5	14.8	15.2	15.0	14.5	14.2	13.8
Norway	4.4	9.2	14.8	16.7	18.2	19.4	19.1	19.0	18.4	17.9	17.6
Austria	4.6	8.9	5.1	6.1	7.0	8.6	9.8	10.6	10.9	10.6	10.3
Canada	5.1	8.7	12.8	13.5	14.8	14.9	16.0	15.8	15.2	14.8	14.3
Germany	3.7	8.6	11.8	12.5	13.5	14.8	16.0	16.3	16.8	16.3	15.6
U.S.A	6.4	8.3	6.7	8.2	9.2	8.8	8.7	8.7	8.4	8.3	8.2
U.K	4.6	8.0	9.6	11.2	12.5	13.0	12.7	12.5	12.2	12.1	12.0
Finland	3.1	7.6	-	-	-	-	18.1	18.0	17.4	17.0	16.6
Irland	1.7	7.2	11.0	14.2	15.4	16.0	15.9	15.7	15.3	15.0	14.8
Spain	2.6	6.5	16.1	17.3	22.4	23.0	22.7	22.5	22.0	21.6	21.3
S.land	1.1	4.3	6.7	6.9	6.7	7.8	8.6	9.4	9.4	9.2	9.0
Japan	2.0	4.1	-	-	10.6	11.3	11.2	11.1	10.8	10.5	10.3

Greece	-	-	-	27.2	29.6	30.1	28.7	28.5	28.2	27.9	27.6
Australia	-	-	10.1	13.0	13.8	13.9	14.3	14.1	13.5	12.8	12.6
N.Zeland	-	-	9.2	9.0	11.3	-	12.8	12.6	12.3	12.0	11.7
Portugal	-	-	15.	6 2	2.1	22.8	22.7	22.5	21.9	21.4	21.2
Average (%)	**4.2**	**8.8**	**12.0**	**14.5**	**16.0**	**16.8**	**16.8**	**16.7**	**16.2**	**15.8**	**15.6**

Source: Schneider 2003,2004,2005

Examined the table generally, it is observed the volume of the shadow economy increased starting with 4.2% in 1960 until the period of 1999/2000, after this period it started to decrease. Considering the average of OECD countries it is seemed that Switzerland has the lowest average unlike Greece. Grease is followed by Italy, Portugal, Belgium and Spain. Nevertheless, the average increase of OECD countries is 11.6% in this 45 years period, in other words volume of the shadow economy of OECD countries rise 2.7 times in 45 years.[39]

2.3.2. Estimation Shadow Economy in Transition Countries

In Transition countries group is appeared former Soviet Union countries and CEE countries. In this group the average volume of shadow economy is 40.1% in 2002/2003. In transition countries the country with the highest volume of shadow economy is Georgia with 68% and the lowest volume of shadow is Czech Republic with 20.1%.

[39]Boyan Belev,, 'The Informal Economy In the EU Accesion Countries: Size, Scope, Trends and Challenges to the of Process of EU Enlargement', Center for the Study of Democracy, 2003, p:23

Table 2.3. The Size of the Shadow Economy in 25 East and Central European and Former Soviet Union Countries

No.	Country	Shadow Economy (in % of off. GDP) using the DYMIMIC and Currency Demand Method		
		1999/00	2001/02	2002/03
1	Albania	33,4	34,6	35,3
2	Armenia	46,3	47,8	49,1
3	Azerbaijan	60,6	61,1	61,3
4	Belarus	48,1	49,3	50,4
5	Bosnia and Herzegovina	34,1	35,4	36,7
6	Bulgaria	36,9	37,1	38,3
7	Croatia	33,4	34,2	35,4
8	Czech Republic	19,1	19,6	20,1
9	Estonia	38,4	39,2	40,1
10	Georgia	67,3	67,6	68,0
11	Hungary	25,1	25,7	26,2
12	Kazakhstan	43,2	44,1	45,2
13	Kyrgyz Republic	39,8	40,3	41,2
14	Latvia	39,9	40,7	41,3
15	Lithuania	30,3	31,4	32,6
16	Macedonia, FYR	34,1	35,1	36,3
17	Moldova	45,1	47,3	49,4
18	Poland	27,6	28,2	28,9
19	Romania	34,4	36,1	37,4
20	Russian Federation	46,1	47,5	48,7
21	Serbia and Montenegro	36,4	37,3	39,1
22	Slovak Republic	18,9	19,3	20,2
23	Slovenia	27,1	28,3	29,4
24	Ukraine	52,2	53,6	54,7
25	Uzbekistan	34,1	35,7	37,2
Unweighted Average		**38,1**	**39,1**	**40,1**

Source: Schneider 2005

2.3.3. Estimation Shadow Economy in Developing Countries

There exist 86 countries in the group of developing countries including 37 African countries, 28 Asian countries, 21 Central and South American countries. Some economists believe that the shadow economy in developing countries will decrease once these countries achieved higher levels of growth and modern development. The informal economy can however no longer be considered as a temporary phenomenon. Moreover, the shadow economy has been observed to have more of a fixed character in countries where incomes and assets are not equally distributed. It seems that if economic growth is not accompanied by improvements in employment levels and income distribution, the informal economy does not decrease. The situation is therefore that the informal economy is continuously increasing in most developing countries, even in rural areas. Estimates show that the non-agricultural employment share of the informal workforce is 78% in Africa, 57% in Latin America and the Caribbean, and 45–85% in Asia[40] . In all developing countries, self-employment includes a greater share of informal employment than wage employment. Specifically, self-employment represents 70% of informal employment in Sub-Saharan Africa, 62% in North Africa, 60% in Latin America and 59% in Asia. Consequently, informal wage employment in the developing world constitutes 30% to 40% of the informal employment outside of agriculture

[40] K. F. Becker, Fact finding study, 'The Informal Economy', SIDA, (2004), p:8

Table 2.4. The Size Of Shadow Economy in 17 African Countries

No.	Country	Shadow Economy (in % of official GDP) using the DYMIMIC and Currency Demand Method				
		1999/00	2001/02	2002/03	2003/04	2004/05
1	Algeria	34.1	35.0	35.6	34.8	33.9
2	Angola	43.2	44.1	45.2	45.3	45.0
3	Benin	47.3	48.2	49.1	49.3	49.8
4	Botswana	33.4	33.9	34.6	34.2	33.8
5	Burkina Faso	41.4	42.6	43.3	43.8	43.1
6	Burundi	36.9	37.6	38.7	39.4	39.7
7	Cameroon	32.8	33.7	34.9	34.4	33.6
8	Central African Republic	44.3	45.4	46.1	46.3	46.9
9	Chad	46.2	47.1	48.0	48.4	47.8
10	Congo, Dem. Rep.	48.0	48.8	49.7	50.4	50.8
11	Republic of Congo	48.2	49.1	50.1	50.5	51.1
12	Cote d'Ivoire	43.2	44.3	45.2	45.4	44.7
13	Egypt, Arabian Republic	35.1	36.0	36.9	36.3	35.4
14	Ethiopia	40.3	41.4	42.1	42.7	42.0
15	Ghana	41.9	42.7	43.6	43.8	43.2
16	Guinea	39.6	40.8	41.3	41.7	41.0
17	Kenya	34.3	35.1	36.0	35.4	34.8
18	Lesotho	31.3	32.4	33.3	32.8	32.3
19	Madagascar	39.6	40.4	41.6	41.9	41.2
20	Malawi	40.3	41.2	42.1	42.7	41.9
21	Mali	42.3	43.9	44.7	44.0	43.2
22	Mauritania	36.1	37.2	38.0	37.4	36.8
23	Morocco	36.4	37.1	37.9	37.3	36.7
24	Mozambique	40.3	41.3	42.4	42.9	43.5
25	Namibia	31.4	32.6	33.4	33.0	32.4
26	Niger	41.9	42.6	43.8	44.1	44.2
27	Nigeria	57.9	58.6	59.4	59.6	59.5
28	Rwanda	40.3	41.4	42.2	42.4	41.6
29	Senegal	45.1	46.8	47.5	47.8	48.2
30	Sierra Leone	41.7	42.8	43.9	44.1	44.3
31	South Africa	28.4	29.1	29.5	29.0	28.2
32	Tanzania	58.3	59.4	60.2	59.1	58.2
33	Togo	35.1	39.2	40.4	40.6	39.4
34	Tunisia	38.4	39.1	39.9	39.4	38.3
35	Uganda	43.1	44.6	45.4	45.8	44.9
36	Zambia	48.9	49.7	50.8	50.2	49.3
37	Zimbabwe	59.4	61.0	63.2	63.9	64.6
Unweighted Average		**41.3**	**42.3**	**43.2**	**43.2**	**42.8**

Source: Schneider 2005

The huge informal economy in Africa is only to some extent an issue of tax burdens and regulation, given the simple fact that the limited local economy means that working in the shadow economy is often the only way of getting a minimal standard of living.

However, it is not possible to treat Asian countries equally because as Israel, Hong Kong and Singapore highly developed, countries like Thailand and Nepal, still developing. It is somewhat astonishing that the average size of the Asian shadow economies is considerably smaller than the shadow economies of African and Latin American states.[41]

Table 2.5. The Size of Shadow Economy in 28 Asian Countries

No.	Country	Shadow Economy (in % of official GDP) using the DYMIMIC and Currency Demand Method				
		1999/00	2001/02	2002/03	2003/04	2004/05
1	Bangladesh	35.6	36.5	37.7	38.3	38.0
2	Bhutan	29.4	30.5	31.7	32.7	33.1
3	Cambodia	50.1	51.3	52.4	52.9	52.2
4	Hong Kong, China	16.6	17.1	17.2	16.4	15.6
5	India	23.1	24.2	25.6	25.9	25.1
6	Indonesia	19.4	21.8	22.9	23.6	24.0
7	Iran, Islamic Republic	18.9	19.4	19.9	20.2	19.7
8	Israel	21.9	22.8	23.9	23.2	22.6
9	Jordan	19.4	20.5	21.6	21.2	20.4
10	Korea, Republic	27.5	28.1	28.8	28.2	27.6
11	Kuwait	20.1	20.7	21.6	21.2	20.7
12	Lebanon	34.1	35.6	36.2	36.5	37.1
13	Malaysia	31.1	31.6	32.2	32.0	31.4
14	Mongolia	18.4	19.6	20.4	20.6	21.2
15	Nepal	38.4	39.7	40.8	40.2	39.3
16	Oman	18.9	19.4	19.8	19.2	18.6
17	Pakistan	36.8	37.9	38.7	39.2	39.5
18	Papua New Guinea	36.1	37.3	38.6	38.0	37.3
19	Philippines	43.4	44.5	45.6	45.1	44.3
20	Saudi Arabia	18.4	19.1	19.7	19.3	18.4
21	Singapore	13.1	13.4	13.7	13.0	12.1
22	Sri Lanka	44.6	45.9	47.2	48.3	48.8
23	Syrian Arab Republic	19.3	20.4	21.6	21.7	21.2
24	Taiwan, China	25.4	26.6	27.7	27.0	26.3
25	Thailand	52.6	53.4	54.1	54.3	53.6
26	Turkey	32.1	33.2	34.3	33.9	33.2
27	United Arab Emirates	26.4	27.1	27.8	27.2	26.5
28	Yemen, Rep.	27.4	28.4	29.1	28.2	27.3
Unweighted Average		**28.5**	**29.5**	**30.4**	**30.3**	**29.8**

Source: Schneider 2005

If we take a look at the characteristics of shadow economy in Latin America we can make a list that;

- There is a very high tax burden (direct and indirect taxes as a percentage of GDP)

[41] F. Schneider,, 'Shadow Economies and Corruption All Over the World: New Estimates for 145 Countries', Johannes Kepler University of Linz, Austria, (2005), p:16

- Government interventions do nothing to bring about the improvements in income distribution.

- The markets are excessively regulated by government.[42]

Central and South American countries, compared to Africa, the rate of increase in shadow economy activity in Central and South America is higher.[43]

Table 2.6. The Size of Shadow Economy in Central and South American Countries

No.	Country	Shadow Economy (in % of official GDP) using the DYMIMIC and Currency Demand Method				
		1999/00	2001/02	2002/03	2003/04	2004/05
1	Argentina	25.4	27.1	28.9	28.6	27.2
2	Bolivia	67.1	68.1	68.3	68.0	67.2
3	Brazil	39.8	40.9	42.3	42.6	41.8
4	Chile	19.8	20.3	20.9	20.3	19.4
5	Colombia	39.1	41.3	43.4	43.0	42.7
6	Costa Rica	26.2	27.0	27.8	27.1	26.3
7	Dominican Republic	32.1	33.4	34.1	34.4	34.8
8	Ecuador	34.4	35.1	36.7	36.1	35.2
9	El Salvador	46.3	47.1	48.3	48.1	47.2
10	Guatemala	51.5	51.9	52.4	51.1	50.3
11	Haiti	55.4	57.1	58.6	59.3	59.6
12	Honduras	49.6	50.8	51.6	50.8	49.3
13	Jamaica	36.4	37.8	38.9	39.2	38.4
14	Mexico	30.1	31.8	33.2	32.6	31.7
15	Nicaragua	45.2	46.9	48.2	48.8	48.1
16	Panama	64.1	65.1	65.3	64.1	62.2
17	Paraguay	27.4	29.2	31.4	32.4	33.1
18	Peru	59.9	60.3	60.9	59.1	58.2
19	Puerto Rico	28.4	29.4	30.7	29.6	28.2
20	Uruguay	51.1	51.4	51.9	50.8	49.2
21	Venezuela, RB	33.6	35.1	36.7	36.1	35.4
Unweighted Average		**41.1**	**42.2**	**43.4**	**43.0**	**42.2**

Source: Schneider 2005

[42] F. Schneider and D. Enste, IMF Economic Issues No:30(2002).
[43] F.Schneider, 'Shadow Economies and Corruption All Over the World: New Estimates for 145 Countries', Johannes Kepler University of Linz, Austria, (2005), p:16

3. CHAPTER

ECONOMETRIC ESTIMATION OF SHADOW ECONOMY IN GERMANY AND USA

Most of the approaches used in determining the size of the shadow economy in GDP have important contras. If we examine the direct approaches; for example the survey approach, we assume that the individuals who play an active role in shadow economic activities, would not answer the questions correctly. Thus, we would not expect accomplished conclusions. In the integrated approach; the conclusions are also acquired by a survey. Mentioning the tax audit and investigation approach, the inspections are centered on the individuals who are registered in tax administration. Thus, unregistered activities and individuals are held out of the evaluation.

However, indirect approaches also have important contras in estimating the size of the shadow economy. For example, the employment approach is not a reliable method because unregistered employees can never be correctly established. Contra of the physical output approach is that electricity is not in every shadow economic activity needed and the efficiency is changeable over time.

If we look at basic monetary approach in the monetary approaches, we see that not just cash, but also checks or bills are important payment instruments in shadow economic activities. One important contra of the trading volume approach is that, it is crucial to determine trade volume and it is much like a theoretical approach rather than a practical one.

Currency Demand Approach and MIMIC Model Approach are the most used methods of late years in estimating the size of shadow economy in GDP. The contras of the other approaches induce the analysts to use these two more reliable approaches. MIMIC Model is a time series estimation model used in measuring the size of the shadow economy and it enables the use of multiple indicators. However, MIMIC Model provides a basis for analyses in different studies.

The most important feature of the MIMIC Model is that unlike the explained methods above, it uses not only the traces that shadow economy leaves on labor, capital or production markets, but all. The MIMIC Model handles the causes like tax burden, inflation, unemployment of shadow economy simultaneously in a statistical frame.

3.1. Data Analysis

In our study we try to estimate the Shadow Economy for France and Germany. Our data covers the annual between 1990 and 2010: 21 observations. Data sources are summarized in Appendix A. In this section it is examined the MIMIC model introduced by Jöroskorg (1996) and the variables being used to estimate the model needs to be stationary. In the first step, the variables are determined under the null hypothesis against stationary using the Augmented Dickey Fuller Test. The results are shown in Table 3.1. The plots of the variable are shown in Appendix B.

Table 3.1: Augmented Dickey Fuller Test for USA

Variables	Incl. Equat.	ADF *	Critical value**	First Level	ADF*	Critical Value**
Indicators						
Circulation of currency	C	-3.2398	-3.0655	Circulation of currency	-4.90	-3.0403
GDP growth rate	C	-2.8097	-3.02068	GDP growth rate	-4.7952	-3.0299
Causes						
Unemployment Rate	C&T	-1.1687	-3.6908	Unemployment Rate	-3.7733	-3.6908
Taxes on production and import/GDP	C&T	-3.6864	-3.7104	Taxes on production and import/GDP	-4.9921	-3.6736
Government Consumption/GDP	C	-1.9171	-3.0299	Government Consumption/GDP	-3.3219	-3.0521
Annual working hours	C	-0.2680	-3.0206	Annual working hours	-3.8963	-3.0299

*For ADF Test Statistics we use the Akaike Information Criteria. ** Critic level %5

According to the results of ADF Test Statistics for Unites States before estimation of the MIMIC model the all variables except Circulation of Currency are differentiated to I(1).

Table 3.2: Augmented Dickey Fuller Test for Germany

Variables	Incl. Equat.	ADF *	Critical value**	First Level	ADF*	Critical Value**
Indicators						
Labor force	C	-0.7091	-3.0299	Labor force	-3.2401	-3.0299

GDP growth rate	C	-4.0331	-3.0403	GDP growth rate	-3.6117	-3.0810
Causes						
Tax burden / GDP	C&T	-1.2084	-3.6736	Tax burden/GDP	-4.1759	-3.6908
Social Security Burden/GDP	C	-2.0528	-3.0810	Social Security Burden/GDP	-3.4117	-3.0810
Government Consumption/GDP	C	-1.9431	-3.0299	Government Consumption/GDP	-3.6551	-3.0403

*For ADF Test Statistics we use the Akaike Information Criteria. ** Critic level %5

According to the table above all variables except GDP growth rate are differentiated to I(1) in order to estimate the size of the shadow economy through MIMIC model.

3.2 Obtaining and Estimation of the Shadow Economy

To measure the Shadow Economy various and different models are considered and in order to estimate the model is formed MIMIC 4-1-2 as an illustration for United States. As seen Figure 3.1 this illustration has 2 indicators and 4 causal variables. The indicators are GDP growth and Circulation of Currency. The Causal factors are Total tax over GDP, Taxes on production and imports over GDP, Annual working hours and taxes on personal income over GDP. As seen Figure 3.2 for Germany MIMIC model is estimated 3-1-2 as an illustration. And this illustration has 3 causal and 2 indicators variables. The indicators are GDP growth rate and Labor force and the causal variables are Social Security burden over GDP, Tax Burden over GDP and Government Consumption over GDP.

The prediction equations of the MIMIC model requires normalization of the second (measurement) equation in which the dependent variable is latent variable and so one of the indicators vectors (λ) is restricted to identify the model. For that reason the coefficient of the Circulation of Currency in estimation of United States and Labor force in Germany is restricted to 1. ($\lambda=1$)

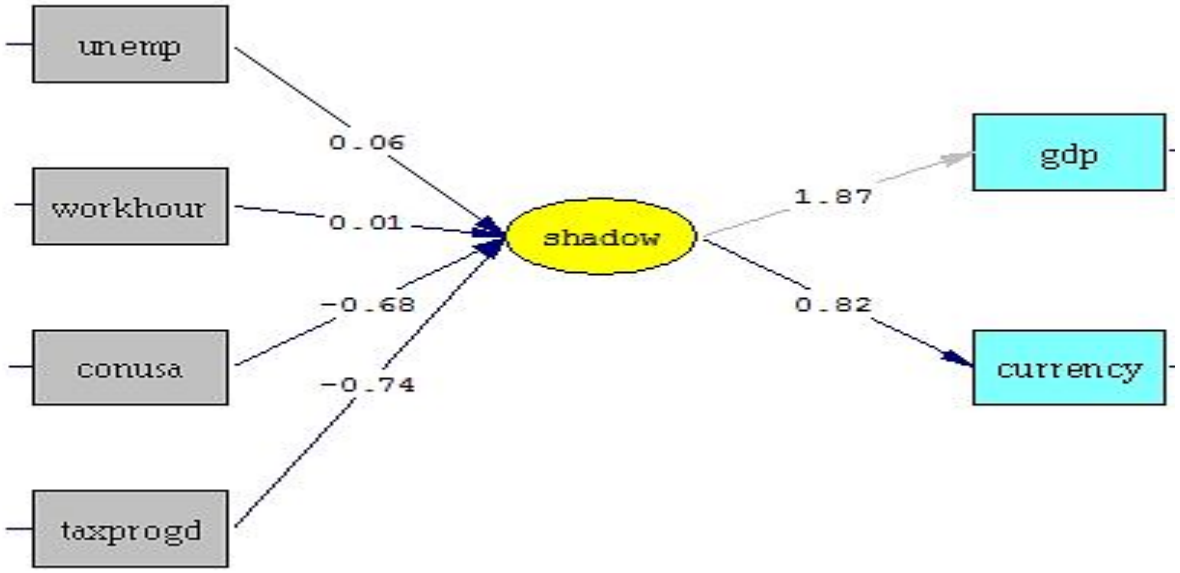


Figure 3.1. Path diagram of the MIMIC Model for United States

On the purpose of the determination of the Shadow Economy in United States and Germany the output belonging to the normalization solution is shown above in order to estimate the MIMIC model using LISREL software.

For United States according to the solution of the MIMIC model approach, taxes on personal income over GDP, tax burden over GDP have a positive relation with the size of the shadow economy and unemployment and taxes on production and import over GDP have negative relation with the size of the shadow economy. There is a positive relation between the size of the shadow economy and both indicator variables.

The predicted latent variable, shadow economy, is expressed 86% of the variance of the circulation of currency and 56% of the variance of the GDP growth. In other words 86% of changes in circulation of currency and 56 % of the GDP growth is explained by the shadow economy. GFI (Goodness of Fit) is obtained 0.90 and also NFI (Normed Fit Index) 0.881. The indexes which are got the value between 0 and 1 are found close to 1 that is required for a fit equilibrium.

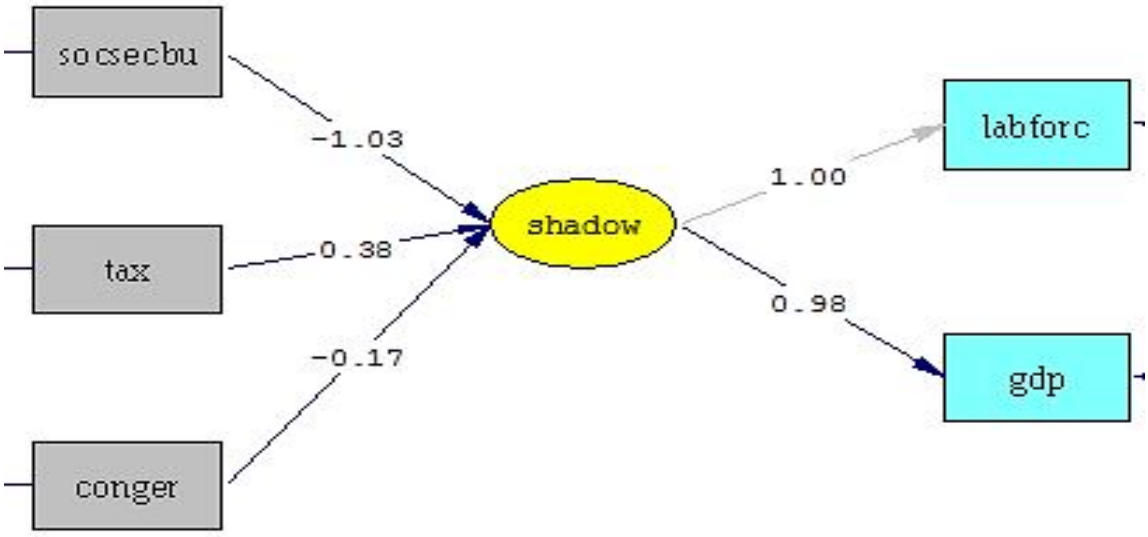


Figure 3.2. Path diagram of the MIMIC Model for Germany

For Germany according to the solution of the MIMIC model approach, tax burden over GDP has a positive relation with the size of the shadow economy and social security burden over GDP and government consumption over GDP have negative relation with the size of the shadow economy. There is a positive relation between the size of the shadow economy and both indicator variables likewise.

The predicted latent variable, shadow economy, is expressed 98.72% of the variance of the labor force and 95% of the variance of the GDP growth. In other words 98.72% of changes in labor force and 95 % of the GDP growth are explained by the shadow economy. GFI (Goodness of Fit) is obtained 0.991 and also NFI (Normed Fit Index) 0.98. These indexes show that the equilibrium is good fit.

In order to estimate the size of the shadow economy in United States the latent variable scaled up to a value of the average of the years between 1999 and 2001 in Schneider's studies. This lead we take the average of these studies to measure the size of the Shadow Economy for our study. And the base value is the 8,7% for the study.

Table 3.3: Size of the Shadow Economy in United States in % of GDP

YEAR	SE as % of GDP USA
1990	9,230965
1991	9,270135
1992	9,192666
1993	9,084732
1994	8,984632
1995	8,92022
1996	8,852326
1997	8,765283
1998	8,704352
1999	8,709575
2000	8,7
2001	8,791396
2002	8,921961
2003	8,997689
2004	8,988114
2005	8,984632
2006	8,984632

2007	9,012486
2008	9,17961
2009	9,277969
2010	9,258819

The rate of the underground economy in the U.S. has grown significantly since the 1990s mainly due to increase in currency holding, growth in the private services sector, the burdensome procedure to obtain business licenses and pay taxes, and a higher perceived level of corruption in public sectors.[44]

- Marginal income tax is one of the most important elements in the growth of the shadow economy and United States holds the highest marginal income tax in all countries. In most countries marginal tax rate is higher than the average tax rate. For example an individual may have a marginal tax rate of 45% but pay average tax of half this amount. In USA analysis shows that as the personal income tax rate increases 1%, shadow economy tends to increase 1.4%[45].

- Illicit employment is one of the most important economic problems of the United States. Today, the population of the illegal immigrants is nearly 8.5 million but this not said to represent the real number.

- Also criminal activities are a significant economic problem in analyzing the rate of the shadow economy. The costs of the unreported wages are around 50 billion US Dollars to the government.

- Due to research, the unemployment rate had reached 10.2% in October 2010.

- Entrepreneurs often make quarterly payments of their taxes and the growth of online commerce may worsen the situation.

- Also government policies have an important role in rising of the shadow economy. The Federal Deposit Insurance Corp. (FDIC) released a report in 2010 concluding that 7.7 percent of U.S. households, that means around 17 million adults, do not have a bank account.

[44]M.K. Hassan and S.Y. Jung, 'A Re-Examination of the US Underground Economy: Size, Estimation and Policy Imlications', Network Financial Institute at Indiana State University, (2010), p:2
[45]F. Schneider, 'Shadow Economy', Johannes Kepler University Linz, Austria, (2002), p:5

It is expected that as an economy gets richer the unbanked population should fall. It is a contrary situation what now happens in the USA.[46]

- Tax revenues became lower than the real GDP since the recession began.
- An evident result is that in 8 years from 1999 to 2007 shadow economies appear to be on the rise in nearly every country around the world. This is just because taxation and regulations have increased in most countries over the past 15 years.

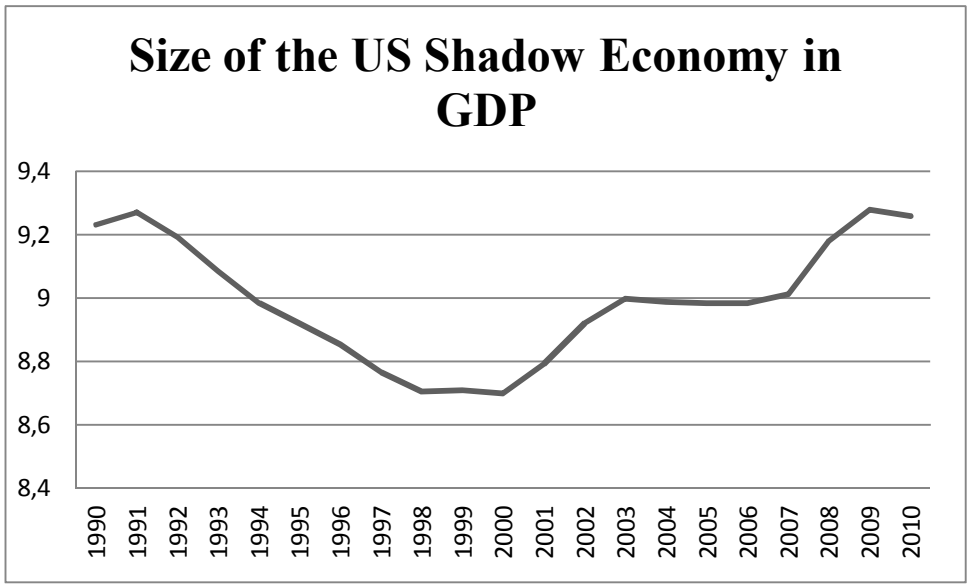


Figure 3.2. Size of the US Shadow Economy in GDP

To calculate the size of the shadow economy in Germany the latent variable scaled up to a value of the year in 1995 that is given in Schneider's studies. This lead we can take the size of the shadow in 1995 which is 13.90 a base value for our study.

[46]R.W.Rahn, 'New Underground Economy', Giovanni's World, Dec 9, 2009

Table 3.4: Size of the Shadow Economy in Germany in % of GDP

YEAR	SE as % of GDP Germany
1990	15,34800585
1991	14,62346782
1992	14,02093471
1993	14,02093471
1994	13,9
1995	13,9
1996	14,32273637
1997	14,50360333
1998	14,38266862
1999	13,95993225
2000	13,9
2001	14,56353557
2002	14,98627194
2003	15,34800585
2004	15,34800585
2005	14,98627194
2006	14,62346782
2007	14,62346782

2008	14,02093471
2009	14,02093471
2010	10,70218663

Shadow economy has been increasing since 2004 because of the mini-job regulation in Germany in April 2003 and this regulation obtained of decrease of unemployment in Germany in 2005 around 9 billion Euros. It is not uncomplicated to analyze the rather new measures for preferable coordination and more efficient process against the shadow economy with stricter legislation on fighting the shadow economy introduced in August 2004 contribute to a reduction of illegal employment. According to the analyses, the new laws reduced the illegal activities by 1 billion Euros in 2005. However it is still argued that if a stricter legislation is a way of decreasing the shadow economic activities. There are two reasons of this argument. First is, it is needed a very high control effort to prevent the shadow activities. Second one is, people are often unaware of the new legislation.

Some reasons of changes of the rates of shadow economy in 2000s;

- Removal of taxes in year 2007 is the reason of declining of the shadow economy in 2008.
- The social insurance has a 5% of increase since July 2006 and this is also a reason of declining of the shadow economy. On the other hand, mini-jobs still lead to an increase in shadow economy[47]. The results of the research show us growth of 300 million Euros. Although the elements we listed above induce a decrease of 100 million Euros in shadow economy. The coordination of illegal employment activities is a significant effect on the level of shadow economy.
- An increase of 45% income tax induced shadow economy by 0.3 billion Euros in 2007.

[47]F. Schneider, 'Reducing the Shadow Economy in Germany; A Blessing or Curse?', Johannes Kepler University of Linz, Austria, (2007), p:20

- Regarding too increase of social insurance contributions levied on “Mini-Jobs” in the commercial sector from 25% to 30% coming since 2006, illicit employment increased by 2500 to 3500 million Euros.[48]
- The decrease of the unemployment insurance increased the size of shadow economy by nearly 1.5 billion Euros.

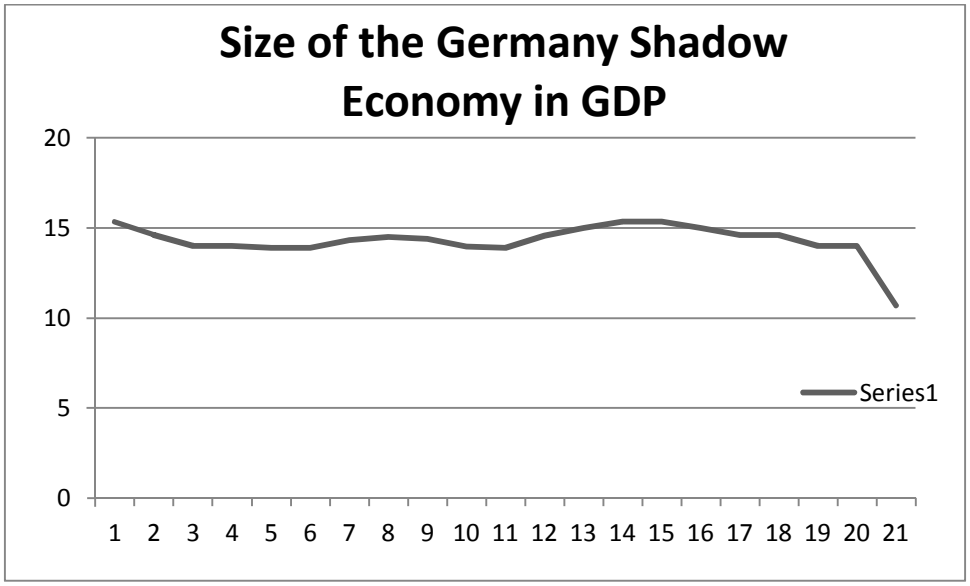


Figure 3.3. Size of the Germany Shadow Economy in GDP

[48]F. Schneider, ‘Reducing the Shadow Economy in Germany; A Blessing or Curse?’, Johannes Kepler University of Linz, Austria, (2007), p:22

CONCLUSION

Shadow economy is a phenomenon of significance in all countries. One of the most important problems of creating and implementing the social and economic politics is the shadow economy. The causes of the shadow economy can be divided into three main such as social, economic and institutional reasons. The tax system is based on the most of the social and institutional reasons. Due to resistance to tax, tax awareness, high tax rates and density of tax legislation and regulation contributes the development of the shadow economy.

The informality in the economic system creates several disadvantages. Shadow economy has a negative effect on the tax system and making the taxable resources out of control of the government and cause public budget deficit through reducing the power and effectiveness of tax collection of government. In term of statistically the negative effect of shadow economy appears some measurement bias on many of data on level of welfare, inflation, employment and account deficit. This situation leads to failure applying the economic and social policies. Through some economic and social policies requires correct and reliable estimates of the shadow economy to provide using the public resources effective and efficient.

There is a variety reasons why people shift to the shadow economic activities. Foremost of engaging in shadow economy appears taxation and regulation. Furthermore a government has to analyses the relationships between official and shadow economy to reduce the activities in shadow economy among its economic policy decisions.

In light of some facts in developed countries governments may not have a big interest to decrease the activities in shadow economy. Almost 2/3 of the earning in the shadow economic activities is spent in the official economy and income earned in shadow economy may create a rise the standard of living of working population.

In our study it is presented the estimates the shadow economy between the years 1990-2010 for the Germany and United States. The estimates are made based on currency demand and MIMIC Model approaches. The calculations denote that the shadow economy as a percentage of GDP has fluctuated between 8% and 10% of GDP for United States and between 14% and 16% of GDP for Germany.

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Appendix A: Sources of Data

A.1. Sources of Data for United States

Causes	Sources	Annotations
Unemployment Rate	OECD	The annual data are averages of monthly estimates and based on 2000.
Taxes on production and import/GDP	BEA	Table 3.1. Government Current receipts and expenditures/ Table 1.1.5. Gross Domestic Product.
Annual average working hours	OECD	In number of hours worked per year person in employment.
Government consumption/GDP	WB	Government final expenditure consumption/ Gross Domestic Product.
Indicators		
Circulation of Currency	FRED	M1/H.6. Money Stock Measures.
GDP growth rate	BEA	Table 1.1.1. Percent Change From Preceding Period in Gross Domestic Product.

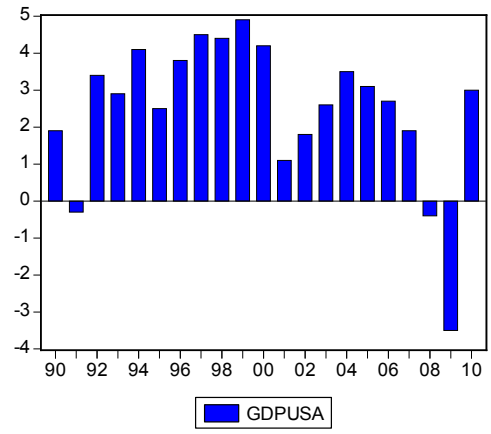
A.2. Sources of Data for Germany

Causes	Sources	Annotations
Social Security Burden/GDP		
Taxes/GDP	OECD	Revenue statistics- Tax revenue as a % of GDP
Government consumption/GDP	WB	Government final expenditure consumption/ Gross Domestic Product.
Indicators		
Labor Force	OECD	ALFS Summary Satistics
GDP growth rate	WB	World Bank Nationals Accounts Data

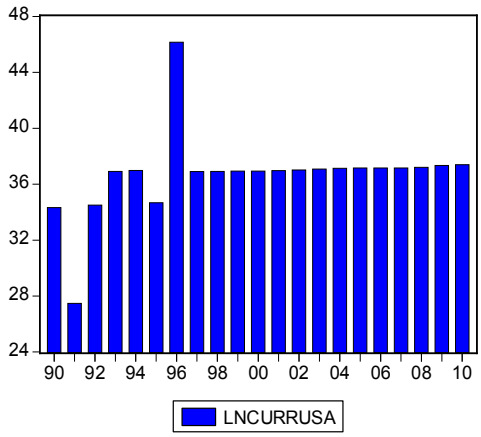
Appendix B: Plots of variables

B.1. United States variables

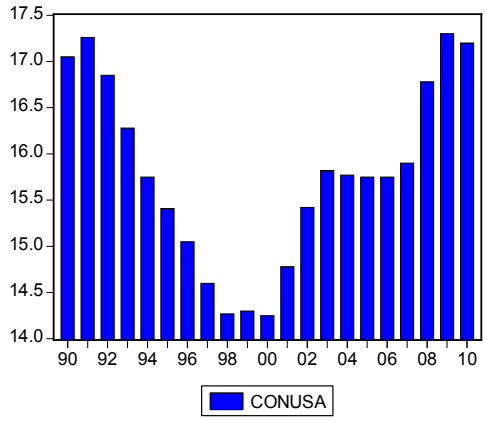
GDP growth rate



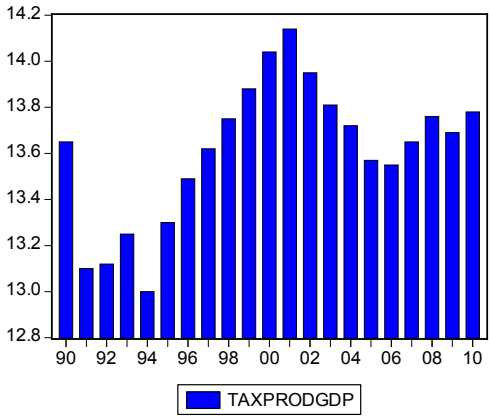
Circulation of Money



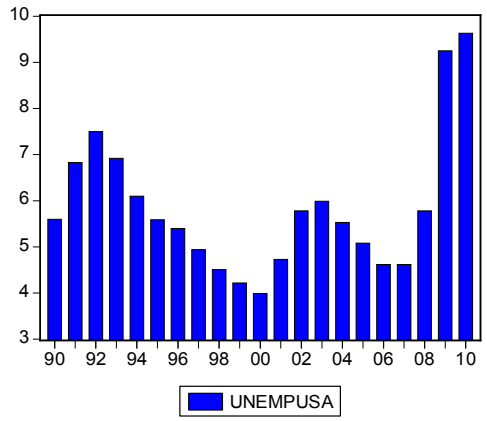
Government Consumption over GDP



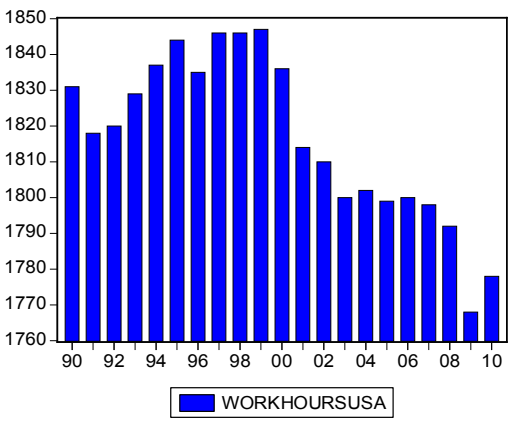
Taxes on production and import over GDP



Unemployment rate

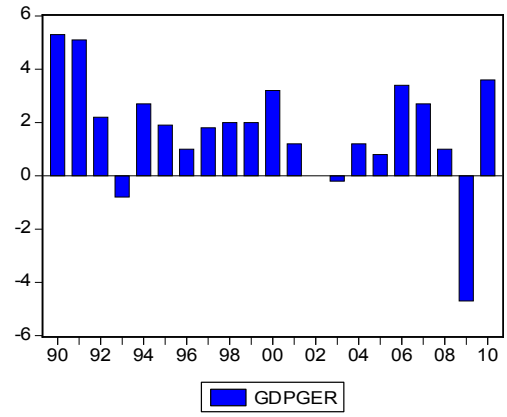


Working hours

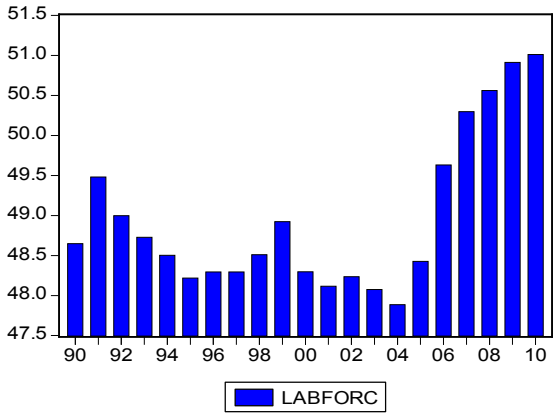


B.2. Germany variables

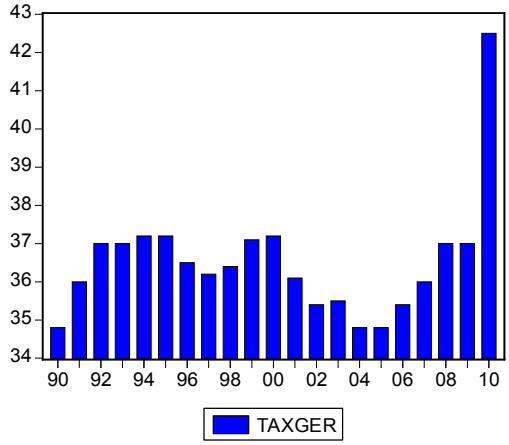
GDP growth rate



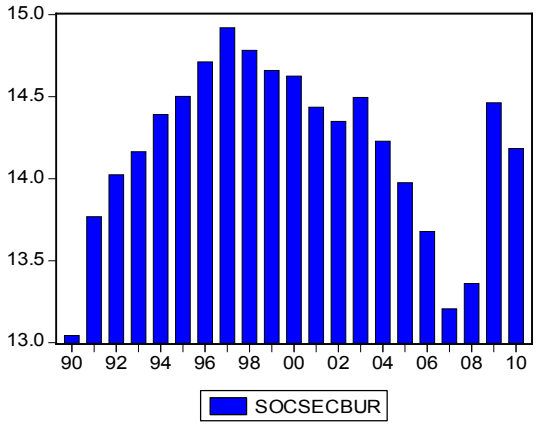
Labor Force



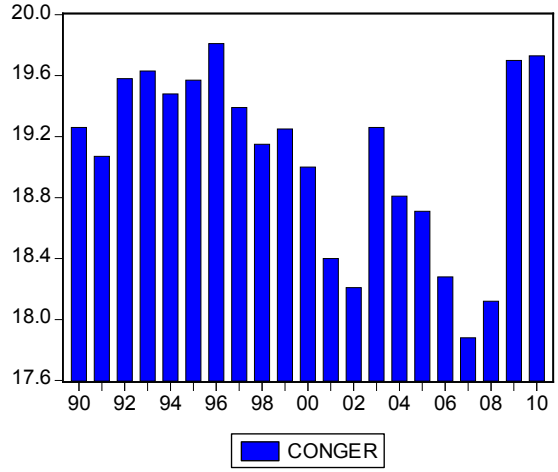
Tax revenue/GDP



Social security Burden/GDP



Government Consumption/GDP



Abstract

As a serious economic and social problem, shadow economy has begun to be discussed in Europe and United Stated during 1960s and it also became an important problem all over the world during 1980s.

The effects of shadow economy on world economies are the rise of the budget deficits, decrease of tax revenues, deprivation of social rights of the workers, the comprise of a inequitable competition, reduce of the efficiencies of the fiscal and monetary policies.

The aim of our study is to exhibit an idea about the shadow economy in two developed countries, Germany and United States, and to compare with the extension of shadow economy in different developed and developing countries. We also submit different policies about the solution of this important economic and social issue.

In first chapter of the study, a definition of the shadow economy is made, and its interaction with the official economy is investigated. In second chapter, in the theoretical background, the main causes and the methods for estimating the shadow economy, the size of shadow economy in different countries were handled. In the third chapter, we made an estimation of shadow economy for Germany and United States with two different approaches which are called 'Currency Demand Approach' and 'MIMIC Model Approach'.

It is necessary to explain the relationship between all causes of the shadow economy to acquire the accurate and certain estimates of its size in GDP. With the frame we denoted above, it is clear that the shadow economy seems to have positive effect in the short run and negative effects in the long run.

Keywords: Shadow Economy, Currency Demand Approach, Structural Equation Models, MIMIC Model Approach.

Zusammenfassung

Schattenökonomie begann in den 1960ern in Europa und in den Vereinigten Staaten als ein Wirtschaftliches und Soziales Problem zu diskutiert werden. In den 80ern wurde es Weltweites Problem.

Die Wirkungen von Schattenökonomie auf die Weltwirtschaft sind die Aufsteigungen der Budgedefizite, Verminderungen der Steuereinnahmen, Entbehrungen der sozialen Rechte der Arbeiter, ungerechtes Wettbewerb und die reduzierungen der Effizienz der Fiskal-und Geldpolitik.

Das Ziel unserer Studie ist es, eine Vorstellung über die Schattenökonomie in zwei entwickelten Ländern, Deutschland und den Vereinigten Staaten zu zeigen, und mit der Erweiterung der Schattenökonomie in verschiedenen Industrie-und Entwicklungsländern zu vergleichen. Wir unterbreiten verschiedene Strategien zur Lösung dieser wichtigen wirtschaftlichen und sozialen Themen.

Im ersten Kapitel, eine Definition der Schattenökonomie ist gemacht und seine Interaktion mit dem ofiziell Wirtschaft untersucht. Im zweiten Kapitel, in den theoretischen Hintergrund, die wichtigsten Ursachen und die Methoden zur Schätzung der Schattenwirtschaft und die Größe der Schattenwirtschaft wurden in verschiedenen Ländern abgewickelt. Im dritten Kapitel, haben wir einen Estimation der Scahttenwirtschaft für Deutschland und die Vereinigten Staaten mit zwei verschiedenen Methoden, ‘Currency Demand Approach‘ und ‘MIMIC Model Approach‘ gemacht.

Es ist notwendig zu erklären die Beziehung zwischen allen Ursachen der Schattenwirtschaft auf die bestimmte Schätzungen um der Größe des BIP zu erwerben . Es ist klar, dass die Schattenwirtschaft hat eine positive Wirkung auf kurze Sicht und negative Auswirkungen auf lange Sicht.

Schlagwörter: Schattenwirtschaft, Currency Demand Ansatz, Stukturgleichungsmodelle, MIMIC-Model-Ansatz.

CURRICULUM VITAE

Name	Fulya Türkler
Date of Birth	July 29, 1984
Place of Birth	Varna (Bulgaria)
Nationality	Turkey & Bulgaria

EDUCATION

1990 – 1995	Primary School, Istanbul (Turkey)
1995 – 1998	Secondary School, Istanbul (Turkey)
1998 – 2002	Gymnasium, Istanbul (Turkey)
2002 – 2006	Bachelor of Economics, University of Istanbul (Turkey)
2008 – Present	Master of Economics, University of Vienna (Austria)