

The Nature of the Underground Economy. Some evidence from OECD countries

Maurizio Bovi^{*}

Abstract

Economic theory suggests that taxation, regulations, efficiency of the bureaucracy and corruption are among the causes of the underground economy. The association between these variables is investigated by using panel regression techniques. The results show that, for OECD countries in the 1990s, the underground economy was positively correlated mainly with institutional failures and, to a lesser extent, with taxation and market regulations. Reflecting a sustained expansion of their public sectors, many OECD countries have raised the tax burden up to late 1990s and improved their institutions. This has led regulations and taxation, excluding social contributions, to increase their association with the shadow economy in the area.

JEL classification: H26, K42, O17.

Key words: Taxation, Corruption, Regulations, Legal system, Underground economy.

^{*} Institute for Studies and Economic Analyses (ISAE), e-mail: m.bovi@isae.it, Fax +39.06.4448.2249, Tel +39.06.4448.2751. I would like to thank seminar participants at ISAE, S. De Nardis, E. Espa and C. Lupi and an anonymous referee for their helpful suggestions. All errors are solely those of author as are the opinion expressed herein.

NON TECHNICAL SUMMARY

The literature suggests that taxation, corruption, excessive regulations and the efficiency of the government are among the causes of the underground economy. Some theoretical models pointed out that these variables are linked such a way that two kinds of equilibria are possible, one good and one bad. Good institutions, light regulations, little black economy, wide tax base and large tax revenue characterize the former; on the contrary the latter is characterized by bad institutions, intrusive regulations, large black economy, narrow tax base and reduced tax revenue. The rationale behind is that taxation allows improving the provision of public goods and services, some of them not available for irregular agents. Thus in the good equilibrium the cost of being underground is greater than in the bad one both because of the greater expected penalty to be detected, and because of the loss of the benefits stemming from a good government.

This paper can be thought of as complementing this strand of the literature. It focuses on the nature of the underground economy in OECD countries throughout the 1990s. By using the latest data available for each of the above-mentioned variables, it highlights new intriguing results. In the sample, the black economy results different both across countries and through time. The Southern European countries (Greece, Italy, Portugal, Spain) seem to share a bad equilibrium, while the Nordic countries (Norway, Sweden, Finland and Denmark) seem to be in a good one. In other words, in the former cluster the irregular activity is more institutional-pushed, while in the latter the (lower) underground economy is more tax-pushed. In line with what predicted by the two-equilibria-theory, during the decade OECD countries lowered their corruption levels and regulations burden, while increased the taxation. These dynamics are captured by the empirical data. In the late 1990s the correlation between the black economy and the tax rates results higher than before. An another important finding of the present paper is that the black economy seems to be more associated with the income tax rate than with the social contributions. As a matter of fact, the underground activity always results from a combination of opportunities and incentives and the case of social contributions is not an exemption. On the employees' side, if social contributions are actuarially fair, there is an incentive to pay for them. On the employers' side, it is possible that social contributions contribute to higher productivity, and are an appreciated source of credit. Furthermore, to the extent the long run elasticity between the wage dynamic and the social tax rate tends to -1 , the gross wage, and the firms behaviour, should be relatively independent from the level of the social contributions. Vice versa, the income tax rate shows the highest elasticity because it creates incentives to go underground that are stronger and one-way: without exemptions, hiding income tax base allows paying less taxes, but also to receive more means-tested social transfers.

LA NATURA DELL'ECONOMIA SOMMERSA. EVIDENZE EMPIRICHE PER I PAESI OCSE.

SINTESI

La teoria economica indica, tra le cause dell'economia sommersa, la tassazione, l'eccessiva regolamentazione dei mercati, la scarsa efficienza della pubblica amministrazione e la corruzione. In questo articolo si misurano empiricamente le correlazioni tra l'economia sommersa e le sue citate determinanti. I risultati per i paesi OCSE mostrano che negli anni '90 l'economia sommersa appare maggiormente associata ai fallimenti istituzionali che non alla presenza di elevata tassazione o di regolamentazioni. Verso la fine del decennio l'incremento della pressione fiscale, contestuale a un miglioramento delle istituzioni pubbliche, ha determinato un aumento della correlazione esistente tra le tasse e l'economia sommersa. Costituiscono un'interessante eccezione i contributi sociali, che non risultano essere collegati positivamente alla decisione di agire regolarmente o meno.

Classificazione JEL: H26, K42, O17.

Parole chiave: Economia sommersa, tassazione, regolamentazione dei mercati, efficienza della pubblica amministrazione, corruzione.

1. Introduction

The underground economy is widespread in time and in space. To some extent this phenomenon is so deeply rooted that one can think about the existence of a “natural rate of underground economy” (Castellucci and Bovi, 1999). There are several important reasons to study the hidden economy¹. Despite improvements and efforts (OECD, 2002), national accounts are still biased by the underground activities and this can mislead the policymakers; the shadow economy affects the design of national tax systems and triggers links between legal and illegal activities; the hidden economy may impose constraints to public revenues generation and, therefore, limit the provision of public goods. Thus, in spite of the difficulty of obtaining reliable statistics of the underground economy, it is important to gather information about it.

Economic theory suggests that taxation, excessive regulations², efficiency of the bureaucracy and corruption are the main causes of the underground economy (Schneider and Enste, 2000). The bigger is the tax wedge (the difference between the total cost of labour and after tax earnings from work) the greater should be the black economy. Alike, regulations are costly to be satisfied and can stimulate the “exit option” (i.e. the decision to go underground). The efficiency of the public sector is linked to the shadow economy because a more efficient bureaucracy increases the expected value of the penalty for the underground agents and this lowers, other things being equal, the level of shadow economy. Furtherly, it is likely that this inefficiency is positively related to the corruption, another potential determinant of the hidden economy, although its relation with the underground economy is ambiguous. Transparency International, an international agency collecting data on world-wide corruption, defines the corruption level as the degree to which economic agents perceives to be the homes of bribe-takers - public officials who abuse their office for personal gain. The link with the black economy is ambiguous because bribery sometimes is a

¹ The unobserved sector of the economy has nor a commonly accepted definition neither a commonly used name. A plethora of terms (underground, subterranean, informal, hidden, irregular, shadow, black) have been used to call it and I will indifferently use here some of them. Regarding the definition, a good benchmark is worked out in 1993 by the System of National Accounts: the underground economy is the legal production unknown by the government.

substitute for going underground, sometimes bribe serve to avoid control (Schneider and Enste, 2000). That is to say, corruption acts as grease or sand in the system? However an economic agent could be more prone to go underground if the environment in which he/she operates is highly corrupt. Corruption can also adversely affect the provision and the quality of publicly provided social services by reducing government revenue. In turn, reduced quality may discourage individuals from using these services and make them less willing to pay for them. Individuals would then engage more in tax evasion and firms would have greater incentive to participate in the underground economy.

In this paper I focus on the situation in OECD countries during the 1990s and I analyse the correlations between, on the one side, the unofficial activity and, on the other side, its above-mentioned determinants. A single country analysis shows that the Southern European countries have the largest unofficial economy and the worst institutional setting in the area, but relatively low tax burdens. In the Scandinavian countries, a mid-range unofficial economy operates under extremely high tax burdens and top-level institutions. A pooled least square estimation shows a number of stylized facts. In the decade under analysis the shadow economy was positively correlated with the institutional failures, i.e. with corruption and efficiency of bureaucracy and, to a lower extent, with the taxation. Labour market regulations and black economy result associated only in the latter part of the period. Social contributions never appear correlated to the irregular economy.

It is noteworthy that other variables are potentially correlated with the shadow economy, such as the complexity of the tax system and the social welfare system, but data availability dictated severe limitations. Furthermore the data do not permit to resolve the endogeneity issues: high levels of corruption cause a large black economy or vice versa? These problems dramatically reduce the normative power of the empirical results, which must be seen as indicative evidence.

² “Excessive” is a key word because not all the regulations are perceived by firms as a burden. Actually some of them, for instance regulations on the healthy and on the safety of the employees, can improve labour productivity.

The paper is organised as follow. In Section 2 and 3 I describe the data and I provide a preliminary analysis at the single country level. In Section 4 I present the results of the OECD area wide econometric analysis. Concluding remarks close the paper.

2. The data

Owing to data limitations for Turkey, for recent OECD members (transition countries, Korea, Mexico) and for smaller countries (Luxembourg, Iceland), I limit the data set to the remaining twenty-one OECD countries. While the choice to focus the analysis on OECD countries reduce the degrees of freedom, it should reduce the heterogeneity of the countries under observation, on the one hand, and it should increase the reliability of the data set, on the other hand.

Data on the shadow economy for these countries in early 1990s are available from two different sources³ (Lacko, 1996, 1997, 1998, 1999; Johnson et al., 1998, 1999). Two are the methods used as well, respectively, the physical input and the currency approach. The former, in the Lacko version (Lacko, 1998), consists in separating the electricity consumption of households into two parts, one independent from the hidden economy and another related to it. The output of this calculation is an indicator of the hidden economy, which is transformed to an indicator that expresses the magnitude of the shadow economy. The currency method (Cagan, 1958; Gutmann, 1977; Tanzi, 1980, 1983) estimates the currency as a function of conventional factors such as the interest rate, the evolution of the payment system, and so on plus black-economy-triggering variables like the tax burdens. These are included because of the hypothesis that in the underground economy transactions are carried out in cash for the obvious reason of not leaving traces. The estimate of currency holdings in the hypothesis of zero income tax is used to compute the “excessive” (i.e. tax induced) currency holdings due to underground economy. The size of the underground economy is then calculated by multiplying the excessive currency by the velocity of

³ Actually, as reported in table 6 of Schneider (Schneider and Enste, 2000), there is a third source of data but I did not use it due to insufficient observations.

money prevailing in the regular economy⁴. Lacko's data describe the situation in 1990, while Johnson's numbers are the average values for years from 1990 to 1993. Data for the late 1990s are available from Schneider (Schneider, 2000) that estimates the hidden economy by using the currency approach. A first inspection of the early 1990s data⁵ show that the level, and sometimes even the ranking, of the black economy is different across the estimates. For instance, the United States and Sweden have a relatively large shadow economy according to the currency method, while they appear very virtuous in the Lacko's estimates. The opposite can be said for Ireland and Austria. Needless to say, no method has imposed itself as being clearly superior to the others and I use both the alternative measures to get more reliable findings and to avoid generating poor-measured mixtures.

Data on the rule of law are available from the Fraser Institute which elaborates an index running from 0 to 10 (lower numbers mean worse legal environment) to measure the efficiency of "the legal institutions, including access to a nondiscriminatory judiciary, that are supportive of the principles of rule of law" (Gwartney et al., 2001, page 6). I use this index as a proxy of the efficiency of the bureaucracy.

Data on corruption⁶ are drawn from Transparency International (TI) which describes the situation of the worldwide corruption by means of an index. The TI Corruption Perceptions Index ranks very many countries in terms of the degree to which corruption is perceived to exist among public officials and politicians. It is a composite index, drawing on 14 different polls and surveys from seven independent institutions carried out among business people and country analysts, including surveys of residents, both local and expatriate. Countries with high values of this index are less corrupt than those with low values, the range takes values from 0 to 10. Transparency

⁴ The hypothesis of a unique velocity of money is one of the critical point of this method, mentioned by Tanzi as well (Tanzi, 1980). However it is reasonable to think that when the "underground" money (i.e. the excessive currency caused by taxes) is used in regular markets, it should behave exactly in the same way as "regular" money in order not to appear suspicious. If this is true, the distinction between the source (from underground incomes) and the destination (towards consumption) links the Tanzi method to approaches based on the hypothesis that people tend to (or can) hide much more income than consumption.

⁵ The full data set is reported in the appendix.

⁶ Available via the Internet: <http://www.transparency.de>.

International defines the corruption level as the degree to which economic agents perceives to be the homes of bribe-takers - public officials who abuse their office for personal gain.

The measurement of the tax burden is subject to controversy: “all current measures reviewed have at least some important shortcomings.” (OECD, 2000a, page 3). Anyway OECD periodically computes statistics on tax rates and tax burdens that, at least, allow reliable cross-country comparisons. Some of these tax burdens are used as alternative measures. Total tax revenues, taxes on personal income and general consumption taxation, all as percentage of GDP, are published by OECD in *Revenue Statistics* (OECD, 2000b). The second set of tax burdens is reported in *Taxing Wages* (OECD, 2000c) and deals with the personal income taxes and the social security contributions as percentage of labour costs.

Data on regulations are from a recent study of Nicoletti et al. (Nicoletti et al. 1999) which presents a database for OECD countries on several indicators of product market regulations and employment protection legislation (EPL). These detailed indicators are then aggregate into summary indicators by means of factor analysis. The scale of indicators is 0-6 from least to most restrictive regulatory setting. I use only the employment protection legislation summary indicators because data on the product market regulations are not available for early 1990s.

3. Single country analysis

In spite of the difficulty of obtaining reliable statistics for the black economy and for variables such as corruption, efficiency of the bureaucracy etc., even from the simple observation of the data, a number of stylized facts seem to be noteworthy.

The underground economy is larger in the Southern European countries (Greece, Italy, Portugal, Spain) than in other OECD regions. It holds both for different estimates of the hidden economy and along the different years of the 1990s. It is hard to think about a tax-induced underground economy in this cluster, because the mean value of the tax burden is lower than that of the OECD area as a whole. Much more suspicious-looking seem the high levels of corruption, the

weakness of the legal systems and the intrusive labour market regulations. The view that institutional failures can be more important than taxes in promoting shadow economy is already present in the literature (e.g., Johnson et al., 1998, 1999; Eilat and Zinnes, 2000; Friedman et al., 2000; and, for an intra-country analysis, Castellucci and Bovi, 1999). Following what suggested by Friedman et al. (2000) it can be said that only governments with a relatively low level of corruption and with a strong legal system can sustain high tax rates. Furthermore, higher taxes afford higher quality public services and this, in turn, increases the cost of being underground⁷.

The above mentioned situation is typical for the Nordic countries (Norway, Sweden, Finland and Denmark), where a medium-sized black economy operates in an environment characterised by an extremely high tax burden, a mid-range level of EPL, but a very good institutional background (see Figures 1,2).

⁷ In passing, in Italian Mezzogiorno the tax wedge is smaller than in the rest of the country. In spite of this, available data suggest that in the Mezzogiorno the level of shadow economy is larger than in the other Italian regions.

Fig. 1 The Nature of the Underground Economy in the Southern European vs the Nordic countries (early 1990s)

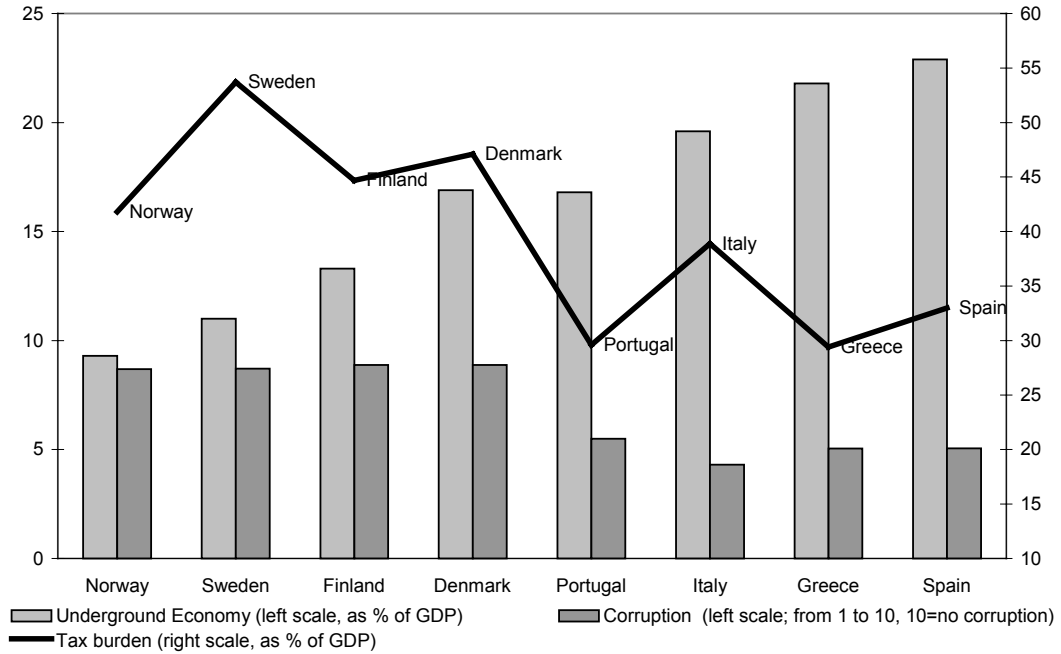
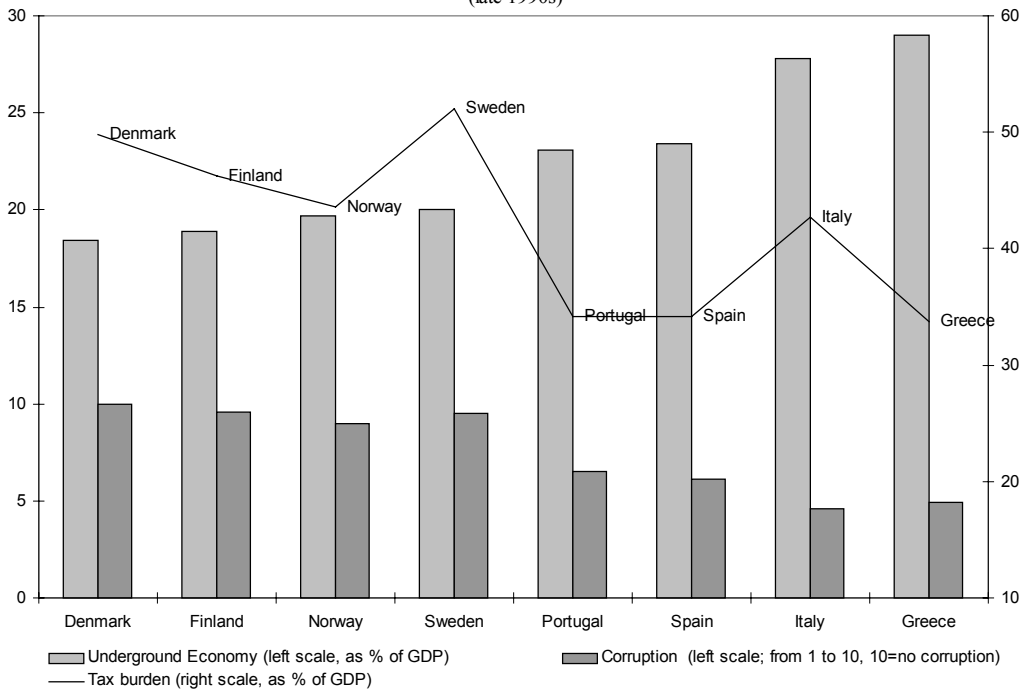


Fig. 2 The Nature of the Underground Economy in the Southern European vs the Nordic countries (late 1990s)



The “continental” European countries (the Netherlands, France, and Germany) form another group with quasi-homogeneous indicators. Their institutions, black economy and employment protection legislation indexes show a mid-range both in early and in late 1990s.

The english speaking countries (the United States, the United Kingdom, Ireland, Australia, New Zealand, Canada) are featured by the lowest values of the EPL indicators and a low tax burden. Unfortunately the estimates of their hidden economy are very unstable and prevent drawing reliable considerations.

Data for the other OECD countries (Japan, Switzerland, Austria, Belgium) show other possible combinations of the indicators suggesting that, summing up, i) the theoretically hypothesised causes of the shadow economy (corruption, taxation, regulations and efficiency of the bureaucracy) are actually associated with the share of the underground economy; ii) the correlations between these variables are different across countries and over time; iii) institutional failures seems to have a special link with the hidden economy. These considerations confirm what already pointed out in literature. There exist two possible kinds of equilibria, one good and one bad. Basically, the former is characterised by good institutions, little black economy, light regulations, wide tax base, and large tax revenue. The latter is characterised by bad institutions, excessive regulations, large black economy, narrow tax base, and reduced tax revenue.

4. The econometric area-wide analysis

The *prima facie* evidence of a statistical association between the shadow economy and its hypothesised causes suggests going on with more rigorous econometric analysis. In an attempt to control for the unobservable country fixed effects and to obtain more reliable estimates, I pool the data across countries and through time. Then I estimate two models, one unrestricted, i.e. without imposing a common intercept between countries, and the other restricted to have the same constant across countries. Finally I compute an F-test for the hypothesis that the constant terms are all equal.

Results suggest proceeding tentatively with the restricted “overall constant” model⁸. The econometric procedure adopted is the following. After having obtained the results for the whole set of right-hand-side variables (the “general” model) I sequentially delete the insignificant variables⁹ to select a parsimonious (specific) model for increasing the precision of the estimates (Hendry, 1995). Table 1 lists the main results.

⁸ Probability values of the F-test are, for the most part of the estimated models (see tables 1 and 2), greater than 10%.

⁹ Variables not significant at the conventional levels are considered irrelevant and excluded from the regression.

Table 1. Correlations between the Underground Economy and its determinants

Dependent variable: share of underground economy on official GDP						
RHS variables	MODELS					
	A-general	A-specific	B-general	B-specific	C-general	C-specific
Corruption ^a	-0.74*** (-3.11)	-0.77*** (-3.65)	-0.79*** (-3.49)	-0.88*** (-4.11)	-0.79*** (-4.14)	-0.73*** (-4.05)
Rule of Law ^a	-0.43* (-1.79)	-0.44* (-1.85)	-0.55** (-2.22)	-0.56** (-2.22)	-0.60** (-2.61)	-0.58** (-2.44)
EPL ^a	0.02 (0.28)		0.068 (1.32)		0.05 (0.78)	
T ₁	0.34* (1.34)	0.38* (1.76)				
T ₂			0.21** (2.01)	0.20* (1.98)		
T ₃					0.20*** (4.19)	0.18*** (3.81)
T ₄					0.06 (0.78)	
T ₅					-0.07 (-1.35)	
Adj. R squared	0.28	0.29	0.30	0.32	0.38	0.38

^a For Rule of law and Corruption Indices, higher values means “better”, vice versa for EPL (Employment Protection Legislation).

T₁=Total tax as % of GDP; T₂=taxes on personal income as % of GDP; T₃=taxes on general consumption as % of GDP; T₄=income tax as % of labour costs; T₅=employee and employer contributions as % of labour costs.

*** Denotes significant at 1% level; ** Denotes significant at 5% level; * Denotes significant at 10% level.

All variables are defined in logarithms; number of observations: 59; White’s heteroskedastic-consistent t-statistics are in parentheses. There are three models (A, B, C) according to the three different tax burdens (T₁; T₂; T_{3,4,5}). Each regression is modelled including all variables (general), and imposing some zero restrictions on the insignificant parameters (specific).

A general evaluation of the estimated equations gives a positive impression. All the variables have the expected sign and the estimated partial correlations remain sufficiently stable across the regressions. It is easily noted that the institutional failures, and especially corruption, have the highest correlation with the black economy. The strong correlation of corruption may be tentatively explained by thinking of corruption as a “special” cause of hidden economy (almost) eclipsing any other variable (De Soto, 1989). When corruption is perceived to be the main problem for businessmen, other factors just have no matter: once pushed underground because of the corruption, agents do not worry about taxation or regulations because bribes are perceived as a sort of “catch all tax”. As underlined by Johnson et al. (1999), the tax burden reported by firms appears to be more a function of regulatory and bureaucratic inefficiency and discretion than of tax rates alone. Furthermore, it has been pointed out that corruption is much more taxing than tax because (Wei, 1997, page 4): “corruption, unlike tax, is not transparent, not preannounced, and carries a much poorer enforcement of an agreement between a briber and a bribee. In other words, corruption embeds arbitrariness and creates uncertainty.” Only a relatively high expected penalty could dampen the decision to go underground, but corruption undermines the legal system and, in fact, the Transparency Index and the Fraser Index are highly correlated in the sample. Turning the attention to the market failures (taxation and regulations), data show that the taxation is more associated with the irregular activity and, in particular, it results that the personal income taxes play a major role. The link between underground economy and indirect tax rate may depend on the circumstance that in some country self-employed workers evade the VAT just to avoid the personal income tax via the underreporting of its tax base.

Along the 1990s corruption in OECD countries lowered, partially as a result of the economic policies aimed to deregulate the labour market (e.g., Bardhan, 1997; Rose Ackerman, 1997). This is once again for the special nature of corruption, that creates “burdens” just to obtain bribes¹⁰ (Huther, J. and Shah, A., 2000). In other words, opportunities for the abuse of power are prevalent

¹⁰ In a sense, Mafia acts in the same way: it “produces” panic to sell “insurance”.

in areas where restrictions and government intervention lead to the availability of rents, such as complex tax and customs systems, market regulations and discretionary public spending (Mauro, 1998). In the meantime, according to the two-equilibria model, the tax burden in the OECD area rose, and all these dynamics stimulate to check for changes in the market regressors effects. Thus I perform another set of regressions with time dummies associates to the tax rates and to the index of the labour market regulations in order to compute their correlations both at the begin and at the end of the period (see table 2).

Table 2. Correlations between the Underground Economy and its determinants. Time changes

Dependent variable: share of underground economy on official GDP						
MODELS						
RHS variables	A-general	A-specific	B-general	B-specific	C-general	C-specific
Corruption ^a	-0.76*** (-3.87)	-0.85*** (-5.97)	-0.85*** (-5.12)	-1.04*** (-7.76)	-0.93*** (-4.94)	-0.95*** (-6.90)
Rule of Law ^a	-0.27 (-1.09)		-0.41 (-1.63)		-0.31 (-0.96)	
Dum90*EPL ^a	0.02 (0.35)		0.05 (0.92)		0.02 (0.34)	
Dum98* EPL ^a	0.11 (1.24)	0.15* (1.92)	0.15* (1.90)	0.17** (2.22)	0.13* (1.96)	0.15*** (3.68)
Dum90*T ₁	0.17 (0.68)					
Dum98*T ₁	0.22 (0.91)	0.04** (2.00)				
Dum90*T ₂			0.18* (1.94)	0.14* (1.79)		
Dum98*T ₂			0.27** (2.85)	0.22*** (2.68)		
Dum90*T ₃					0.08 (0.63)	
Dum98*T ₃					0.08 (0.76)	
Dum90*T ₄					0.09 (0.81)	
Dum98*T ₄					0.40** (2.51)	0.38*** (2.70)
Dum90*T ₅					-0.02 (-0.28)	
Dum98*T ₅					-0.22* (-1.98)	-0.25** (-2.18)
Adj. R squared	0.36	0.38	0.40	0.40	0.41	0.44

^a For Rule of law and Corruption Indices, higher values means “better”, vice versa for EPL (Employment Protection Legislation). T₁=Total tax as % of GDP; T₂=taxes on personal income as % of GDP; T₃=taxes on general consumption as % of GDP; T₄=income tax as % of labour costs; T₅=employee and employer contributions as % of labour costs. I have three estimates of the shadow economy, two for the beginning, one for the end of 1990s; Dum90=1 for the first two periods, 0 otherwise; Dum98=1-Dum90.

*** Denotes significant at 1% level; ** Denotes significant at 5% level; * Denotes significant at 10% level.

All variables are defined in logarithms; number of observations: 59; White’s heteroskedastic-consistent t-statistics are in parentheses. There are three models (A, B, C) according to the three different tax burdens (T₁; T₂; T_{3,4,5}). Each regression is modelled including all variables (general), and imposing some zero restrictions on the insignificant parameters (specific).

The exercise shows that at the beginning of the 1990s the underground economy was associated almost exclusively with the institutional failures while, at the end of the period, the correlations with the market failure variables rose. The rationale for that may lie in the reduction of the corruption levels during the decade. This is once again for the special nature of the corruption: market failures can emerge only when corruption reaches a “minimum”. Results seem also to suggest that the elasticity of the irregular economy to the tax rate is greater than that to the regulations’ one. As above said, the two-equilibria model underlying these exercises points out a positive correlation linking regulations and corruption, on the one side, and a negative correlation linking tax rates and corruption, on the other side. Thus the findings seem to confirm what a priori expected.

It is worth noting that in all the experiments, social contributions never result positively correlated with the shadow economy. A cost-benefit analysis suggests that employees know that contributions, partially paid by them, are future wage and fight for it. On the employers’ side, it is possible that social contributions contribute to higher productivity, and are an appreciated source of credit. Furthermore, to the extent the long run elasticity between the wage dynamic and the social tax rate tends to -1 , the gross wage, and the firms behaviour, should be relatively independent from the level of the social contributions. A similar incentive, but opposite in sign, tends to increase the relationship between the income tax and the black economy. Indeed, hiding income not only reduces the tax debt, but also allows obtaining means-tested benefits like cheaper credit, subsidies etc.

5. Conclusion

The analysis of the underground economy must be led and valued, by definition, very carefully. The links between the shadow economy and the other variables here studied can be more complex than expected. For instance, the underground economy can reduce government revenue and this can lead to a more inefficient bureaucracy. This suggests finding an appropriate set of

instrumental variables to deal with the endogeneity issues¹¹, but the availability of data dictates severe limitations. All that means that the results are surrounded by significant margins of uncertainty, that the exercises here proposed can realistically offer only some indicative correlations, and that further and deeper analyses are paramount.

On the positive side, the results of this paper contribute to the ongoing debate confirming what underlined by the literature and yielding some new insights. The associations between the shadow economy in OECD countries during the 1990s with its proposed determinants are changed. In the early 1990s the underground economy was correlated mainly with the institutional failures (widespread corruption in an inefficient public sector), while the market failures (excessive regulations and high tax rates) increased their connections with the unofficial economy at the end of the period, when the corruption level was lower. In other words, if a country is relatively corrupt, its hidden economy is large even if its regulations and tax burdens are not particularly heavy. On the contrary, if institutions were perfectly efficient and completely uncorrupt, high tax rates and onerous regulations would be uncorrelated to the shadow economy because underground agents can not share the benefits stemming from efficient governments, and because the probability to be detected would approach one.

A similar cost-benefit analysis of the firm's decision to operate in the shadow sector helps to understand why black economy and social contributions seem to be orthogonal. On the employees' side, if social contributions are actuarially fair, there is an incentive to pay for them. On the employers' side, it is possible that social contributions contribute to higher productivity. On the employers' side, it is possible that social contributions contribute to higher productivity, and are an appreciated source of credit. Furthermore, to the extent the long run elasticity between the wage dynamic and the social tax rate tends to -1 , the gross wage, and the firms behaviour, should be relatively independent from the level of the social contributions. Vice versa, the income tax rate

¹¹ Actually a potentially useful, and sometimes used, data set is that developed by La Porta et al. (1999). Anyway the limited time dimension of the sample does not allow constructing proper endogeneity tests. Furthermore the variation in the data does not seem to be enough.

shows the highest elasticity because it creates incentives to go underground that are stronger and one-way: without exemptions, hiding income tax base allows to pay less taxes, but also to receive more means-tested social transfers.

The correlations seem to be different not only over time, but also across countries. Data show that the Southern European countries have the largest unofficial economy and the worst institutional setting in the area, but relatively low tax burdens. In the Nordic European countries, a mid-range unofficial economy operates under extremely high tax burdens and top-level institutions. Thus, countries with the largest unofficial economy have not necessarily the highest tax burdens, and countries with the top-level tax rate are not necessarily those with the highest black economy.

Summing up, the underground activity always results from a combination of opportunities and incentives. While the goodness of the institutional background seems to be the first incentive (or the principal cost) for not going underground, higher tax rates rise the advantages of being irregular, but can help to improve the efficiency of the bureaucracy and this, in turn, rises the costs of being underground. Therefore the variables under scrutiny can lead to two kinds of equilibria. One is characterised by good institutions, light regulations, little black economy, wide tax base and large tax revenue; the other is characterised by bad institutions, intrusive regulations, large black economy, narrow tax base and reduced tax revenue.

Appendix A

Table A1. Data for 1990 (Underground Economy from Lacko's estimate)

Country	UE	EPL	Rule of Law	Corruption	Tax ₁	Tax ₂	Tax ₃	Tax ₄	Tax ₅
Norway	9,3	3,1	10	8,7	41,8	10,9	7,8	25,2	16,8
Switzerland	10,2	1,3	10	9,0	30,9	10,7	3,1	10,2	17,8
USA	10,5	0,2	10	7,8	26,7	10,1	2,1	18,4	12,8
Sweden	11,0	3,4	10	8,7	53,7	20,7	8,0	32,5	16,9
Canada	11,7	0,6	10	9,0	36,1	14,7	5,1	20,2	7,9
France	12,3	2,7	8,3	7,5	43,0	4,6	8,1	7,4	39,9
UK	13,1	0,5	8,3	8,3	36,0	10,0	6,1	18,9	14,9
Japan	13,2	2,6	8,3	7,3	30,9	8,3	1,3	8,2	12,8
Finland	13,3	2,2	10	8,9	44,7	17,2	9,2	29,6	15,8
Netherlands	13,4	3,1	10	9,0	42,8	10,6	7,1	11,8	35,0
Germany	14,6	3,6	10	8,1	32,6	9,0	5,4	18,5	27,5
Australia	15,3	1,1	10	8,2	29,3	12,6	2,4	21,9	1,3
Austria	15,5	2,4	10	7,1	40,2	8,4	8,4	7,3	31,4
Portugal	16,8	4,2	8,3	5,5	29,6	4,7	5,8	6,2	27,4
Denmark	16,9	2,4	10	8,9	47,1	24,8	9,8	44,1	2,6
Italy	19,6	4,2	8,3	4,3	38,9	10,2	5,7	17,2	32,8
Belgium	19,8	3,0	10	7,4	43,1	13,9	7,1	25,6	27,9
Ireland	20,6	1,0	8,3	7,7	33,6	10,7	6,9	25,1	15,1
Greece	21,8	3,6	8,3	5,1	29,4	4,1	7,8	4,7	28,7
Spain	22,9	3,7	6,7	5,1	33,0	7,2	5,3	10,9	25,4

Legend: UE=Underground Economy; EPL=Employment Protection Legislation; Tax₁=Total tax as % of GDP; Tax₂=taxes on personal income as % of GDP; Tax₃=taxes on general consumption as % of GDP; Tax₄=income tax as % of labour costs; Tax₅=employee and employer contributions as % of labour costs. Sources: Schneider and Enste, 2000; Nicoletti et al. 1999; The Fraser Institute; Transparency International; OECD 2000b, 2000c

Table A2. Data for 1990-1993 (Underground Economy from Johnson's estimate)

Country	UE	EPL	Rule of Law	Corruption	Tax ₁	Tax ₂	Tax ₃	Tax ₄	Tax ₅
Austria	5,8	2,4	10	7,1	41,4	8,4	8,0	8,1	31,5
Norway	5,9	3,1	10	8,7	41,2	10,9	7,0	22,7	16,4
Switzerland	6,9	1,3	10	9,0	31,2	10,7	3,3	10,4	17,7
UK	7,2	0,5	8,3	8,3	34,9	10,0	6,5	18,4	14,6
Ireland	7,8	1,0	8,3	7,7	34,2	10,7	7,0	24,3	15,6
Japan	8,5	2,6	8,3	7,3	29,7	8,3	1,4	8,5	12,9
N. Zealand	9,0	1,0	10	9,3	36,7	17,6	8,6	23,9	0,0
Denmark	9,4	2,4	10	8,9	47,5	24,8	9,7	44,3	2,6
Canada	10,0	0,6	10	9,0	36,1	14,7	5,1	20,8	9,2
France	10,4	2,7	8,3	7,5	43,2	4,6	7,9	8,3	39,0
Germany	10,5	3,6	10	8,1	36,3	9,0	6,1	18,4	28,1
Sweden	10,6	3,4	10	8,7	50,8	20,7	7,6	28,3	17,6
Netherlands	11,8	3,1	10	9,0	44,6	10,6	6,8	11,9	34,3
Australia	13,1	1,1	10	8,2	27,9	12,6	2,5	21,6	1,4
USA	13,9	0,2	10	7,8	26,8	10,1	2,2	18,4	12,9
Belgium	15,3	3,0	10	7,4	43,4	13,9	7,0	26,0	28,2
Portugal	15,6	4,2	8,3	5,5	28,6	4,7	6,8	6,4	26,9
Spain	16,1	3,7	6,7	5,1	33,5	7,2	5,3	11,8	25,5
Italy	20,4	4,2	8,3	4,3	41,0	10,2	5,7	16,1	33,0
Greece	27,2	3,6	8,3	5,1	30,1	4,1	7,6	2,7	31,5

Legend: see Table A1

Table A3. Data for 1998 (Underground Economy from Schneider's estimate)

Country	UE	EPL	Rule of Law	Corruption	Tax ₁	Tax ₂	Tax ₃	Tax ₄	Tax ₅
Switzerland	8,0	1,3	10	8,9	35,1	11,2	10,4	6,4	19,6
USA	8,9	0,2	10	7,5	28,9	11,7	18,1	4,7	12,9
Austria	9,1	2,4	10	7,5	44,4	10,0	10,5	12,4	35,3
Japan	11,1	2,6	10	5,8	28,4	5,3	6,8	5,3	12,8
N. Zealand	11,9	1,0	10	9,4	35,2	14,7	20,0	12,6	0,0
UK	13,0	0,5	10	8,7	37,2	10,2	16,7	12,1	15,3
Netherlands	13,5	2,4	10	9,0	41,0	6,2	7,2	11,4	36,3
Australia	14,1	1,1	10	8,7	29,9	13,0	23,9	7,6	1,5
Germany	14,7	2,8	10	7,9	37,0	9,3	21,1	10,1	31,1
France	14,9	3,1	7,9	6,7	45,2	7,8	14,1	12	33,5
Canada	15,0	0,6	10	9,2	37,4	14,1	21,5	9,2	10,2
Ireland	16,3	1,0	10	8,2	32,2	10,0	19,7	12,5	13,3
Denmark	18,4	1,5	10	10	49,8	25,7	33,7	16,5	10,0
Finland	18,9	2,1	10	9,6	46,2	14,9	27,9	14,2	20,9
Norway	19,7	2,9	10	9,0	43,6	11,9	21,8	16,2	15,7
Sweden	20,0	2,4	10	9,5	52,0	18,2	27,5	11,2	23,2
Belgium	22,6	2,1	7,9	5,4	45,9	14,1	27,8	11,4	29,0
Portugal	23,1	3,7	7,9	6,5	34,2	5,8	7,1	14,1	26,7
Spain	23,4	3,2	5,8	6,1	34,2	7,1	13,8	10,1	25,2
Italy	27,8	3,3	10	4,6	42,7	10,7	19,9	11,7	27,6
Greece	29,0	3,5	3,8	4,9	33,7	4,4	2,4	13,7	33,7

Legend: see Table A1

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