# Impact Participation Rate
# and Unemployment Rateon
# Underground Economy in OECD Countries

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*Abstract:*

*In the decision system, policy makers decide based on an information system including statistical indexes. If information system would be based on shadow economy, the policy makers will not achieve to desired results, because information and results are subjected to estimate by error. This part of economy effects on important indexes such as income redistribution, employment, government income and finally social welfare. So study about this part of economy and how affecting other parts of economy from this will help government to control its effects.*

*In this paper, we have tried to analyze the effect of shadow economy on the other parts especially labor market and tax system of a country via panel data for 17 developed countries of OECD between 1994-2008 and then presented the suggestions to simplify the control of this part.As a consequence, in the labor market, partnership rate has significant effect negatively and unemployment rate has significant positively on expanding the shadow economy and the regulation burden have also direct effect on this part of economy. About the tax, tax burden has significant effect positively on shadow economy growth and versus change in tax burden of these countries doesn't have significant effect on this part of studied countries.*

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## 1. Introduction

In all countries, some economic activities do hidden for escape from limitation of rules or in reason of kind of activity. Hidden activities do due to being undercover of information record systems or having shortcoming in these systems. For example, the commodity illicit which does for getting profit does hidden due to being against the law, but the householders' activities or small producers don't record in official statistics, because these aren't recordable, so informal activity in economy doesn't always mean illegal one.

Informal economy which called by different names such as underground economy, underground economy, and hidden economy and … is subjected to attend after World War II and after more appearance of government in economy and making incentive for moving to informal part and in last decades, its literature has expanded considerably, so the economists try to research about the reasons and factors which effect on it.

In this paper, at first we have tried to expand the theoretical base of underground economy and the most effective factor which have made it. In following the most important parts of economy which affected by underground economy will study. After that, the model is presented and introduced panel data method for estimating. Finally, for surveying the effect of different effective factors on underground economy, the model has estimated for 17 countries of OECD and the results are analyzed. In this model, the factors such as regulation burden, tax burden, change in tax burden, partnership rate and unemployment will be studied based on existing statistic data.

## 2. Theoretical consideration

Many researchers have tried to present the complete definition for informal economy, never else there are still a lot of ambiguities about it and there are different understandings for it. Several existing words for this issue such as underground economy, underground economy, informal economy and … indicates that there are various understanding but with much

coordination between them. Feige said that despite of determination of importance of underground activities, but there is still considerable ambiguity about the meaning of this issue. Different authors used various words that the plentifulness of these indicates commotion in its literature which tries to clear some undiscovered parts of it. Chugand and Uppal described some discrimination points of these definitions with more clearness via the schematic method. (Fig.1)

With countries developing, it is made more rules which set of them and information system related to them causes that more activities sets in formal and informal parts of economy. Therefore with countries developing, the informal part of economy has expanded, so we can discuss this hypothesis that the fraction between the economic theory and realities can be lead of information systems and statistics shortcoming and this makes to doubt to some theories and economic policies efficiency.

**Fig1:** The position of black economy in whole economic activity in opinion of Chugand and Uppal
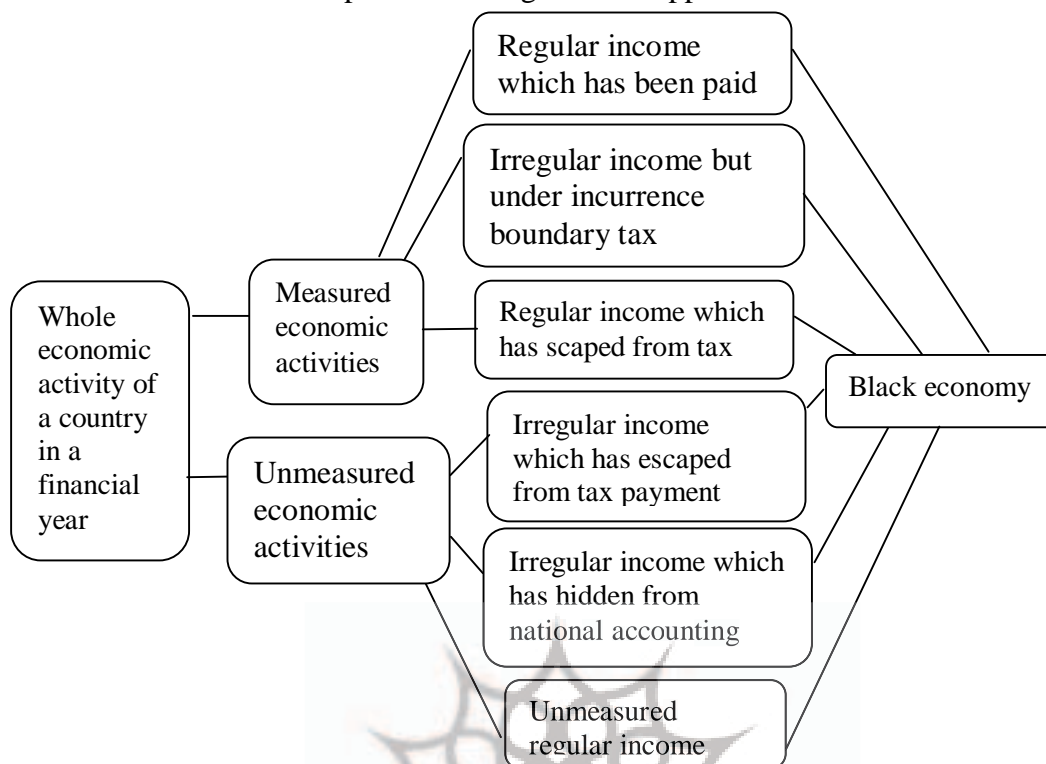


## 2.1. The reasons of appearance and expanding of black economy
### 2.1.1. Tax burden and social security system

In more done researches, tax burden and social security are introduced as the most important factors of existing informal economy. The ordained taxation by government with effect of optimum labor- leisure choice causes to motivate the labor for moving to informal economy. When labors observed the more difference between costs and incomes, they get more incentives for avoiding from the income and moving to informal part.
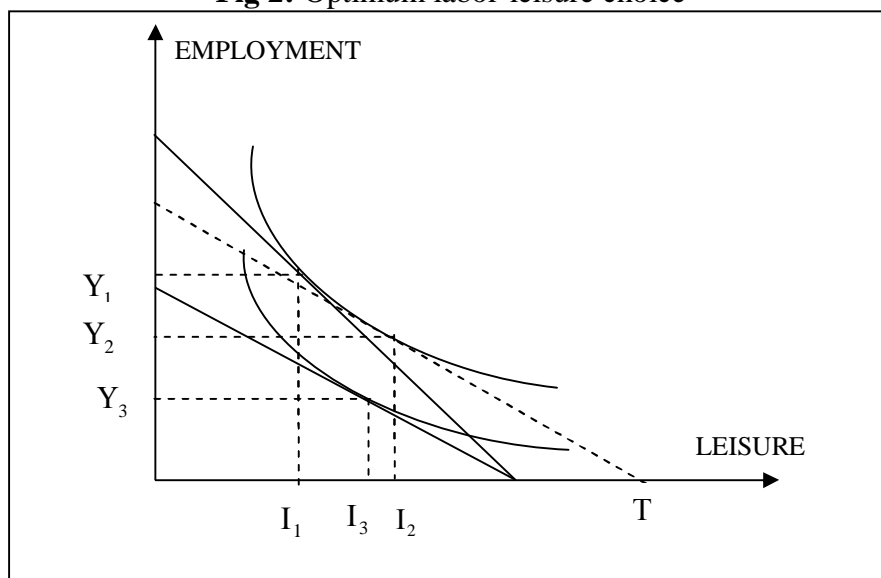
**Fig 2:** Optimum labor-leisure choice



Fig 2 indicates that after increasing in tax on income, the optimum point between labor and leisure changes from I1 to I3 and causes to decrease labor supply in formal part and increase in informal part in order to keep preliminary welfare level.

One of the most important indexes in neoclassic model is marginal rate of tax. Whatever this rate would be more; the substitution effect of labor-leisure choice is more than income effect especially when people are possible to get income in formal part, so the time of labor work decreases in formal part.

### 2.1.2. Intensity of regulation

Increasing in intensity of regulation (which measured by the quantity of rules) is one of the principle reasons of decreasing freedom and individual choice in formal economy. Labor market rules, commercial obstacles and other limitations can be enumerated as intensity of regulation. Intense rules leads to increase considerably in work costs in formal economy. Since more work costs transfers to labors, so it makes incentive for working in informal economy. In countries with more regulations, the informal part is more expanded as 1% increase in

regulation measure index leads to 8.1% increase in proportion of informal economy.

### 2.1.3. Government interference and legal tribulations

Kaufman (1998) in their research about informal economy concluded that with expanding in control right and supervision by policy makers and bureaucracy system, the proportion of informal economy to GDP increases. One of the most important realities which have had considerable effects on informal part growth is policy makers' presence and interference and bureaucracy system in economic activities. The economic activities politicization means that the supervision right on economic enterprises activity expands by policy makers. Control and supervision on enterprises via government starts with bureaucracy and then follows by private benefits of policy makers and bureaucrats. In recent studies, this phenomenon (expanding of supervision right of government) surveyed in different countries such as Peru, France, Russia and Ukraine.

The used public assumption in economic literature is that a marauder government decreases the volume of economic activities. In east Europe countries and former soviet studied that after politicization of economic activities, economic actives move to underground economy. In fact they prefer to not pay tax instead of recording the economic activity. In this condition, some enterprise decrease government income by quitting formal part and it leads to decrease public services and consequently decrease incentive for activity in formal part. Indeed it makes an undesirable equilibrium and finally low-level tax incomes leads to a larger informal part and decreasing in qualify of public services.

### 2.1.4. Labor market

There are serious ambiguities about the trace direction unemployment factor on volume of black economy. In one hand, with increasing unemployment, the incentives of activity in informal economy increase, but in the other hand, it is said that unemployment rate is considered as a macroeconomic index and

its increase is sign of starting the economic recession period and demand decrease for labor, in formal and informal activities. So it can expect decrease in black economy size with unemployment increase.

The great regulations existences in labor market and wage insufficiency are the reasons for being more dynamic in informal economy. In more OECD countries, expanded unemployment and the costs related to labors wages leads to grow informal part of economy. Times work decrease design in formal economy is proposed by some governments and works unions for decreasing unemployment rate. Decreasing the time work of workers provides job opportunities for unemployed people and makes labors proficiency, but it is neglected that mandatory decrease of time work provide the fields for activity in informal economy and expands it. Early retiring can lead to increase in informal activities opportunities for retired persons as part time and without tax payment. This was discussed by Verbil.

Experimental results indicate that there is reverse relation between partnership rate and times works in informal part with formal part. Lee mix, Ferchit and Fertin, (1994) one of the other results of these researches is very large negative elasticity between times work in informal economy and wage rate in governmental part and much mobility between parts.

## 2.1.5. Corruption, rent-seeking and the role of law

One of the other most important effective factors of making and expanding the informal economy is corruption and rent-seeking. Various researches have just analyzed the relation between informal economy and corruption as visionary models. In economic literature, corruption has often definite as:" corruption is use of governmental power for private benefits." Corruption has different kinds, but in researches, it is more emphasized on relation between corruption and governmental activities. Kaufman (1998) by using statistical data of OECD countries Latin America and transferring economies indicates that with corruption expanding and law role weaken, the volume of

informal economy increases. Countries which have more corruption and fewer laws face to more informal economy.

About the survey of effect of corruption on selection between formal and informal part based on the model, we can point to Thum and Choi research. They assumed that in economy, employers have heterogeneous abilities and for starting the activity in formal part, they have to pay some money (m) as bribe to politicians and also we can assume that all economic actives pay some costs (k) for investment. An employer gets a gross income (v) from an economic activity. The probability of doing activity in informal economy is u, so the profit function of the activity in formal and informal part is as:

$$\pi_{0e} = v - k - m$$

$$\pi_{se} = (1 - \mu)v - k$$

$$\longrightarrow \begin{cases} \dfrac{m}{\mu} \le v & \text{Enter to formal part} \\[2mm] \dfrac{k}{1-\mu} \le v < \dfrac{m}{\mu} & \text{Enter to informal part} \\[2mm] v < \dfrac{k}{1-\mu} & \text{Non economic activity} \end{cases}$$

It is indicated in the above model that the corruption existence causes to increase the informal economy. One of the most important findings of Thum and Choi research which can be effective on government policies, is that although the corruption is defined as bad use from public power for private benefits and it causes to growth the informal economy, but every activity for obviation the informal economy without considering the main problem, corruption, will be an ant productive. In the other statement, in this condition for limitation the volume of informal activities, it must obviate the roots which lead to corruption in the government. In the other research, Vostroknutoa studied the relation between informal economy, rent-seeking activities and law performance. Rent-seeking is the ant productive activity that leads to redistribution of wealth which made by others, without

any partnership in production process. When there is possibilities for doing the rent-seeking activities in an economy, producer can hidden some earned income from both parts including tax catching and bribery and transfers it to informal part.

In this paper we have investigated that increasing the law performance in economies with high level of corruption will lead to expand the corruption and rent-seeking activities. In economies with low level of corruption, increasing in law performance will have positive effect on investment level, but in ones with high level of corruption, same policy has undesirable effect on investment. Also in this paper, we have surveyed when the corruption level would be low, increasing in law performance decreases the size of informal economy, while the same policy in economy with high level of corruption will have positive effect on the size of informal economy. Law performance basically includes taxation law performance, taxation and supervisory policies performance which are determinants for economic growth when there is corruption. Policy making stability and regulations clearance are essential for the anti corruption view. Complicated regulations, confused processes with instability policy making insufficient juridical institutions can be provided the suitable area for corruption making.

## 2.2. The effects of underground economy
## 2.2.1. The effect on gross domestic production
Due to the difference between real and recorded income, gross domestic production is always underestimated (when the informal economy has big size.)In countries which informal part grows with higher speed than the formal one, judgeship about the economic growth has a big error.

Some researches about the macroeconomic effects of this phenomenon have done. Perhaps the most important and controversial one is the effect of these activities on measured production growth. Frey and Weck-Hanneman (1984) acclaimed that hidden economy growth decreases the measured gross domestic production growth rate, because it causes to exit production inputs (such as labor) from formal economy.

Schneider and Enste (2000) repeated such claim too, but Subrahmanyam (1991) in his paper by using the IS-LM model indicated that the effect of increasing in underground activity on the measured income is indeterminate.

Based on usual view, it is possible that person gets to the reverse result about the informal part. In neoclassic view; the informal economy is benefit when it can obviate economic environment demand for urban services and small-scale companies. In this view, the informal part growth can lead to increase efficiency and competitiveness fields for formal part. This part maybe represents a great partnership in making markets, increasing in financial resources, structure and economic institutions modifying and capital accumulation.

The selection between formal and informal economy based on microeconomic models is arguable similar to macroeconomic ones and can be the potential factor for economic growth and also represents a positive relation between informal part and economic growth. Finally we can conclude that there is much ambiguity about the effects of underground economy on economic growth.

The experimental evidences don't clarify this assume, for instance, Loayza (1996) found the evidences in many Latin American countries with traditional and difficult rules and insufficient institutions that is led of their growth and developing models. Thus expanding the informal economy causes to decrease the economic growth via two ways: 1- decrease the available public services for each person, 2- representation the public services with low level efficiency and quality.

In the other hand, it must be paid attention to the lateral positive effects of activities. The experimental findings of Schneider's research (1998) show that more than 66% of earned income from informal part costs immediately in such part and it must be considered its effects on economic growth and taxation incomes increasing. Bhattacharyya (1993, 1999) represented the reasonable evidences that informal economy has positive and considerable effects on consumption costs in period 1960-80 in England economy. He also indicates that although informal

economy has positive effect on consumption cost, services and brittle goods, but it leads to increase in consumption costs of tough goods.

### 2.2.2. The effect on earned tax

If the earned tax would be less than real one, naturally the taxation income will decrease. Schneider and Enste believe that the essential decrease in underground economy leads to significant increase in taxation incomes and consequently increases in quantity and quality of public services and goods and finally it can motivate the economic growth and they said that Loaysa in his paper at 1996 represented the experimental evidences for this assumption. In the other hand, they pointed to this neoclassic belief that underground economy is optimum, because it answers to the demand of economic environment for urban services and small- scale industries. In this view, informal economy by making dynamism and entrepreneurship, leads to more competitiveness, high efficiency powerful bound and limit for governmental activities. Therefore such factors can conduce to the positive relation between underground economy and economic growth, but they immediately pointed that it isn't represented any clear experimental evidences for these assumptions.

### 2.2.3. The effect on income distribution

Informal part growth effects on the income distribution via two ways. One way is via decreasing the government taxation incomes for income distribution and decreasing the categories difference and the other is via the categories differences which naturally made by informal activities for improving its factors condition.

### 2.2.4. The effect on planning and policy making

In the decision system, the policy makers decide based on information system including statistical indexes.   If the information system would be affected by underground economy,

the policies won't have the considered results, because both resources and results are estimated by error.

Adam and Ginsburgh (1985) by surveying the macroeconomic model with informal activities existence indicated that reaching to increase in output and employment with decrease the volume of informal part frequently leads to policy prescriptions confliction. (The recommended policies supply one of the above goals and cause to scat of the other goal.) Also the Keynesian's multiple coefficients decrease in such state. Bhattacharyya (1999) in the frame of a simple model said that taxation escape decrease the multiple coefficient. Caragata and Giles (1999) acclaimed that hidden economy growth enhances multiplier parts of money supply which isn't subjected, so decreases the inflation policy.

### 2.2.5. The effect on social welfare

As it is said decrease in governmental incomes by expanding the informal activities leads to decease in public goods and services and gradually leads to decrease in social welfare. Of course some people, who are active in informal part, reach to more welfare and it isn't considered in official measurement of social welfare. Although their entrance to informal part deduce to decrease in some people's welfare, but based on compensation principle which said when added welfare for actives in informal part would be more than the others' loss, the social welfare increase with existence of informal part.

Bhagwati and Hansen (1973) said that the commodity illicit doesn't increase the welfare and only in especial frame, we can observe increase in welfare with existence of illicit. They also said that doing the especial degree of protection from production with existence of illicit to the times which there is no illicit, make less welfare, but Deardorff and Stolper by expanding this model by attention to the condition of African countries showed that these results aren't hold and illicit cause to welfare.

Frey and Weck-Hanneman (1984) acclaimed that the increase in hidden economy deduces to decrease in labor partnership rate and also the times work in formal part. Although Giles (1999)

described the effect of this phenomenon on the labor partnership rate as ambiguity and represented the experimental evidences for being positive in New Zealand economy.

Thomas said that taxation escape causes to miss the taxation justice. Tanzi and Shome (1993) and Giles and Karagata (1999) confirmed this claim. While Bhattacharyya (1999) belief that not holding the taxation justice leads to taxation escape. Thus a kind of closed circuit is made that intensified the taxation escape phenomenon.

Chug and Uppal in the study of black economy said that:" the existence of black economy in a country is like the cancerous tumor in human body that gradually and surely expands to deduce to the final downfall. The black economy affects all levels of the society: social, cultural, economic and political."

## 3. Literature review

In the microeconomic view, the appearance reasons of underground economy must be founded in how passing rational decision process by people and enterprises. In such framework, people for presence in irregular activities compare their benefits and expected costs and finally compare its especial benefits and the benefits of presence in regular activities. If the first would be more than the second, partnership in irregular part will be selected. Many researches tried to analyze the human behavior in this condition especially in taxation escape.

Some researches with macroeconomic view tried to test the statistical correlation between macroeconomic variables and the procedure of this phenomenon.Tanzi (1980) knew the taxes and limitation as two main factors making underground economy and confirmed that the considerable effect of especial tax (income tax in America, social security tax and value added in Europe and tax on foreign commerce in developing countries) deduction in a country on the expanding of this phenomenon.

Frey and Weck-Hanneman (1983, 1984) knew the imposed burden to people by governmental part (including tax burden and regulation burden), unemployment and the low-level developing

as the main appearance factors of hidden economy and added not respecting of moral sense in taxation to the list and tested it in industrial countries.

Alm, et al (1992) showed that how increase the tax regulation respect with much misgiving.

Tanzi an Shome (1993) stated that how form the taxation escape with the kind of part (such as agricultural, industry, commercial), the kind of production arranging (being small or big enterprise), the kind of economic employer ,social behavior,

Giles and Tedds and Werkneh (1999) said that the main reasons of making underground activities and taxation escape are high and multiplier burden taxation, inflation, real multiplier disposable income and decreasing the respect of moral sense and also asserted that several authors support this clam. Giles (1999) by emphasizing on the government rule in expanding the underground economy said that public taxation burden, taxations combination and performing the more regulations on the labor and yield market are the factors of partial increasing of this phenomenon in different countries.

Schneider (2000) at the study of survey of effective factors on underground economy in 18 western industrial countries pointed to direct and indirect burden taxation and governmental regulation as a taxation economic and moral reasons and the people tendency to government as a noneconomic reasons. Draeseke and Giles (1999) emphasized on the effect of taxation rate and the degree of regulation deduction (sanction and performance of regular limitation).

Schneider and Enste (2000) knew the effective factor on underground economy as taxation burden, social security burden, regulations intensity and performance, social transferring (such as income protection, unemployment insurance) , the factors of labor market ( such as time work decrease, unemployment rate) and the factors related to governmental services ( such as government efficiency, bureaucracy quality, corruption).

Schneider (2004) estimated black economy in 110 countries including developing, transferring and developed (OECD

countries) economies and then said that increase in taxation burden and payment for social security make the fields for black economy.

Miguel and Roberto Dellanno (2004) reached to following results at study black economy in Spain, Greece and France by using the MMIC model:

1- Unemployment is one of the main factors of making black economy. This index has a positive sign in whole models and whole countries.

2- There is a positive relation between size of black economy and self-employment index.

3- The social partnerships are an important determinant factor for black economy in three countries. The labor market regulation is the other factor of black economy existence.

The indirect taxation in Spain and direct taxation in France are the determinant factor for black economy, but in Greece, there is an ambiguity relation.

Torgler and Schneider (2007) in their paper which studied more than 25 supervision indexes and institutional states by panel data for whole world countries, indicated that improving the regime procedure and supervision and institutional states of society and the people's taxation moral help to decreasing the incentives for underground activities.

## 4. The theory pattern of research

In this part, the used way is introduced for estimating the model and representing the results and then the findings are subjected to analyze.

## 4.1. Panel data method

In panel data, the similar cross sectional data (for example, a country or an enterprise) test during the time. HISAO, et al stated that the most important advantage of using panel data is controlling the heterogeneous properties and considering every country and enterprise, while the cross sectional and time series method don't control this heterogeneity and by using these

methods, probably there is some bias in results. Baltagi, (1995) indeed by using panel data, it is possible to determine the effects which can't be determined by cross sectional and time series methods. We can divide panel data in two categories: model with sideway error term and model with bilateral error term. In model with sideway error term, the disturbance term is defined as:

$u_{it} = \mu_i + \nu_{it}$ , i=1, 2,...,        N, t=1,2,...,T

That $\mu_t$ indicates the unobservable effect of each country and $\nu_i$ indicates the residual disturbance term. $\mu_t$ has time inalterability and considered the personal especial effects which don't enter to regression. The model with bilateral error term is as follow:

$u_{it} = \mu_i + \gamma_t + \nu_{it}$ ,              i=1,2,...,N , t=1,2,...,T

$\mu_i$ and $\nu_{it}$ are similar to previous ones in model with sideway error term and in addition, $\gamma_t$ indicates the time inalterability effect. So the difference between two models is $\gamma_t$ which has country inalterability and includes the time effect not entering in the regression. For example the oil prohibition effects on the oil supply.

In this paper, the data of 17 countries during 14 years are studied. We can use both methods or pooling them or using panel data that performs as two forms: fixed effect and random effect, for estimating the model. In the first method, it isn't considered the heterogeneity of different countries, while there isn't this imperfection in the panel data. By using F- Leamer method can determine which method (pooling method or panel data) must be used for estimating the model. Finally for discrimination between fixed and random effect, it is better to use Hausmann test.

### 4.1.1. Fixed effect method

In the following simple regression, it is assumed that $\mu_i$ are the constant parameters for estimation and residual disturbance term ($\nu_{it}$) is stochastic, independent and has identical distribution. For all I and T, $X_{it}$ is independent of $\nu_{it}$.

$$y_{it} = \alpha + \beta X_{it} + \mu_i + \nu_{it}$$

By averaging based on time, it can be written as:

$$y_i = \alpha + \beta X_i + \mu_i + \nu_i$$

And by subtracting equation 3 from 4:

$$y_{it} - y_i = \beta(X_{it} - X_i) + (\nu_{it} - \nu_i)$$

And by averaging from all observations, we can obtain this estimation:

$$y_i = \alpha + \beta X_i + \nu_i$$

For getting each $\mu_i$, it is used from constraint $\sum_{i=1}^{n} \mu_i = 0$. This is an arbitrary constraint on the virtual variables coefficients to prevent from falling in the trap of virtual variables or composite correlation. Indeed, only $\beta$ is obtained from equation 5. $\beta$ held in equation 6 and conclude $\alpha$. By these coefficients and using equation 4, each $\mu_i$ is earned.

$$\mu_i = y_i - \alpha - \beta X_i$$

### 4.1.2. F-Leamer's approach

By using restricted residual sum of squares (RRSS) obtained from estimation the pooling model by OLS and unrestricted residual sum of squares (URSS) obtained from inter-group regression, we can write:

$$F = \frac{(RRSS - URSS)/(N - 1)}{(URSS)/(NT - N - K)} \sim F_{N-1, N(T-1)-K}$$

In F-test, assumption H0 means being identical the intercepts (pooling method) against assumption H0 means being no identical the intercepts (panel data method). Therefore, if assumption H0 would be rejected, the panel data method is accepted.

### 4.1.3. Random effect

In this condition, it is assumed that $\mu_i$ is random vit ~IID $(0, \delta_v^2)$, $\mu_i$ ~IID $(0, \sigma_\mu^2)$, and $\mu_i$ are independent from $v_i$. In addition, Xit for all i and t are independent from $\mu_i$ and $v_i$.

( Rencher, 200) with these assumption, it can be written:

$$\mu_{it} = \mu_i - v_{it}$$
$$\text{var}(\mu_{it}) = \sigma_\mu^2 + \delta_v^2$$

So a variance-covariance matrix that indicates the serial correlation during time between disturbance terms of similar countries is made. For estimating the model, it must use generalized least square (GLS) model and consequently variance-covariance matrix $\Omega$ is usedIn Fuller and Battes method is used from $\left[\theta = 1 - (\sigma_v / \sigma_\mu)\right], \sigma_1^2 = \sigma_\mu^2 + \delta_v^2$, and the variables are entered as (yit -$\theta$ yi ) in the model and the model is estimated. Of course in random effect, different $\theta$ are stated by authors.

Now the best second level unbiased estimators of variance elements are gotten from TEYFI dissersion. Hence $\hat{\delta}_v^2$ and $\hat{\delta}_1^2$ which are the results of inner and outer group estimation, are obtained as:

$$\delta_v^2 = \frac{\sum_{i=1}^{N} \sum_{t=1}^{T} (u_{it} - \bar{u}_i)^2}{N(T-1)}$$

$$\delta_1^2 = T \sum_{i=1}^{N} \frac{\bar{u}_i^2}{N}$$

### 4.1.4. Hausman test

Hausman test is based on this assumption $H_0 = Cov(\mu_i, X_{it}) = 0$. In fixed effect method or inner group estimation under assumption H0, model is compatible, but no efficient, while under opposite assumption, the model is only compatible. And about the random effect method, the model under assumption H1 is compatible and efficient, but under opposite assumption is incompatible. (Green, 2000)

Hence, under assumption H0, two estimations mustn't have regular difference, now we can test the hypothesis based on this difference as:

$$VAR(\beta - \hat{\beta}) = VAR(\beta) + VAR(\hat{\beta}) - COV(\beta, \hat{\beta}) - COV(\beta, \hat{\beta})' \qquad (12)$$

The essential result of Hausman test is the covariance of efficient estimator with difference of efficient and inefficient estimator is zero.

$$Cov((b - \hat{\beta})' \text{ و } \hat{\beta}) = Cov(b - \hat{\beta}) - Var(\hat{\beta}) = 0 \qquad (13)$$

$$Cov(b \text{ و } \hat{\beta}) = Var(\hat{\beta}) \qquad (14)$$

By replacing the equation 14 in equation 12, the required matrix of for Hausman test is gotten:

$$Var(b \text{ و } \hat{\beta}) = Var(b) - Var(\hat{\beta}) = \sum \qquad (15)$$

In this equation, b is a matrix of estimated coefficients by fixed effect method and b is a matrix of estimated coefficients by random effect method.

$$W = \chi^2(k) = (b - \hat{\beta})' \overset{\Lambda}{\sum}{}^{-1} (b - \hat{\beta}) \qquad (16)$$

$\sum$ is gotten from covariance matrix of estimated coefficients by fixed effects method and covariance matrix of estimated coefficients by random effects. W has distribution X2 with freedom degree laterally. If W would be bigger than X2 in table, the fixed effect method is accepted.

**4.2. Model design and discussion**
**4.2.1. Model introduction and discussed time period**
In this paper by reviewing the other used models, Frey and Weck Hanneman' model (1983) is better than the others and specified as following:

$$UG_t = C_0 + C_1 \operatorname{Re} g_t + C_2 Txg_t + C_3 Dtx_t + C_4 \operatorname{Pr} t_t + C_5 Uem_t + \varepsilon_t$$

UG is a variable which indicated the size of underground economy as a dependent variable and REG as a regulation burden, TXG taxation burden, DTX change in taxation burden, PRT partnership rate, and unemployment as an independent variable.

Data for 17 developed countries OECD are collected. Surveyed time period in this paper is 1994-2007. The variables are defined completely in table 3. For example, the information about underground economy for studied countries is brought in table 1. As determined, developed countries repel with underground economy by understanding its disadvantage effects on the other parts of economy. And results show that it has decline procedure in more countries.

**Table1:** The volume of underground economy in selected countries

|             | 2005 | 2006 | 2007 | 2008 |
|-------------|------|------|------|------|
| America     | 8.2  | 7.5  | 7.2  | 7.0  |
| Switzerland | 9.0  | 8.5  | 8.2  | 7.9  |
| Sweden      | 17.5 | 16.2 | 15.6 | 14.9 |
| Spain       | 21.3 | 20.2 | 19.3 | 18.7 |
| Norway      | 17.6 | 16.1 | 15.4 | 14.7 |
| Netherland  | 12.0 | 10.9 | 10.1 | 9.6  |
| Italy       | 24.4 | 23.2 | 22.3 | 21.4 |
| Ireland     | 14.8 | 13.4 | 12.7 | 12.2 |
| England     | 12.0 | 11.1 | 10.6 | 10.1 |
| Greece      | 27.6 | 26.2 | 25.1 | 24.3 |
| Germany     | 15.4 | 15.0 | 14.7 | 14.2 |
| France      | 13.8 | 12.4 | 11.8 | 11.1 |
| Denmark     | 16.5 | 15.4 | 14.8 | 13.9 |
| Canada      | 14.3 | 13.2 | 12.6 | 12.0 |
| Belgium     | 20.1 | 19.2 | 18.3 | 17.5 |
| Austria     | 10.3 | 9.7  | 9.4  | 8.1  |
| Australia   | 12.6 | 11.4 | 11.7 | 10.6 |

**Resource:** the Schneider research at 2009

### 4.2.2. Experimental results

In this part, it has estimated the model which determined in previous part and by using Eviews software via pooling method, fixed and random effect, and the effects of independent variables on the underground economy are studied. By comparing measured index F with F index in table, we can say that

assumption $H_0$ isn't accepted with 95% probability, so between two methods. Pooling and panel data, it must be selected panel data. Also it has been chosen fixed effect or inner group effect by Hausman test, because its estimated value is 39.86 and in comparing with its values in F table, assumption $H_0$ isn't accepted, so based on previous reasons, the analysis must be done by fixed effect.

**Table 2:** F-Leamer and Huasman Test

| Test | Estimated Value | Prob. | Diction |
|------|-----------------|-------|---------|
| F Leamer | 9.22 | 0.0058 | Fix Effects |
| Hausman | 39.86 | 0.00021 | |

As finding show, regulation burden coefficient (6.43) has positive and significant effect on underground economy. It indicates that increasing in regulation intensity (which measured by the quantity of regulation) in one of the main reasons for decreasing freedom and individual selection and increasing considerably in cost of working in formal part. Labor market regulation, commercial impediments and the other restrictions are as some regulation intensity.

The coefficient of taxation burden variable (0.12) is positive and significant, too that implicated direct relation between taxation burden and the size of underground economy. This emphasizes results of the other researches. Because taxation and taxation escape is the main incentive for entering to underground economy. People weasel from paying some income as tax to government by this selection. Thus they accept risk of such selection for getting to more welfare. Of course the coefficient of change in taxation burden variable has no significant effect on underground economy.

Social partnership is one of the determinant factors for black economy in these countries and its value (-0.14) is negative and significant. It signified that the informal economy will grow by decreasing in people's partnership in formal economy and people will move to activity in informal economy.

Unemployment is one of the other important factors in making underground economy. Here, this item (0.35) has positive and significant effect that implicates by unemployment rate increasing; the inceptive for working in informal economy increases, hence growing the black economy is expectable.

Generally, we can point to the important role of government in labor market and taxation part and effectiveness in underground economy growth. However decreasing the commercial limitations and regulation burden causes to decline this part of economy, but against due to some governments' inefficiency in compilation, performance and supervision the rules, not attention to social, cultural, political and economical fields, the illicit is increased.

By considering the especial condition in each country or in positions which government policies performance needs to society partnership, reaching to policies goals must accurately lionize. As a sample, if decreasing in regulation burden would lead to much decrease in central government, it can be an impediment for developing and a factor for expanding the underground economy.

Government abilities' support in performance rules by increasing the expertism and management ability via belief, more accurate in selection of policy performance instruments, increasing in people partnership in rules designing and compilation, rules arranging, performance and supervision, decreasing unseasonable interfere in labor market, supporting the private sector in order to juice up informal economy and decreasing unemployment can be called as the ways to repel of expanding the underground economy.

**Table 3:** Estimation the model by panel data (fixed effect)

| Variable | Coefficient | Scale deviation | Statistic t | probability |
|---|---|---|---|---|
| Dependent variable: UG | | | | |
| Reg | 6.43 | 1.22 | 5.27 | 0.00 |
| Txg | 0.12 | 0.07 | 1.98 | 0.05 |
| Dtx | -0.003 | 0.01 | -0.38 | 0.70 |
| Prt | -0.14 | 0.07 | -2.07 | 0.04 |
| Uem | 0.35 | 0.09 | 3.90 | 0.00 |
| AR(1) | 0.64 | 0.03 | 18.69 | 0.00 |
| Fixed effect | | | | |
| AUS-C | 13.48 | | | |
| AUT-C | 8.96 | | | |
| BEL-C | 15.70 | | | |
| CAN-C | 13.88 | | | |
| DNK-C | 14.54 | | | |
| FRA-C | 8.56 | | | |
| GRM-C | 13.46 | | | |
| GRC-C | 25.07 | | | |
| IRL-C | 15.55 | | | |
| ITL-C | 20.37 | | | |
| NLD-C | 11.51 | | | |
| NOR-C | 18.83 | | | |
| ESP-C | 17.73 | | | |
| SWED-C | 13.82 | | | |
| SWIS-C | 12.49 | | | |
| ENG-C | 11.62 | | | |
| USA-C | 10.79 | | | |
| R-Squared | 0.96 | Prob (F-Statistic) | | 0.00 |
| F-Statistic | 3177.64 | Durbin- Watson STAT | | 1.79 |

**Resource:** finding results

## 5. Conclusion

In this paper, we have investigated different aspects of underground economy. After explanation the introduction and total basis, the most important affective factors are subjected to study. After reviewing the most important done researches in this field, the used model and estimation method are discussed. Finally, in order to doing the experimental test of the effectiveness of the effective factors of labor market and taxation

on black economy, the econometric model is subjected to estimate via panel data method and the estimated coefficients are analyzed.

About the labor market, partnership rate has reverse relation with underground economy growth and against regulation burden and unemployment rate has direct relation with underground economy.

While change in taxation burden doesn't have significant effect on underground economy in these countries, but taxation burden has direct effect. This implicates that people are more sensitive to taxation burden more than its changes.

Generally, we can point to the important role of government in labor market and taxation part and effectiveness in underground economy growth. However decreasing the commercial limitations and regulation burden causes to decline this part of economy, but against due to some governments' inefficiency in compilation, performance and supervision the rules, not attention to social, cultural, political and economical fields, the illicit is increased.

**Table 4:** the variables definition and their gathering resources

| Resource | Explain | Index |
|---|---|---|
| Schneider researches in different years | Activities which its income is irregular, unrecorded or unreported. | UG |
| Measured by OECD data Factbook 2009 | Regulation intensity which effects on economic activities and is got by dividing government expenditure on GDP | Reg |
| OECD factbook 2009 data | This index measured tax intensity on society by considering the taxation satisfaction | Txg |
| OECD factbook 2009 data | The measuring of change in taxation burden | Dtx |
| www.OECD.com | The measuring of people partnership in economic activity | Prt |
| OECD factbook 2009 data | The measuring of people searching job and not finding it | Uem |

**Resource:** finding results

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