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## Tax Rates with Corruption: Labour-market Effects. Empirical Cross-country Comparisons on OECD Countries

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MŰHELYTANULMÁNYOK

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MÁRIA LACKÓ

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Tax Rates with Corruption: Labour-market Effects  
Empirical Cross-country Comparisons on OECD Countries

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# **Tax Rates with Corruption: Labour-market effects**

## **Empirical Cross-country Comparisons on OECD Countries**

Mária Lackó

### **Abstract**

The paper investigates how tax rates, corruption and institutional aspects of the labour market influence the size of the segments of the labour market such as unemployment, employment, self-employment and activity in the hidden economy. The novelty of our approach is the theoretical justification of the interaction between the perception of taxes and of corruption, as well as the establishment of a new concept and variable, the subjective tax rate. Alternative regression calculations are carried out on data for OECD countries for the period 1995 to 2000. The tests confirm the validity of the new variable and the results imply the need for a more sophisticated policy approach for influencing labour market outcomes.

JEL classification: D73, E26, J2, H26

### **Keywords:**

Taxation, corruption, labour market, hidden economy

# **Az adóráták és korrupció munkaerőpiaci hatásai:**

## **Empirikus keresztmetszeti elemzés az OECD országok adatai alapján**

LACKÓ MÁRIA

### Összefoglaló

A tanulmány azt vizsgálja, hogy az adóráták, a korrupció elterjedtsége és különböző munkaerő-piaci intézmények hogyan befolyásolják a munkaerőpiac egyes szegmenseinek - munkanélküliek, foglalkoztatottak, önfoglalkoztatottak, a rejtett gazdaságban dolgozók - relatív nagyságát a fejlett piacgazdaságokban. Megközelítésünk újdonsága abban áll, hogy egy új fogalom és változó, a szubjektív adórátá bevezetésével elméletileg megalapozza az adóráták és a korrupció kölcsönhatásban való vizsgálatát. Az OECD országoknak az 1995-2000-es évek adatai alapján végzett regressziós elemzések megerősítik az új fogalom érvényességét. Az eredményekből az következik, hogy a gazdaságpolitika csak kifinomultabb szemlélettel képes a munkaerő-piaci jelenségeket célszerűen befolyásolni.

### Tárgyszavak

Adózás, korrupció, munkaerőpiac, rejtett gazdaság

## **1 Introduction**

Potential participants of the labour market regularly have the (not always freely available) opportunity to make decisions about joining various parts of the labour market. They may opt to move either to the visible segments of this market, to the invisible part (the hidden economy), or even to both. The visible segments include unemployment and employment; the latter divided to employee status and self-employment.

In the literature, empirical investigations on the determinants of national rates of unemployment, employment and self-employment usually the cross-country or panel approaches are used. These visible segments of the market are, as a rule, associated with the size of taxes and the nature of labour market institutions, while for the size of hidden activities the influence of taxes and corruption are emphasized.

This study attempts to use three types of explanatory variables, tax rates, the extent of corruption and various institutional aspects of the labour market, for the explanation of the relative size of the visible and non-visible segments of the labour market in developed market economies and some transition countries. The novelty of our analysis is that we establish that the role of corruption is closely connected with that of tax rates, and the two effects can be combined in a new indicator, *the subjective tax rate*. This joint indicator is then taken into account not only in explaining the size of the hidden economy, but, along with labour market institutions, it becomes a major factor also in the explanation of cross-country differences of unemployment, employment and self-employment.

Section 2 of the study provides a brief review of the literature on the role of corruption in the economy, and summarizes the literature focusing on the role played by taxes and corruption in the emergence and development of the hidden economy. In section 3 we introduce the new indicator – the subjective tax rate – and analyse its structure and order of magnitude. Section 4 investigates the impact of the subjective tax rate (and other factors) on the development of the various segments of the labour market. The study concludes with a Summary.

## **2 The role of corruption in the visible and invisible economy**

There are numerous definitions for the concept of corruption. According to the simplest definition, it is the abuse of public power for private gains. While accepting this general definition, we should not exclude the possibility that corruption-like behaviour exists in exclusively private sector activities as well. In large private enterprises, particularly where the managers are not the same as the owners, this phenomenon can also exist, but here the usual conflict between public and private interests transforms into the conflict between company interest and personal private interest.

Theory usually differentiates between two types of corruption: small and grand corruption. Small corruption means the corruption of bureaucrats, tax inspectors, policemen, etc.. Grand corruption is connected with the attitude of politicians, representatives of the parliament and others (cf. Tanzi, 1998).

In some countries corruption is widespread, while in others it is persistently low. Why do officials in some countries misuse public office for private gain more frequently and for larger payoffs than officials in other states? In answering this question various theories

emphasize certain historical and cultural traditions, the level of economic development, political institutions, government policies, or the combination of these (cf. Treisman, 2000 and Svensson, 2005).

La Porta et al. (1999) and Treisman (2000) assume that the size of corruption is directly related to the expected costs, benefits, or both of corrupt activities in a country. The most obvious cost of a corrupt behaviour is the risk that the perpetrator gets caught and punished. The probability of getting caught in turn depends partly on the effectiveness of *the country's legal system*. Legal systems differ from the point of view that how much protection they offer to private agents harmed by corrupt acts of officials, and the opportunities for recourse to remedy. La Porta et al. (1999) argues that common law systems (found mostly in Britain and its former colonies) differ in this respect from civil law systems (used mostly in continental European countries and their former colonies). Common law originally developed in England, partly to protect the parliament and property owners against the harmful interventions by the sovereign to regulate and expropriate them. In contrast, civil law systems furthered by monarchs and rulers such as Napoleon and Bismarck, developed as an instrument of the sovereign to be used for state-building and controlling economic life. La Porta et al. (1999) and Treisman (2000) hypothesize and show that due to greater protection of property against the intervention of the state, embodied in common law systems, various aspects of government performance improves, including the prevention from corruption.

Expectations and practices concerning the *enforcement of laws* are as crucial as the original intent and formulations of laws. There is high variation across countries in terms of legal culture, i.e. the relative importance of law in preserving social order. Research results show that in Britain and in some of its former colonies, the focus is primarily on the procedural aspects of law as opposed to the respect of hierarchy and the authority of offices. Judges are willing to follow procedures, even when the results threaten the hierarchy, and this obviously increases the chance that corruption by officials will be uncovered (cf. Treisman, 2000).

*Religious traditions* also provide a cultural framework that conditions attitudes towards social hierarchy. Catholicism, Eastern Orthodoxy, and Islam are considered more hierarchical religions than Protestantism, which is more egalitarian or individualistic. Accordingly, challenging the deeds of officeholders is less accepted in cultures influenced by the former than in those dominated by the latter. Another channel through which different religions approach the abuses of power differently is the tradition on which the religion in question had developed. Protestantism, due to its emergence from dissenting sects opposing the powerful Catholic Church, has a general disposition of readiness to monitor and denounce abuses of positions in a hierarchy, including the suspicious activity of state officials.

The extent of *ethnic heterogeneity* is also considered to be important in allowing more or less room for corruption in a society. The idea is that in ethnically more heterogeneous societies the ethnic groups that come to power usually establish a rule that turns against the ethnic losers. This may take the form of physical destruction, economic expropriation, restriction of political freedom and access to public goods, etc.. Political theories associate higher ethnic heterogeneity in a society with governments becoming more interventionist and less efficient, including lesser quality of public goods and more restrictions on political freedom. In a cross-country regression analysis La Porta et al. (1999) shows that higher ethnic fractionalization is associated with more interventionism, lower government efficiency, i.e. more corruption, and inferior provision of public goods (the latter represented by proxies of demographical, educational and infrastructural variables).

*The level of openness and democracy* in a political system also influences the likelihood that corruption becomes widespread and persistent. In more democratic and more open political systems the risk of exposure of corrupt acts may be higher than in closed societies. Freedom of association and freedom of the press predisposes public interest groups and reporters to monitor public policy and expose abuses of the government. In an indirect way *higher economic development* may also contribute to the commitment and ability of the society to uncover abuses of political power. Economic development implies the spread of education, literacy, as well as depersonalized relationship thus increasing the possibility that an abuse of the political position will be noticed and challenged (cf. Treisman, 2000).

One of the specific features of corruption is that, except for a few interested persons, it is invisible. Therefore the direct measurement of the intensity or spread of corruption is very difficult. There are several indirect ways, however, of getting information about the prevalence of corruption in a country or in an institution. Information can be obtained from:

- Reports on corruption available from published sources (newspapers, journals);
- Case studies about corrupt agencies such as tax administrations, customs offices, and the police;
- Questionnaire-based surveys: these can be related to a specific institution or to a whole country; these surveys measure the perception of corruption rather than corruption per se.

The results obtained from surveys on corruption are now widely used by researchers and business people. The best-known of these surveys, the corruption index, has been constructed and compiled by Transparency International.<sup>1</sup> In this article the published values of this index will be used. Transparency International's annual index of 'perceived corruption' represents a poll of polls, constructed by a team of researchers at Göttingen University from a number of individual surveys of businessmen or local population of the relevant countries as well as from several ratings by economic risk analysts and country experts.

Over the past ten years, when the nature and impact of corruption gained growing attention among scholars, politicians and public officials, numerous investigations have been made about the effects of corruption on the economy. By using the available quantified indices of corruption several cross-sectional econometric analyses were carried out, reporting important quantitative results regarding the effects of corruption on various macroeconomic variables. These results by and large suggest that corruption has a negative impact on economic growth (Mauro, 2004). The detailed results that support this outcome are the following: Corruption reduces investment and, as a consequence, the growth rate of output (Mauro, 1995); it reduces expenditure on education and health (Mauro, 1998); decreases public investments (Tanzi and Davoodi, 1997) and also reduces the outcomes of public spending.<sup>2</sup> Corruption distorts the effects of industrial policy on investments (Ades and Di Tella, 1997); diminishes the productivity of public investments and the productivity of the country's infrastructure (Tanzi and Davoodi, 1997); reduces tax revenues, mainly through its adverse impact on the work of tax and customs administrations, thereby limiting the government's ability to realize the needed level of public expenditures (Tanzi

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<sup>1</sup> See for instance: [www.transparency.org/cpi/2000/cpi2000.html](http://www.transparency.org/cpi/2000/cpi2000.html)

<sup>2</sup> An example for the latter result: in countries with low level of corruption public health spending reduces infant and child mortality rates more than in countries with higher level of corruption (Rajkumar and Swaroop, 2002).



and Davoodi, 1997); corruption also reduces foreign direct investment, because it operates as an additional tax (Wei, 1997).

In the investigations of the behaviour of different visible segments of the labour market, i.e. employment, self-employment and unemployment the direct effect of the corruption has usually been neglected. The impact of corruption has been seriously taken into account only in the investigation of the hidden (unofficial) economy. Theoretically the relationship between corruption and the hidden economy may be either complementary<sup>3</sup> or substitutive<sup>4</sup>. The empirical evidence so far has been mostly in favour of complementarity, however, a recent paper by Dreher and Schneider (2006) shows that in high income countries corruption and the hidden economy are substitutes, while in low income countries they are complements.

Loayza (1997) investigates the emergence of the hidden (informal) economy assuming that excessive taxes and regulations on the one hand, and a government unable to enforce these on the other, are together important explanatory factors for hidden activities. His proxies for weak enforcement are the quality of bureaucracy and corruption. Using data for Latin American countries in the early 1990s he tests some of the implications of the model and estimates the size of the informal sector in these countries. He uses a MIMIC model of latent variable, where exogenous causes determine the latent variable, and the latent variable determines a set of endogenous indicator variables. The causal variables are the corporate income tax rate, a proxy for labour market restrictions, and a proxy for the strength of the enforcement system<sup>5</sup>. The results of the calculations show that the size of the informal sector depends positively on proxies used for the tax burden and for labour market restrictions, and negatively on a proxy for the quality of government institutions.

Johnson et al. (1997), using a sample of the transition countries, examine how the interplay of politics and economic and institutional incentives influences the growth of the unofficial economy and, in turn, how the unofficial economy affects economic performance. The authors set up a simple model of tax and regulatory incentives that lead firms to choose between operating in the official and the unofficial sector. A higher unofficial economy leads to a loss of public revenues, less public goods, such as law and order, a decrease in the productivity of firms, as well as to a further boost to the unofficial economy. Firms in the unofficial sector neither pay official taxes nor share in public goods (such as law and order). Instead, they pay private agencies – the ‘mafia’ – for contract enforcement and protection from thieves. A multiple equilibrium model ensues.

The empirical analysis in Johnson et al. (1997), based on data from a wide variety of sources, offers support to the model. As output in the unofficial sector is not recorded in the official GDP, the authors estimate total GDP from the national electricity consumption.<sup>6</sup> The results suggest substantial variation in the size of the unofficial sector across the transition economies, as well as significant differences, in both levels and growth rates, of total GDP compared to the official GDP.

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<sup>3</sup> See Choi and Thum (2004) and Rose-Ackermann (1997).

<sup>4</sup> See Friedmann et al. (2000) and Johnson et al. (1998).

<sup>5</sup> The proxy is the average of three subjective indicators, namely the quality of bureaucracy, corruption in the government, and the rule of law, all reported in the *International Risk Guide* for the period 1990-1992.

<sup>6</sup> In a series of studies I criticised the total electricity approach used by many authors for the estimation of the size of the hidden economy. In search for a more reasonable alternative, I developed the household electricity approach, which was subsequently used in various estimations (see Lackó, 2000)

To quantify the relative costs and benefits for businesses operating in the official economy, the mentioned authors use an array of indicators including measures of liberalization, privatization, deregulation, corruption, and tax fairness, as well as characteristics of the legal environment; the latter are the public goods most relevant to their theoretical model. Better performance in terms of these institutional and legal reform measures is associated with a smaller unofficial economy and higher official GDP. In turn, a large unofficial sector and less official output are associated with larger budgetary deficits and higher inflation.

Friedman et al. (2000) raise the question: what drives entrepreneurs and large businesses underground? They bring up two competing hypotheses: (1) high taxes, (2) special political and social institutions that govern the economy, such as excessive bureaucracy and corruption, and a weak legal environment. When testing the two hypotheses the authors use data from 69 countries for the 1990s for variables such as tax rates, bureaucratic hindrances, corruption, the legal environment, and the size of the unofficial economy. The analysis reveals no evidence that higher direct or indirect tax rates are associated with a larger unofficial economy. In fact, the authors find some support to the relationship that higher direct tax rates are associated with a smaller underground sector. However, when per capita income levels are controlled for (in order to allow for the possibility that richer countries have a better-run administration, and operate with higher tax rates), this paradoxical relationship ceases to be significant. By contrast, more bureaucracy, greater corruption and weaker legal environment are all associated with a larger unofficial economy, even (in most cases) when per capita income is controlled for. These findings are confirmed not only for the whole sample, but also for different groups of countries, such as the OECD countries, the transition economies and Latin American states.

Johnson et al. (1999) also investigate the relationship between taxes and the unofficial economy. After building a theoretical model, they empirically show that the tax burden on the agents depends much more on the extent of bribery and corruption than on the tax rates per se.

While the previously mentioned empirical analyses investigated the impact of two factors, tax rates and corruption on the hidden economy separately from each other, in this article we concentrate on the impact of the interaction between tax rates and corruption on the hidden economy as well as on the visible segments of the labour market. To enable this analysis we introduce a new indicator that we call the subjective tax rate.

### **3 A new indicator: the subjective tax rate**

The two forms of corruption (small and grand) can be considered as extra taxes. A higher level of small corruption means that the nominal, statutory tax rate will be complemented with an additional cost or tax related to corruption. In the case of grand corruption this connection is more indirect: a high level of grand corruption signals that in the given country public revenues are less likely to be used for the necessary public services, and also that the risk of conducting orderly business is higher. Under extensive grand corruption the main functions of the public sector are distorted: the allocative function (allocation between social and private goods), the redistributive function (redistribution between the rich and poor), as well as the stabilization function (the use of the budget policy to maintain a sufficient level of employment, the stability of prices, budget deficit, and so on).

Thinking in a cost-benefit framework, the decision-maker (employee, employer, tax payer, etc.) observes the combined cost of conducting business, i.e. his actual tax obligations and his costs related to corruption. The future benefits to be materialized from the public utilization of recent or current tax revenues are only partly observed, because some benefits are realized only in the long term. However, the decision-maker observes that in a corrupt institutional system the benefits are reduced, they are gradually eroded; anyway he is facing an inefficient use of tax revenue that implies extra costs, for example in healthcare, in legal protection, in protection against crime, etc. Both types of corruption force the agents of the economy to spend extra-expenditures that can be considered extra-taxes, which, however, do not show up as extra revenues for the state budget.

Members of the society are not blind: sooner or later they perceive the extra-tax nature of corruption and respond in their own way. In the literature about tax compliance we find propositions, based both on theory and on results from controlled experiments, about people's reaction to corruption.

Spicer and Lundstedt (1976) and Smith (1992) hypothesize that a taxpayer will feel 'cheated' if he believes that his tax dollars are not well spent, and may respond by refusing to pay his full tax liability. Alm et al. (1992) perform experiments to test this idea. They find a greater willingness to comply with tax obligations when participants perceive that they will receive benefits in public goods funded by the taxes collected. Using experimental methods Webley et al. (1991) also examine what role the taxpayers' satisfaction with the operation of the government plays in the compliance to pay taxes. The authors find that those participants, whose responses to a survey taken several months before the experiments had indicated alienation from government or a negative attitude towards laws, were significantly more likely to engage in tax evasion during the experiments. In their theoretical model Pommerehne et al. (1994) found that the greater the deviation between the individuals' optimal choice of public goods provision and the actual level, the more they, as taxpayers, underpay their taxes; the higher the level of squander by the government in the previous period, the less the individual is willing to contribute in the present. In their survey investigation for the Czech and Slovak Republics, Hungary and Poland, Hanousek and Palda (2002) found that those, who believed they are getting quality government services also tended to evade taxes much less than those, who did not believe getting the services they expected. The authors show that governments are constrained in their actual tax collection by the perceptions people have about the quality of government services that they receive.

Based on the considerations summarized above we can state: a simple comparison of statutory tax rates across countries to analyze the tax burden may be misleading, since in this case we do not take into account *the environment* in which tax rates let their impact be felt. In this context environment means the way taxes are set and collected (coherence, transparency and the orderliness of the tax system and tax collection) as well as the way taxes are used in the provision of government services (again transparent, orderly and economical utilization). For a proper cross-country comparison of the tax burden we define a new indicator, the so-called *subjective tax rate*, which combines the traditional tax rate with the level of inefficiency of the institutional environment.<sup>7</sup> In this article the latter is to be proxied by the level of corruption in the given country.

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<sup>7</sup> A similar concept was introduced in Johnson et al. (1999), where the authors developed a theoretical model of the informal economy in which tax rate and corruption were combined in one variable, the so-called "generalized tax rate on output". As they wrote: "The generalized tax rate  $t$  includes taxation, regulation and corruption." (p. 4.)

Let us assume that corruption is considered by people as a burden, and this burden is translated into tax-equivalent units. The tax-equivalent burden of corruption shows the effect of corruption as if it implied an additional tax.<sup>8</sup> Translating the level of corruption to tax-equivalents has to take into account that, by convention, the perception of the level of corruption is measured/estimated on a scale between 1 and  $k^*$ , where 1 indicates the most corrupt, and  $k^*$  the corruption-free environment.

The size of corruption in tax-equivalent units can be expressed as follows:

$$t_k = a_1(k^* - k) \quad (1)$$

or, choosing another formulation

$$\ln t_k = a_2(\ln k^* - \ln k) \quad (2)$$

where  $t_k$ : the cost of corruption expressed in tax-equivalent units, per cent of the tax base  
 $k$ : corruption index; a higher value means lower corruption (1, ...,  $k^*$ )

$k^*$ : maximal value of the corruption index, meaning a corruption-free environment

The subjective tax rate is the sum of the traditional tax rate and the tax-equivalent of corruption:

$$t_s = t + t_k = t + a_1(k^* - k) \quad (3)$$

or

$$\ln t_s = \ln t + \ln t_k = \ln t + a_2(\ln k^* - \ln k) \quad (4)$$

where  $t_s$ : subjective tax rate

$t$ : traditional statutory tax rate

It is understandable why we call this rate *the subjective tax rate*: it reflects that the objective values of traditional tax rates are perceived or interpreted by economic agents in the light of their own subjective experience of the quality of public administration which sets, collects and spends these taxes. While the subjective tax rate is primarily sensed at the micro level, this perception is communicated at large, and therefore its impact can be felt and interpreted at the macro level as well. In the present article we deal with the subjective tax rates at the macro level and use this indicator to make international comparisons.

The actual weight of the subjective tax rate compared to the traditional tax rate ( $a_1$  or  $a_2$ ) has to be identified empirically. The tax-equivalent unit of corruption can be assessed within a regression framework, where particular variables are explained, among other factors, by the effects of the traditional tax rate and corruption. After identifying  $a_1$  or  $a_2$  we can make statements that one unit change in corruption intensity, in its effect on the explained variable, is equal to changes of a certain number of units in the statutory tax rate.

According to our preliminary regression analyses about corporate taxes and taxes on labour, the form of the subjective tax rate is close to that in (4), and the value of  $a_2$  is close to 1. Namely:

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<sup>8</sup> The idea of the tax equivalent of corruption was already used in Wei (1997) and Barth et al. (2001), where the authors investigated FDI in a cross-country perspective, and transformed the opacity index into a tax equivalent. Taxes and corruption were used in interaction empirically in Lackó (2003, 2004) and Torrini (2005).

$$\ln t_s = \ln t + \ln t_k = \ln t + \ln k^* - \ln k \quad (5)$$

In the next sections of this article we will test whether the subjective tax rate, constructed according to the above described formula, is really meaningful and operates in a sensible way in the labour market.

The scale of the subjective tax rate depends on the scales of its constituting factors. It reaches its maximum level in the case when the agent operates in the maximally corrupt environment and he is also obliged to pay the largest physically possible tax from his revenue. Naturally, such an extreme case does not occur in reality.

Table 1 presents cross-country data for the traditional tax wedge<sup>9</sup> and the corresponding values of the subjective tax wedge for 28 OECD countries in 2000. We can see that Sweden has the highest traditional tax wedge, but with respect to the subjective tax wedge, it is close to the average value of the OECD countries. Germany, the Netherlands and Denmark also have traditional tax wedges higher than the average, but the values of their subjective tax wedge are below the OECD average. Mexico is an opposite example: its traditional tax wedge is below-average, but according to its subjective tax wedge, Mexicans are exposed to a much higher tax burden, than the average of the OECD countries. The three Central and East European transition economies in the sample (Poland, Hungary, and the Czech Republic) have both higher than average traditional tax wedge, and higher than average subjective tax wedge in this group of countries. This is the case with some more developed market economies as well, such as Italy, Belgium, Greece and Spain.

[Table 1]

## **4 The impact of the subjective tax rate on different segments of the labour market**

### **4.1 Hidden economy**

Several recent studies summarized in section 3 arrived at the counterintuitive conclusion that there was no connection between the size of the hidden economy and the tax rates. Based on their results we should believe that a high level of corruption and weak performance of the legal and institutional environment are sufficient to induce people to work in the hidden economy, and traditional tax rates have no impact on the size of hidden activities. In this section we challenge this view and show – with the help of different indicators of taxes and two different samples of countries – that the subjective tax rate does exert a strong influence on the size of the hidden economy. We use two country samples, and for both we use data for the size of the hidden economy from already available estimations, i.e. from sources independent from this work.

Sample I covers 31 countries, including 18 developed, 8 developing and 5 transition countries. Our results indicate, similarly to those of Friedman et al (2000), that neither the income tax rate nor the corporate tax rate has significant relationship with the size of the

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<sup>9</sup> The tax wedge here is calculated as the sum of employees' and employers' social security contributions, plus personal income tax, less transfer payments, all as a percentage of gross labour costs, paid by one-earner married couple at the so-called APW (average production wage) level.

hidden economy (see column [1] in Table 2). If we add the corruption index (column [2]), we get better results: according to these, the size of the hidden economy is significantly influenced by the extent of corruption and the income tax rate. In column [3] the results of the regression calculation are presented in which instead of the traditional tax rates (income and corporate taxes) we used the subjective tax rates. In this calculation the effects of the tax rates on the size of the hidden economy are significant: with higher subjective tax rates the size of the hidden economy becomes also larger.

[Table 2]

Sample II contains 21 OECD countries, and here we make calculations with another type of tax indicator, the tax wedge. The results of the calculations are shown in the second block of Table 2. As it turns out, in this sample the tax wedge and the corruption index explain the size of the hidden economy, both separately and jointly. In column [5] we can observe that the absolute size of the coefficient of the traditional tax wedge approximately equals that of the coefficient of the corruption index.<sup>10</sup> From this coincidence one may derive that the *subjective* tax rate is the single relevant explanatory variable here. For this reason, when proceeding with the estimations, it comes as no surprise that the subjective tax wedge shows a significant explanatory impact on the hidden economy in this sample (see column [6] in Table 2).

The calculations on the two samples of countries above give a preliminary indication that the subjective tax rate is a relevant concept. However, the results have to be taken with caution in view of certain problems in the previous estimations:

(1) In the calculations outlined above the values for the size of the hidden economy (the left hand side variable) were taken from sources which, given the nature of the hidden economy, produced these values based on certain estimation procedures. These procedures, in turn, usually already assume the impact of different tax rates on the hidden economy. For this reason, when we use the estimated values of the size of the hidden economy with the aim of investigating the impact of tax rates, we can easily arrive at a tautological relationship.

(2) The above-mentioned similarity of the coefficients – the elasticity of the size of the hidden economy on tax rates on the hand, and of the corruption index on the other – may be accidental, determined by the actual sample we use.

(3) The causality of the relationship between the size of the hidden economy and the extent of corruption needs a thorough analysis.

For the above reasons, we carry out further investigations to show to what extent the subjective tax rate is a relevant concept. We focus on the determination of participation in different segments of the labour market, in areas that are not as uncertain and invisible as the hidden economy. More precisely, we analyse whether the subjective tax rates can contribute to explaining the cross-country differences in the rates of employment, self-employment and unemployment.

## 4.2 Visible labour market segments

Various theories as well as empirical investigations of the labour market deal with the impact of tax rates and labour market institutions on the different segments of this market (see Blanchard, 2005; Nickell et al., 2005; Nickell, 2003; Planas et al., 2003; Jackmann,

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<sup>10</sup> In the case of Sample I we experience a similar correspondence between the sum of the coefficients of the two tax rates on the one hand, and the coefficient of the corruption index, on the other, in column [2] of Table 2.

2002; Belot and Van Ours, 2001; Blanchard and Wolfers, 2000; Elmeskov et al., 1998; Leibfritz et al., 1997; Nickell, 1997; Daveri and Tabellini, 1997; Scarpetta, 1996; Layard et al., 1991).<sup>11</sup>

It is well known that taxes on labour influence both workers' decisions about how much labour they supply, and firms' decisions about how much labour they employ. Higher personal income taxes and employee social security contributions tend to reduce the return to working, which may discourage labour supply and depress potential output. Not only employment, but also wages may respond to the variation in labour taxes. The size and pattern of this response, however, depend on the institutional structure of wage bargaining, labour market policies and the degree of competition in the product markets. In the presence of rigidities on both labour and product markets, workers' resistance to higher taxes imposed on their labour efforts can boost wage demands, thereby raising the labour costs for employers. On the employer's side, in the presence of rigidities, an increase in statutory payroll taxes (social security contributions by the employer) will raise labour costs directly, i.e. employers will not be able to offset the additional taxes by lowering wages. Such shifting of taxes onto labour costs, in turn, decreases the demand for labour, as it decreases profitability and investment.

It is also well known that various groups of the unemployed react differently to the wage rates in their employment decisions, because of the different elasticity of their labour supply. Females and young people have a more elastic labour supply, because they tend to be the marginally employed. As the literature suggests, they react also more strongly to tax rates than do older males. In addition, in a theoretical framework Bertola et al. (2002) showed that the functioning of labour market institutions, which are meant to improve workers' income share, leads to larger disemployment effects when labour supply is more elastic.

Employee and employer behaviour observing the subjective tax rate, rather than the usual taxes, may modify these traditional effects of labour taxes. Higher subjective taxes due to an increasingly corrupt environment may further discourage the supply of labour. This environment may, however, also discourage employers and contribute to a lower demand for labour: facing higher costs or uncertainty due to high corruption decisions on investment into new fixed assets may be cut back.

In order to identify these effects on the labour market in the following we carry out cross-country investigations on unemployment rates and employment rates (differentiated by gender) and self-employment rates (with and without unpaid family workers). The calculations are made on data for the OECD countries for the period 1995-2000. The factors tested are the usual explanatory variables in the literature, complemented by the level of the corruption indicator in the investigated countries as a component of the subjective tax rate. The regression equations are estimated by the Two-stage Least Squares method, with Huber-White-corrected standard errors in the presence of heteroscedasticity.

Since in the tested models the variable of corruption may be endogenous, it had to be instrumented. The selected instruments are cultural and institutional variables: as

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<sup>11</sup> While these studies provide a more-or-less general consensus view about the macro-behavioural patterns present in labour markets in industrialized countries, recently a radically critical opinion was presented about this consensus model. In their recent paper Baker et al. (2004), after surveying the above mentioned studies, show that their own new empirical results are, at many instances, in sharp contrast with the generally accepted model of the factors influencing the labour markets.

discussed in section 2 of this study, the literature on corruption suggests that certain cultural and historical factors are traditionally closely related to the extent of corruption in the given country. The instrumental variables used are the following: the average value of five different indices characterizing the level of ethno-linguistic fractionalization of the population; the legal origin of the Company Law or Commercial Code (English Common Law or continental-type law); the percentage of the population belonging to the Protestant religion; and the absolute value of the latitude of the country as a proxy for economic development.

### ***Unemployment***

In the explanation of cross-country differences in unemployment rates, labour taxes are, as a rule, important factors, along with the following ones: the generosity of the unemployment benefit system, the character of the wage bargaining system, the level of unionization, the strength of employment protection legislation, the importance of labour standards, and active labour market policies.

A generous unemployment benefit system increases the level of unemployment through two mechanisms: (1) it reduces the disutility of unemployment and directly increases pressure on the wages paid by the employees; (2) it decreases the 'effectiveness' of unemployed people as potential fillers of vacancies, by allowing them to be choosier (c.f. Nickell, 1997).

The wage bargaining system has two main sides, employees and employers. Depending on the strength and the coordination of these two sides the system has different effects on the labour market. The extent of unionization, reflected in the indicator of union coverage, may play an important role. High union coverage tends to contribute to raising the pay, and by this it contributes to a rise in the unemployment rate. This effect, however, may not occur if the unions and employers coordinate the bargaining activities. While some studies consider both employment protection legislation and labour standards important in influencing unemployment rates, others refute this claim. The crucial tax variable usually considered in this context is the tax wedge.

In the following calculations tax wedge is defined as the ratio of income tax plus social security contributions (paid by both employers and employees) to the labour cost.<sup>12</sup> Beside the traditional tax wedge and the level of corruption we consider the following explanatory variables: the variable characterizing the unemployment benefit system (with the help of the replacement rate), the variable of labour market rigidities<sup>13</sup>, the qualitative index characterizing the degree of employers' and unions' coordination in the wage bargaining systems, union density, the index of union coverage, the inflation rate, and time dummies for each year.

In columns [1] and [2] of Table 3/A we present the results of our regression calculations that aim at explaining the total unemployment rate in the OECD countries in 1995-2000. Regression calculations for [1] and [2] (and the following pairs of regressions) differ in terms of the tax variables used: equation [1] uses the traditional tax wedge, while [2] the subjective tax wedge. In the first regression the parameters of the following variables are

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<sup>12</sup> This corresponds to the use of the concept of tax wedge in OECD analyses and statistics.

<sup>13</sup> This proxy is based on the number of ILO convention regulations aimed at protecting employees that have been ratified by the relevant national parliament.



significant and have the proper signs: the tax wedge, the proxy of labour rigidities (ILOCONV), the intensity of employers' and employees' coordination in wage bargaining (COORDINATION), the inflation rate, and the time dummies. The variables of replacement rate (BENEFIT) and union coverage (UNCOV) turn out not to be significant. The  $R^2$  is 0.73.

[Table 3/A]

The regression results in [2] confirm that the subjective tax wedge is significant; in addition, the coefficient of the replacement rate becomes significant with the expected sign, and the value of  $R^2$  is higher than in regression [1].

Columns [3] and [4] of Table 3/A present results for similar regression calculations, but for the female unemployment rate. The role of the subjective tax rate is confirmed here as in the previous calculation: there is a significant effect of the subjective tax wedge on the variation of the female unemployment rate. In regression [3] the replacement rate has a strong positive effect, which means that a high replacement ratio particularly 'encourages' female workers to move into unemployment. When we use the subjective tax wedge, the union density (DENSITY) turns out significant. When we do not consider the corruption index (built in the variable of subjective tax rate),  $R^2$  takes the value 0.73, while in the equation with the subjective tax wedge  $R^2$  becomes 0.78.

We continue the investigation with the equations for male unemployment (columns [5] and [6]). This makes it possible to analyze whether there is any difference in the determination of the male unemployment rate from that of the female unemployment rate. In column [5] the parameters of the traditional tax wedge, the proxy for labour market rigidities, the index of employers' and employees' coordination, and union density are all significant and have the proper signs. It is an important result that here, contrary to the case of female unemployment rate, the replacement ratio has no effect on the unemployment rate. If we consider the subjective tax wedge as one of the explanatory variables (see column [6]), this again turns out significant with a positive sign (although with a smaller parameter than in equations [2] and [4]). The fact that male unemployed are less sensitive to the traditional tax rate than females is well known in the literature; it is a surprising new result, however, that male unemployed are similarly less sensitive to the subjective tax rate, than their female counterparts. (This implies that male employed respond similarly or less sensitively to changes in corruption than the female unemployed.)

Regressions explaining the long term unemployment rate are presented in Table 3/B. In columns [1] and [2] the regressions do not contain the union-coverage variable, while in columns [3] and [4] they do. In both pairs of regressions we can see that the effects of the traditional tax wedge and of subjective tax wedge are similar; the fitting values of the estimations are, however, higher when the subjective form of the tax wedge is used. When we insert into regressions the variable of union coverage, the effects of both the traditional and subjective tax wedges become much smaller. The reason is that some multicollinearity appears between the traditional tax wedge and the variable of union coverage. It is important to note that almost all explanatory variables have much higher coefficients in the equation explaining the long term unemployment rate than in the equation related to total unemployment rate, reflecting a stronger reaction of the unemployed to their environment when they are out of work longer (see columns [2] in Table 3/A and [2] in Table 3/B).

[Table 3/B]

## ***Employment***

In the following regression calculations the determinants of the cross-country variation in the employment rate are investigated, i.e. of the ratio of employed to the working-age population. We use the same explanatory variables as in the analysis of unemployment rates, but, in addition to the tax wedge on labour, we also focus on the corporate tax rate as well to its equivalent in the subjective tax rate.

In Table 4/A the first equation (column [1]) makes regression estimations with the help of the two traditional tax rates. As it turns out, the coefficients of both the tax wedge and the traditional corporate tax rate show significant negative effects. The coefficient of the replacement ratio is positive and significant. This would mean that with a higher replacement ratio for the unemployed there is a stronger tendency to participate in the labour market as employed. This relationship strongly contradicts the expectation that more generous benefits attract people to the unemployment status, rather than to the employment status! We will return to this paradoxical result below when we analyse the impact of unemployment benefits on male and female employment rates. In regression [1] the parameters of the variables of wage bargaining coordination, union coverage and labour market rigidities are significant and with the expected signs.

[Table 4/A]

In columns [2], [3] and [4] the results of the regression calculations indicate that growth in the subjective tax rate influences negatively the total employment rate: higher subjective tax rates go together with lower employment rates. The effect of the subjective tax wedge on labour is stronger than that of the subjective corporate tax rate. The parameters of the coordination of wage bargaining, union coverage and labour rigidities are significant and with the expected signs.

We have seen above that the unemployment rates of the two genders react rather differently to changes in the various explanatory variables. It is therefore justified to carry out the investigation for the employment rate separately for the two genders, the same way as it was done for the unemployed. Figures 1 and 2 show the relationship between the subjective tax wedge and the subjective corporate tax rate on the one hand, and the male and female employment rates, on the other. Even in these reduced relationships we can see that male and female employment rates react differently to changes in the subjective tax rates (see the difference between the steepness of the trends for the two genders).

[Figure 1]

[Figure 2]

Table 4/B and 4/C show the results of these regression calculations. Here we find that in the determination of the female employment rate the traditional tax wedge has no effect, while the traditional corporate tax rate has a significant negative effect (see column [1] in Table 4/B). The former experience is connected with the multicollinearity between the tax wedge and the variable of union coverage. The level of union coverage seems to be a very important factor in the determination of female employment: higher coverage goes together with a lower female employment rate. The effect of union density, however, is mostly insignificant.

[Table 4/B]  
[Table 4/C]

In the explanation of the male employment rate the effect of the traditional tax wedge is very strong, while the traditional corporate tax rate has no effect at all. We find that here the density of the unions has a much stronger negative effect than in the case of the equation of the female employment. Interestingly, the generosity of unemployment benefits has no explanatory power for either the male or the female employment rates. While the generosity of unemployment benefits affects the rate of unemployment, especially female unemployment, it seems to have little impact on male and female employment, and shows a counter-intuitive – weakly positive – effect on total employment (see above). What is clear that high unemployment benefits lead to high unemployment rates, but it is also true that generous benefits must make participation in the labour market in general more attractive: after all, participation is a necessary condition to be eligible for those unemployment benefits. Accordingly, a weak impact of benefits on the employment rate may occur, because a strong unemployment effect and a strong labour market participation effect tend to cancel out each other (cf. Nickell, 1997, p. 68).

When we go further to the equations containing the subjective tax rates in Tables 4/B and 4/C we find that the subjective tax wedge has negative effect on both the female and male employment rates; however, the subjective corporate tax rate has a much smaller effect on the male than on the female employment rate. The qualitatively smaller effect of the subjective corporate tax rate on male employment is not only interesting, but also surprising. All these unexpected differences between the employment (and unemployment) behaviour of males and females need some explanation. We shall attempt to provide a sufficient rationalization for this puzzling behaviour below in the course of investigating a special part of the employed people, the self-employed.

### ***Self-employment***

The sector of self-employed is, as a rule, a poorly recorded and somewhat mysterious part of the national economies. As a consequence, the determination of the size of self-employment is far from straightforward. In most countries the agricultural sector uses a relatively high proportion of self-employed workers, therefore, in a cross-country perspective a higher share of agricultural employment is usually associated with a higher share of self-employment in total employment. During the 1990s, however, in most OECD countries non-agricultural self-employment grew faster than civilian employment as a whole, with the effect of increasing the share of non-agricultural self-employed. Various, to some extent overlapping, explanations have been put forward for this recent renaissance in self-employment (c. f. OECD, 2000a):

(1) It may have been a reaction to the overly rigid labour and product markets and to the high level of taxation. The opportunities that self-employment offers in paying less tax to the state could have been partly responsible for the recent reallocation of employment to this sector.

(2) The growth of the self-employed sector reflected changes in the industrial organization. Greater stress on outsourcing non-core activities may have increased the amount of work subcontracted to the self-employed, due to the experience that self-employment business has shown greater flexibility and speed of response than traditional firms.

Cross-country studies traditionally emphasize that there is a strong negative correlation between the level of GDP per capita and the share of non-agricultural self-employment without unpaid family workers (Kuznets, 1966, Schultz, 1990, Bregger, 1996). This empirical finding is usually substantiated with the argument that a low level of prosperity coincides with a low level of wages, implying little pressure to increase efficiency, or to increase the average scale of enterprise activities. At this stage of development a major route for ambitious wage earners to increase their incomes is to set up an own shop and become an entrepreneur. Economic development subsequently leads to rising wages, which stimulates enterprises to work more efficiently and to reap economies of scale and scope. An additional effect of rising wage levels is the increased attraction of wage-employment: the high and secure income of wage-earners increase the opportunity cost of becoming self-employed (cf. Iygun and Owen, 1998).

Empirical investigations, including cross-sectional econometric investigations usually try to find out which of these two tendencies – traditional, income-related or/and the more recent, organization- and regulations-related trends – are dominant in the determination of the size of the self-employed sector. The usual explanatory factors to be used are the level of development, the unemployment rate, the proportion of women in the labour force, the share of GDP produced in the service sector, as well as average and marginal tax rates (see Acs et al., 1994, Staber and Bogenhold, 1993, Robson and Wren, 1999).

In these models the sign of the coefficient of the unemployment rate is *a priori* uncertain, since the unemployment rate may either decrease or increase together with the self-employment rate depending on the segments of the labour market from which people move to the self-employment sector. Estimates concerning the effect of unemployment on self-employment vary from study to study. Investigations at the micro-level, however, show that most self-employed people were previously in wage and salary employment, and a substantial proportion of self-employed leave their self employed status for entering or re-entering the segment of wage- and salary-employment. Only a very small proportion of the unemployed people find employment through self-employment.

As for the other variables in the regression equations explaining self-employment, the proportion of women in the labour force is usually expected to have a negative sign, while the share of the service sector in GDP a positive sign. While these are plausible assumptions, not all relevant econometric estimations could confirm them.

With respect to the role of the average tax rate, most of the investigations arrived at the result that the tax rate has a positive coefficient: the environment characterized by higher average tax rates provides more incentive to find ways of avoiding and evading taxes through self-employment, and people tend to utilize these opportunities. This was found, for instance, by Robson and Wren (1999), OECD (2000a) and Scharle (2002), but one can find a few such investigations as well which could not confirm this assumption. A recent article by Torrini (2005) uses the statutory tax wedge in the explanation of cross-country differences in the self-employment rate in the non-agricultural sectors of the OECD countries. He shows that unless self-employment offers sufficiently high tax evasion opportunities, a higher tax rate reduces the incentive to enter self-employment. If the tax evasion opportunities for the self-employed workers are sufficiently high, a tax increase will encourage growth in self-employment.<sup>14</sup> He also takes into account the size of public employment that has a

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<sup>14</sup> Torrini (2005) uses a variable that contains the interaction of the tax wedge and a dummy denoting countries that have a higher than average corruption perception index. A special

negative significant impact on self-employment rates showing a crowding-out effect on self-employment opportunities.

The econometric analysis of the self-employment rate in OECD (2000a) incorporates also the average unemployment benefit replacement rate as an explanatory variable. The replacement rate is expected to have a negative sign based on the idea that an increase in this rate tends to increase the attractiveness of wage-employment through the advantages of unemployment insurance: if business opportunities turn to worse, self-employed have no opportunity to get unemployment benefits, while wage earners, if they lose their jobs, may pull back to this shelter.

After this introduction we turn to our own investigation of the determinants of the self-employment rate in the OECD countries in 1995-2000 using, among others, the new indicator, the subjective tax rate. In Table 5 we present the results for the total self-employment rate with and without the unpaid family workers. The explanatory variables are the traditional and subjective tax wedge, the traditional and subjective corporate tax rate, the index of the unemployment benefit system, and the share of agricultural employment.

As the results indicate, in all the regression calculations the agricultural employment rate has a very strong positive effect. As indicated above, this comes as no surprise. In the calculation where the impact of corruption as an extra tax is not taken into account (columns [1] and [3] of Table 5) we find that the tax wedge has a positive and significant parameter, which means that higher traditional tax rates on labour induce, *ceteris paribus*, higher rates of self-employment. The reasons are twofold. First, for the self-employed himself/herself, the self-employment status offers ample opportunity to evade taxes and higher taxes offer more encouragement to choose a status where one can evade them. Second, higher taxes offer more opportunities for tax-avoidance for the enterprises that traditionally employ workers. By pushing some of their employees to the self-employed sector, and keeping them working for the enterprise, through this outsourcing setup they can avoid paying social security contributions after them.

[Table 5]

In the regression calculations the variable representing the unemployment benefit entitlement has a negative sign. This result is in accordance with our expectation: more generous benefits make more people give up their self-employed position for the wage-earner status. In the regression calculations incorporating the subjective tax rates (columns [2] and [4] in Table 5) the coefficients for these taxes turn out significant. The fitting values are fairly high, in fact higher than in the regression with the traditional tax rates.

Now we return to the puzzles experienced above, i.e. in the course of explaining the rates of unemployment and employment for various genders. We discovered that the male unemployment rate was much less sensitive to the size of the subjective tax wedge, than the unemployment rate of the females. In addition, when analyzing the employment, it appeared that the labour supply of men, unlike that of the women, was not sensitive to the subjective corporate tax rate.

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interaction of the tax rates and the corruption index, the subjective tax rate was used already in Lackó (2003, 2004) for the explanation of cross-country differences in the size of the hidden economy, unemployment, long-term unemployment, employment rates and the self-employment rate.

We believe that the puzzle can be solved in a satisfactory manner if we properly take into account the results received for the self-employment rates. To help the interpretation we have to acknowledge the fact that our results for the self-employed are relevant mostly for the men: statistical data as well as several studies show that in the OECD countries the probability of being self-employed is much higher among men than women (see Blanchflower, 2000; Blanchflower and Oswald, 1998).

In human societies the basic unit of living and subsistence is the family, and in the traditional family model male employment is critical for earning for the whole of the family. This condition already defines the difference between the employment behaviours of the two genders. The results of our investigations indicate that, if higher traditional tax rates are combined with a higher level of corruption, this implies worse conditions for employment. If, in this way, the employee status is less available and/or less attractive, female workers who used to be employees choose or accept to become either unemployed, or unpaid family workers, or to completely leave the labour market. Under similar conditions, male employees make a different choice: in order to maintain a certain flow of (declared) earnings for their family, they become, as a rule, self-employed.

In the sections above we found an additional gender-specific difference in the employment behaviour, and it was related to the impact of the generosity of the unemployment benefit. While in the case of female employees the size of the unemployment benefit, *ceteris paribus*, positively influences both the unemployment rate and the employment rate, in the case of the male employees there is no direct effect of the benefits on either the unemployment rate or the employment rate. While this may seem puzzling, if we take into account the special behaviour of the self-employed, we discover an indirect impact of the unemployment benefits on male employment: since the increasing generosity of the unemployment benefits decreases the share of self-employed, this implies an increasing share of the employees within the employed males. This way this behavioural pattern ensures for the male employees that they would increasingly be eligible for the unemployment benefits in the future.

## **5 Summary and conclusions**

This study aimed at explaining how tax rates, the level of corruption and various institutional aspects of the labour market influence the relative size of different segments of the labour market in developed market economies. Dissatisfaction with the weak, ambiguous, or misleading impact of such crucial factors as statutory tax rates and the indicator of corruption in the literature stimulated the author to look for alternative explanatory variables. As a result, a new, synthetic variable was devised, tested and used: the subjective tax rate. This concept combines the traditional tax rate with the level of inefficiency of the institutional environment, the latter being proxied by the level of corruption in the given country.

The subsequent empirical investigations showed that the explanation of worker participation in both the visible segments of the labour market and in its invisible part requires the use of this new concept: along with other institutional differences in the labour market, subjective tax rates are relevant factors explaining the cross-country differences in unemployment, employment and self-employment rates, as well as the size of the hidden economy. With the use of the new variable the experience that similarly high statutory tax

rates lead to different labour market outcomes in different countries remains no more a puzzle.

The environment characterized by the subjective tax rate does not affect male and female participants of the labour market the same way. Potential male and female employees, due to their different status in the family, show distinct features in their response to changing conditions. If higher subjective tax rates make the conditions of employment worse, the response of female and male employees will be different. Female workers either go into unemployment, or join the group of unpaid family workers within the self-employed sector, or even leave the labour market. In contrast, male participants, since they are expected to earn a living for the rest of the family, make, as a rule, every effort to become self-employed and preserve, even if partly, a status in the visible economy.

The various behavioural patterns discussed in the study shed light on certain similar and diverging functions of the three “shelters” available for the potential employees when they face high statutory taxes, corrupt environment, or both. These shelters are: unemployment, self-employment and the hidden economy. Members of the potential labour force move across these segments – sometimes in an erratic way, but in certain situations showing some rational patterns. For instance, a withdrawal to the self-employment sector may contribute also to the increase of the hidden economy, since self-employed persons are able to evade and avoid taxes more easily than regular employees. Since this is also true for those who become unemployed, here we see some parallel mechanisms. A high corporate tax rate combined with a high level of corruption may force employees to give up their status and become self-employed subcontractors of their old firm. These are the so-called false self-employed: in practical terms they are still employees, but are undeclared as far as payroll taxes are concerned. This transformation of the employee status enables both employees and employers to evade taxes, but the same changes in conditions may also increase the share of non-employed people who (just like the self-employed) are prone to be engaged in the hidden economy.

Another factor, the generosity of unemployment benefits, in turn shows differing functions of two of the shelter sectors. While increasingly generous unemployment benefits may contribute to an increase in the number of unemployed, they induce, *ceteris paribus*, a drop in the self-employment rate.

Table 1  
**Traditional and subjective tax wedge, 2000**

Country	Tax wedge <sup>a</sup> per cent	Corruption index <sup>b</sup>	Subjective tax wedge per cent
Australia	7.7	8.3	9.3
Luxembourg	10.9	8.6	12.7
New Zealand	15.2	9.4	16.2
Switzerland	18.1	8.6	21.0
Ireland	15.5	7.2	21.5
Canada	21.2	9.2	23.0
United Kingdom	22.6	8.7	26.0
USA	21.6	7.8	27.7
Norway	27.3	9.1	30.0
Japan	20.1	6.4	31.4
Denmark	31.2	9.8	31.8
Austria	29.6	7.7	38.4
Korea	15.8	4.0	39.5
Netherlands	35.4	8.9	39.8
Finland	39.8	10.0	39.8
Portugal	26.2	6.4	40.9
Germany	33.1	7.6	43.6
Spain	30.6	7.0	43.7
Mexico	15.0	3.3	45.5
Sweden	42.8	9.4	45.5
Czech Republic	24.8	4.3	57.7
France	39.0	6.7	58.2
Belgium	40.4	6.1	66.2
Hungary	37.0	5.2	71.2
Greece	35.8	4.9	73.1
Italy	36.3	4.6	78.9
Poland	38.1	4.1	92.9
Turkey	40.2	3.8	105.8
Average	27.5	7.0	44.0

Sources:

a. Taxing Wages, OECD, 2002

b. Transparency International, 2000



Table 2

**Regressions for the hidden economy**

Dependent variable: Hidden economy in per cent of GDP

Explanatory v.	Sample I			Sample II		
	[1]	[2]	[3]	[4]	[5]	[6]
Tax rate	traditional	traditional	subjective	traditional	traditional	subjective
ln GDP	-17 [-11.01]	-12 [-4.53]	-13 [-7.59]	-11 [-5.83]	-6.7 [-2.07]	-6.6 [-2.43]
ln INCOMETAX	2.9 [1.51]	3.9 [2.20]				
ln TAXWEDGE				8.1 [3.17]	7 [2.75]	
ln CORPTAX	6 [1.78]	3.8 [1.19]				
ln CORRUPTION i.		-9.3 [-2.39]			-7 [-1.92]	
ln SINCOMETAX			4 [2.30]			
ln STAXWEDGE						6.9 [3.88]
ln SCORPTAX			4.5 [2.16]			
R2	0.84	0.86	0.86	0.64	0.69	0.71
RMSE	5.4	5	4.9	3.7	3.5	3.4
n	31	31	31	21	21	21
Method	OLS	OLS	OLS	OLS	OLS	OLS

Sample I source: Friedman et al.(2000), 31 countries

Sample II source: Schneider and Klinglmair (2004), 21 OECD countries

Table 3/A  
**Regressions for the unemployment rates**  
Equations

Dependent variables	[1]	[2]	[3]	[4]	[5]	[6]
	total un.	total un.	female un.	female un.	male un.	male un.
Tax rate	traditional	subjective	traditional	subjective	traditional	subjective
Explanatory var.						
ln TAXWEDGE	0.96 [8.01]		1.14 [8.59]		0.8 [6.78]	
ln STAXWEDGE		0.71 [7.99]		0.89 [9.15]		0.55 [6.14]
ln BENEFIT	0.019 [0.24]	0.21 [2.65]	0.077 [0.77]	0.32 [3.68]	-0.096 [-1.17]	0.0558 [0.65]
ILOCONV	0.0068 [4.93]	0.0056 [4.52]	0.0074 [4.18]	0.0055 [3.55]	0.0066 [5.26]	0.0059 [4.96]
ln COORDINATION	-0.83 [-9.50]	-0.92 [-10.27]	-0.76 [-7.42]	-0.88 [-9.15]	-0.91 [-10.62]	-0.97 [-10.55]
DENSITY	0.0027 [2.10]	0.006 [4.91]	-0.0005 [-0.33]	0.003 [2.61]	0.0058 [4.18]	0.008 [5.72]
UNCOV						
ln INFL	-0.043 [-1.68]	-0.094 [-2.25]	-0.045 [-1.78]	-0.11 [-2.57]	-0.057 [-1.84]	-0.093 [-2.13]
DUMMIES for years	yes	yes	yes	yes	yes	yes
n	106	106	101	101	101	101
R <sup>2</sup>	0.73	0.75	0.73	0.78	0.72	0.71
RMSE	0.269	0.258	0.307	0.275	0.267	0.273
METHOD	INST	INST	H-W	INST	INST	INST

Dependent variables are in logarithmic form.

t-statistics in paranthesis

INST: estimation with instruments

Table 3/B  
**Regressions for the unemployment rates**  
Equations

Dependent variables	[1]	[2]	[3]	[4]
	long term un. traditional	long term un. subjective	long term un. traditional	long term un. subjective
Explanatory var.				
In TAXWEDGE	1.43 [3.81]		0.43 [2.16]	
In STAXWEDGE		1.38 [6.06]		0.7 [4.64]
In BENEFIT	0.15 [0.95]	0.53 [3.33]	0.088 [0.66]	0.35 [2.79]
ILOCONV	0.018 [5.45]	0.013 [4.43]	0.013 [5.36]	0.011 [4.88]
In COORDINATION	-1.09 [-4.88]	-1.35 [-5.90]	-1.31 [-8.42]	-1.4 [-8.74]
DENSITY	0.0006 [0.84]	0.0044 [2.31]	0.003 [1.62]	0.005 [3.06]
UNCOV			0.82 [8.13]	0.64 [6.81]
In INFL	-0.16 [-2.46]	-0.28 [-3.43]	-0.12 [-2.74]	-0.19 [-3.61]
DUMMIES for years	yes	yes	yes	yes
n	103	103	103	103
R <sup>2</sup>	0.71	0.78	0.83	0.87
RMSE	0.536	0.459	0.399	0.363
METHOD	INST	INST	INST	INST

Dependent variables are in logarithmic form.

t-statistics in paranthesis

INST: estimation with instruments

Table 4/A  
**Regressions for the total employment rate**  
Equations

Dependent variables	[1] total emp.	[2] total emp.	[3] total emp.	[4] total emp.
Tax rate	traditional	subjective	subjective	subjective
Explanatory var.				
ln TAXWEDGE	-5.6 [-4.11]			
ln STAXWEDGE		-6.2 [-5.65]	-8.5 [-8.48]	
ln CORPTAX	-3.2 [-3.61]			
ln SCORPTAX		-3.8 [-5.05]		-6.2 [-7.21]
ln BENEFIT	3.5 [2.65]	0.67 [0.65]	0.7 [0.63]	2.25 [1.96]
ILOCONV	-0.065 [-3.23]	-0.046 [-2.67]	-0.043 [-2.43]	-0.069 [-4.19]
COORDINATION	2.85 [10.12]	2.92 [2.08]	3.1 [11.14]	2.6 [9.95]
DENSITY	-0.006 [-0.295]	-0.029 [-1.75]	-0.013 [-0.72]	-0.041 [-2.30]
UNCOV	-6.75 [-11.97]	-4.9 [-8.86]	-4.8 [-7.78]	-6.7 [-10.67]
ln INFL	-0.58 [-1.42]	0.4 [1.14]	0.38 [1.10]	-0.25 [-0.58]
DUMMIES for years	yes	yes	yes	yes
n	114	114	114	114
R <sup>2</sup>	0.7833	0.86	0.84	0.83
RMSE	3.99	3.24	3.43	3.57
METHOD	INST	INST	INST	INST

t-statistics in paranthesis

INST: estimation with instruments

**Table 4/B**

**Regressions for the female employment rates**

Equations

Dependent variables	[1] female emp.	[2] female emp.	[3] female emp.	[4] female emp.
Tax rate	traditional	subjective	subjective	subjective
Explanatory var.				
ln TAXWEDGE	-0.3 [-0.158]			
ln STAXWEDGE		-3.9 [-2.24]	-8.1 [-4.71]	
ln CORPTAX	-5.3 [-4.55]			
ln SCORPTAX		-7 [-5.0]		-8.4 [-6.04]
ln BENEFIT	5.4 [2.70]	2.2 [1.37]	2.4 [1.18]	3.2 [1.93]
ILOCONV	-0.1 [-3.38]	-0.07 [-2.71]	-0.07 [-2.41]	-0.09 [-3.41]
COORDINATION	3 [7.15]	3.1 [8.57]	3.4 [7.8]	3 [8.15]
DENSITY	0.044 [1.54]	0.026 [0.99]	0.055 [1.89]	0.019 [0.72]
UNCOV	-9.4 [-11.58]	-6.8 [-7.86]	-6.7 [-6.52]	-7.9 [-9.87]
ln INFL	-0.55 [-0.905]	0.63 [1.18]	0.59 [1.09]	0.23 [0.394]
DUMMIES for Years	yes	yes	yes	yes
n	114	114	114	114
R <sup>2</sup>	0.72	0.79	0.76	0.79
RMSE	5.8	5	5.4	5.1
METHOD	INST	INST	INST	INST

t-statistics in paranthesis

INST: estimation with instruments

**Table 4/C**  
**Regressions for the male employment rate**  
Equations

Dependent var.	[1] male emp.	[2] male emp.	[3] male emp.	[4] male emp.
Tax rate	traditional	subjective	subjective	subjective
Explanatory var.				
ln TAXWEDGE	-9.7 [-7.84]			
ln STAXWEDGE		-7.6 [-7.15]	-7.9 [-8.71]	
ln CORPTAX	-0.97 [-0.905]			
ln SCORPTAX		-0.57 [-0.489]		-3.5 [-3.64]
ln BENEFIT	1.7 [1.69]	-0.5 [0.534]	-0.5 [-0.528]	1.4 [1.31]
ILOCONV	-0.04 [-3.04]	-0.033 [-2.73]	-0.033 [-2.72]	-0.06 [-4.78]
COORDINATION	2.38 [10.55]	2.38 [10.87]	2.4 [10.96]	2 [6.81]
DENSITY	-0.06 [-3.22]	-0.086 [-4.59]	-0.08 [-4.79]	-0.1 [-4.96]
UNCOV	-3.6 [-7.59]	-2.7 [-5.053]	-2.7 [-5.02]	-4.9 [-8.1]
ln INFL	-0.76 [-2.31]	-0.066 [-0.207]	-0.07 [-0.219]	-0.87 [-2.11]
DUMMIES for years	yes	yes	yes	yes
n	114	114	114	114
R <sup>2</sup>	0.77	0.8	0.8	0.73
RMSE	3.31	3.1	3.1	3.6
METHOD	INST	INST	INST	INST

Table 5

**Regressions for the self-employment rates**  
Equations

Dependent variables	[1] self-emp. with unpaid f.w.	[2] self-emp. with unpaid f.w.	[3] self-emp. without un.f.w.	[4] self-emp. without un.f.w.
Tax rate	traditional	subjective	traditional	subjective
Explanatory var.				
ln TAXWEDGE	3.4 [2.49]		2.7 [2.22]	
ln STAXWEDGE		2.4 [2.71]		1.7 [2.08]
ln CORPTAX	2.7 [2.18]		2.1 [2.95]	
ln SCORPTAX		4.3 [2.92]		3.1 [3.61]
ln BENEFIT	-4.2 [-3.93]	-2.3 [-2.53]	-1.9 [-2.08]	-0.61 [-0.84]
AGR	1.4 [9.30]	1.2 [7.92]	1 [9.74]	1 [8.81]
DUMMIES for years	yes	yes	yes	yes
n	107	107	113	113
R <sup>2</sup>	0.74	0.79	0.7	0.74
RMSE	4.49	4.07	3.7	3.4
METHOD	INST	INST	INST	INST

t-statistics in paranthesis

INST: estimation with instruments

Figure 1 : Employment rates and the subjective tax wedge

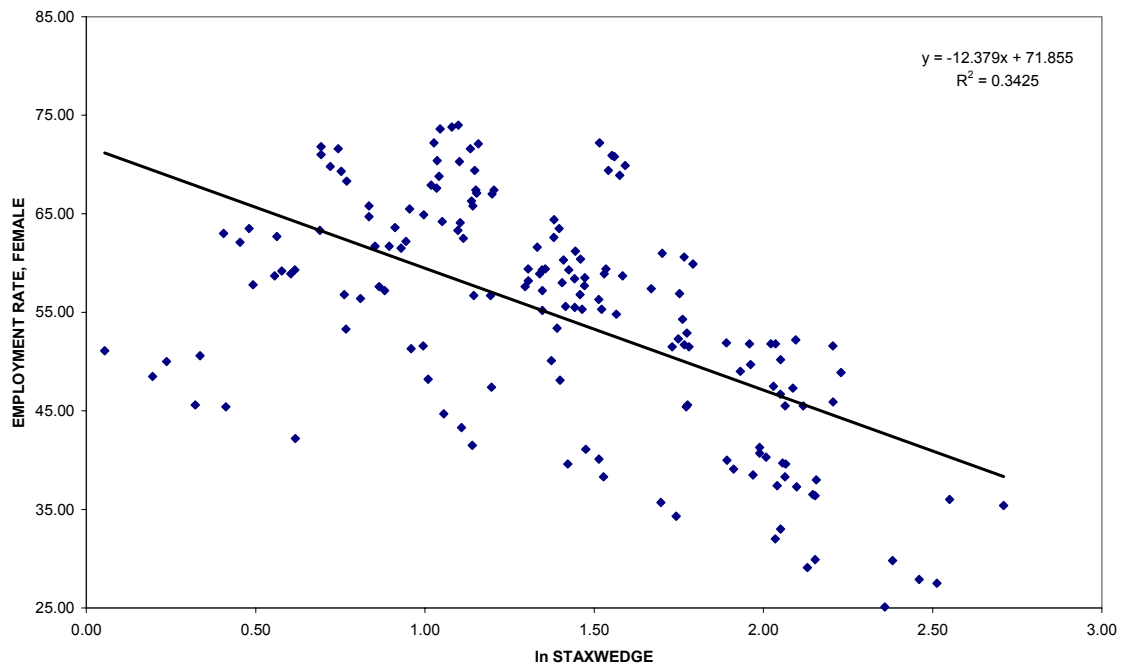
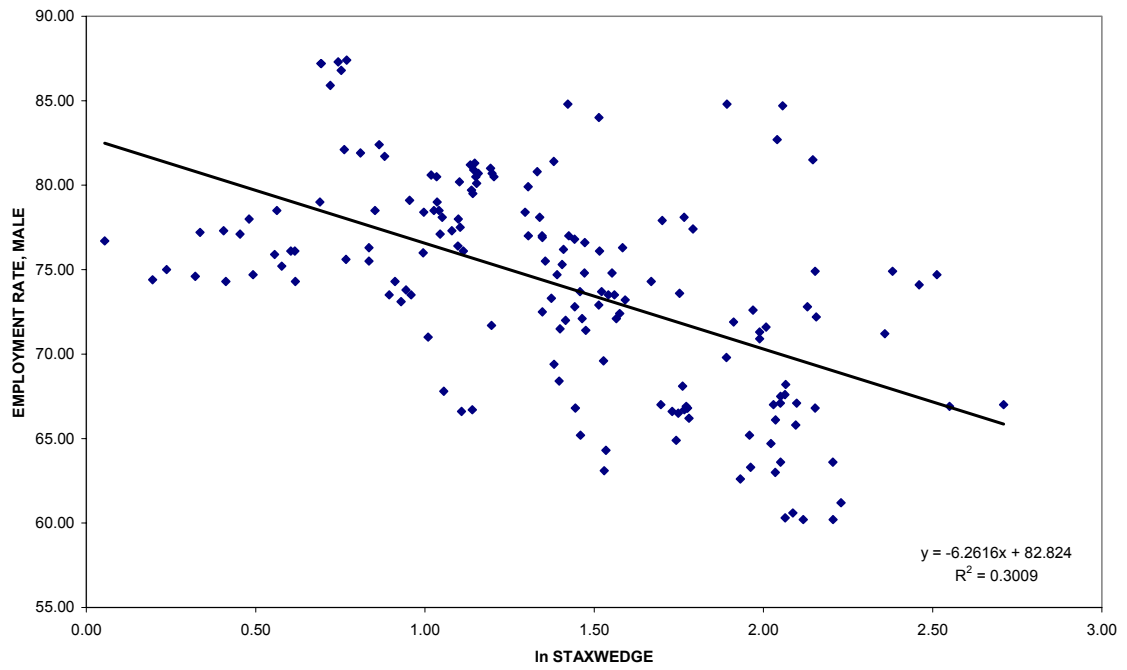
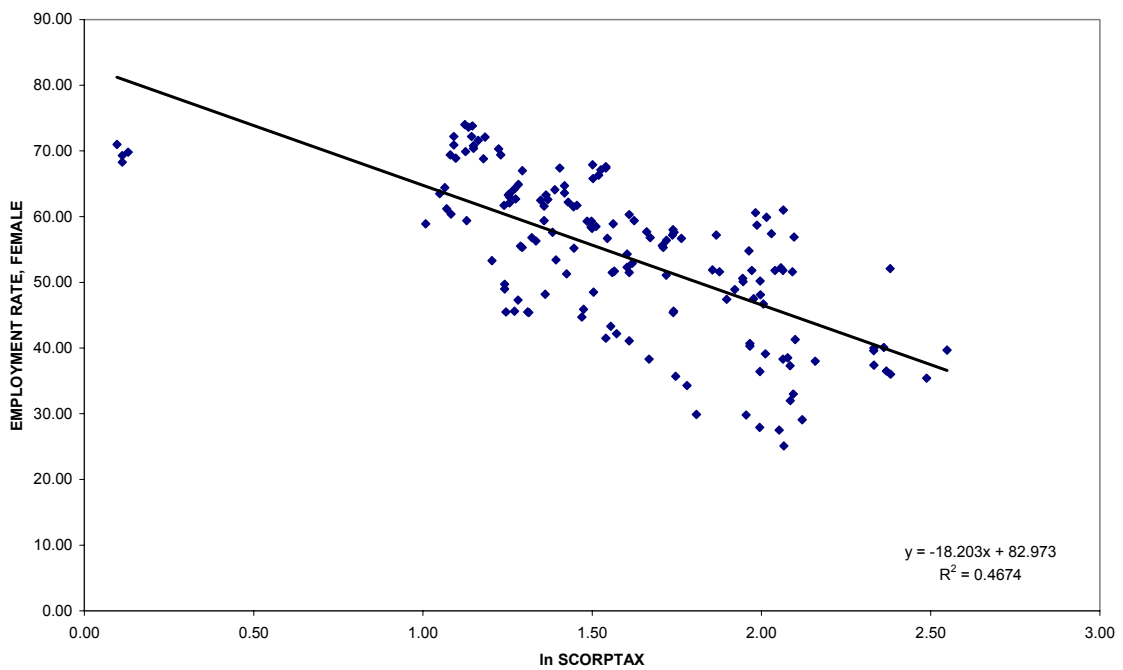
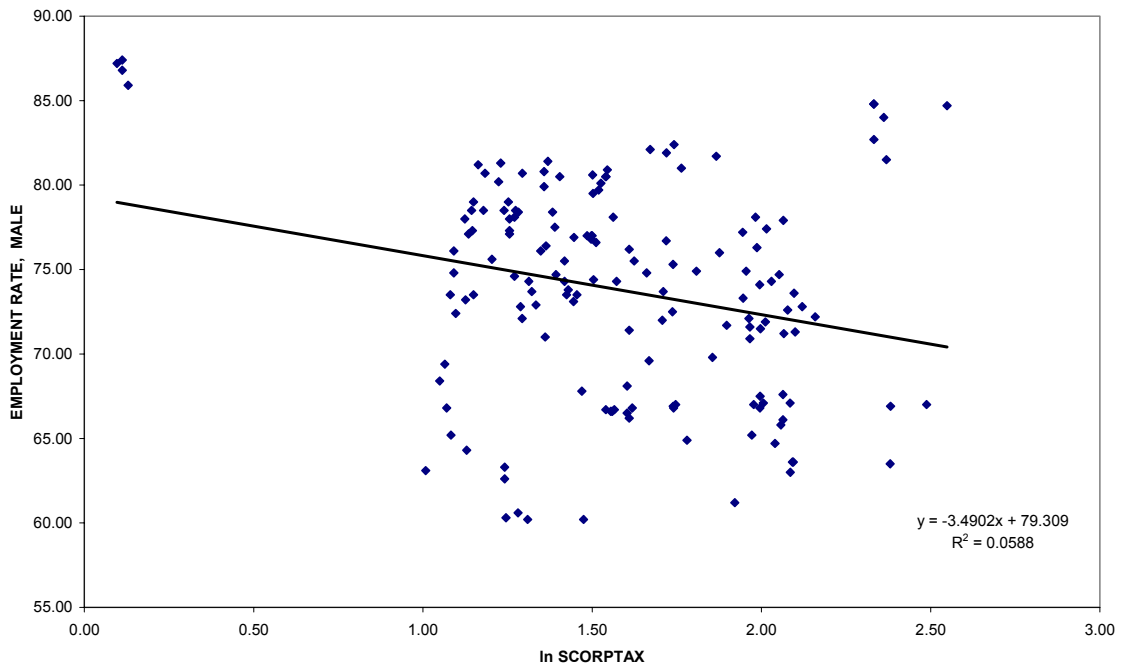




Figure 2 : Employment rates and the subjective corporate tax rate



## **Appendix : Variables, definitions and sources of data**

AGR: agricultural employment rate: ratio of employed persons in agriculture to the total employed people, per cent. Source: KILM (2001); World Development Indicators, 2001.

U: Unemployment rate: ratio of unemployed persons to the relevant labour force, per cent. Source: KILM (2001).

UM: Male unemployment rate: ratio of male unemployed persons to the relevant labour force, per cent. Source: KILM (2001).

UF: Female unemployment rate: ratio of female unemployed persons to the relevant labour force, per cent. Source: KILM (2001).

E: Employment rate: ratio of employed persons to the working age population, per cent. Source: KILM (2001).

EM: Male employment rate: ratio of male employed persons to the working age population, per cent. Source: KILM (2001).

EF: Female employment rate: ratio of female employed persons to the working age population, per cent. Source: KILM (2001).

SELF1: ratio of self-employed with unpaid family workers to the total employment, per cent. Source: KILM (2001).

SELF2: ratio of self-employed to the total employment, per cent. Source: KILM (2001).

INCOMETAX: Top income tax rate, per cent. Source: Friedman et al. (2000).

SINCOMETAX: Subjective income tax rate:

CORPTAX: Statutory corporation tax rate, per cent. Source: Friedman et al. (2000) , KPMG Corporate tax database

SCORPTAX: Subjective corporate tax rate

TAXWEDGE: Tax wedge: Employees' and employers' social security contributions and personal income less transfer payment as a percentage of gross labour costs, paid by one earner married couple at APW wage level. Source: OECD (2001), Taxing Wages.

STAXWEDGE: Subjective tax wedge

CORRUPTION: Corruption Index: level of corruption ranked from a low of 10 to a high of 1. Source: Transparency International.

BENEFIT: OECD summary measure of benefit entitlements: weighted average of the gross replacement rates over seven possible unemployment durations. Source: OECD (2002), Benefit and wages; Vodopivec, Wörgötter and Raju (2005).

ILOCNV: ILO convention: Cumulative number of ILO conventions ratified by the country, based on legal documents. Source: Rama and Actecona (2002).

COORDINATON: Coordination (employers + employees): the degrees of employer and union coordination are ranked from a low of 1 to a high of 3. Source: Riboud et al. (2002).

DENSITY: Union density: percentage of salaried workers that belong to a union. Source: Riboud et al. (2002).

**COVERAGE:** Union coverage index: 1: less than 25% of salaried workers are covered by collective agreements; 2: between 26 and 69% are covered, 3: 70% or more are covered. Source: Riboud et al. (2002).

**INFL:** Inflation rates, per cent. Source: OECD (2000), Economic Outlook.

**EF:** Ethno linguistic fractionalization: Average value of five different indices of ethno linguistic fractionalization. Its value ranges from 0 to 1. Source: La Porta (1999).

**ENGLISH:** Legal origin: Identifies the legal origin of the Company Law or Commercial Code of each country. Source: La Porta et al. (1999).

**PROT:** Protestant religion: The percentage of the population of the country that belongs to the protestant religion. Source: La Porta et al. (1999).

**LAT:** Latitude: The absolute value of the latitude of the country, scaled to take values between 0 and 1. Source: La Porta et al. (1999).

**HIDDEN:** The size of the hidden economy, per cent of official GDP, Source: Schneider (2000, 2002)

**GDP:** GDP/capita: GDP per capita expressed in US dollar at PPP, OECD (2000).

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