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SURVEY
ON THE SHADOW ECONOMY AND
UNDECLARED EARNINGS IN OECD COUNTRIES

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and

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Abstract: *In most OECD countries THE policy instrument of choice to prevent people from working in the shadows has been deterrence. While deterrence is well-founded from a theoretical point of view, the empirical evidence on its success is weak: tax policies and state deregulation appear to work much better. The discussion of the recent literature underlines that in addition economic opportunities, the overall situation in the labor market, and unemployment are crucial for an understanding of the dynamics of the shadow economy.*

JEL-Classification: K42, H26, D78.

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1. INTRODUCTION

For decades fighting tax evasion and the shadow economy has been an important policy goal in OECD countries. In Germany, such activities include the "Law to intensify the fight against black activities and accompanying tax evasion" (SchwarzArbG, Bundesrats-Drucksache 155/04a) passed in 2004 or the raid of German investigators against dishonest taxpayers in Liechtenstein in 2008 (the Zumwinkel affair) or the most recent pressure on Switzerland to extend administrative and legal cooperation to tax evasion (in addition to tax fraud).

Here and elsewhere deterrence appears to be *the* policy instrument of choice, the German "Black Activities' Act" for instance increases punishment of employers and introduces fines of up to € 300.000 misdemeanors for offences against declaration duties. Illegal employment of foreigners can even lead to imprisonment from one to six years depending on the severity of the offence and other circumstances.

However, German policy against the shadow economy also comprises positive measures like a reduction of the tax burden for low income people who presumably work more intensively in the underground economy. The mini job legislation, for example, requires employers of people who earn up to 400 € per month to pay social security contributions and taxes of only 30.1 percent without the usual 50 percent split between employer and employee. There are further reductions of these contributions in the case of private households who can also deduct some of their expenses for housekeeping from their income tax bases. Further tax deductions have been introduced for craftsmen expenses allowing the deduction of 20 percent of expenses up to 1200 € which implies a tax bonus of up to 6000 € of labor costs (including VAT).

Similar legal measures have been enacted by the Swiss federal government in connection with the Swiss "Black Activities' Act" of 2008 and most EU countries as well (Williams, Horlings and Renooy 2008), but up to date, the success of these policies has not been evaluated properly. In this paper we take stock of the recent research in order to shed some light on the debate about success and failure of the policies to fight the shadow economy. This research more heavily relies on questionnaires and surveys than has been previously done and thus allows for a closer look on the influence of deterrence, tax policies, regulatory policies or tax morale on the probability of individuals to work underground. Such direct estimates of the shadow economy are then put into a wider context by a comparison with estimates from indirect approaches (like the MIMIC approach). Finally, the interactions between the shadow and the official economy are discussed. The overall picture we draw is rather differentiated with respect to policies, but also to the assessment as to how detrimental the shadow economy actually is.

In this survey, we are mainly concerned with the shadow economy, black activities, the underground economy or undeclared earnings. Tax evasion, tax morale or experimental studies on tax compliance are beyond the scope of this paper.[1]

2. DEFINITION AND MEASUREMENT

According to one commonly used definition the shadow economy comprises all currently unregistered productive economic activities:[2] "market-based production of goods and services, whether legal or illegal, that escapes detection in the official estimates of GDP" (Smith 1994, p. 18). This definition is used, e.g., by Feige (1989, 1994), Schneider (1994a, 2003, 2005) and Frey and Pommerehne (1984). A broader definition, taken from Del'Anno (2003), Del'Anno and Schneider (2003) and Feige (1989), is: "…those economic activities and the income derived from them that circumvent or otherwise avoid government regulation, taxation or observation". See also Thomas (1999), Fleming, Roman and Farrell (2000) or Feld and Larsen (2005, p. 25) *Table 1* summarizes such underground activities.

Table 1: A Taxonomy of Underground Economic Activities[1)]

Type of Activity	Monetary Transactions		Non Monetary Transactions	
ILLEGAL ACTIVITIES	Trade with stolen goods; drug dealing and manufacturing; prostitution; gambling; smuggling; fraud; etc.		Barter of drugs, stolen goods, smuggling etc. Produce or growing drugs for own use. Theft for own use.	
	Tax Evasion	Tax Avoidance	Tax Evasion	Tax Avoidance
LEGAL ACTIVITIES	Unreported income from self-employment; wages, salaries and assets from unreported work related to legal services and goods	Employee discounts, fringe benefits	Barter of legal services and goods	All do-it-yourself work and neighbor help

[1)] The table is from Lippert and Walker (1997, p. 5) with additional own remarks.

From *Table 1*, it is obvious that a broad definition of the shadow economy includes unreported income from the production of legal goods and services, either from monetary or

1. See Andreoni, Erard and Feinstein (1998) for the authoritative survey on tax compliance, Feld and Frey (2007) or Kirchler (2007) for broader interdisciplinary approaches, or the papers by Kirchler, Maciejovsky and Schneider (2003), Kastlunger, Kirchler, Mittore and Pitters (2009), Kirchler, Hoelzl and Wahl (2007). The authoritative scientific work on tax morale is by Torgler (2007). See also Torgler (2002) for a survey on experimental studies and Blackwell (2009) for a meta-analysis.
2. Do-it-yourself activities are not included. For estimates of the shadow economy and the do-it-yourself activities for Germany see Bühn, Karmann und Schneider (2009) or Karmann (1986, 1990).

barter transactions – and so includes all productive economic activities that would generally be taxable were they reported to the state (tax) authorities.

This paper uses the following more narrow definition of the shadow economy.[3] The shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities for one or more reasons:

1. to avoid payment of income, value added or other taxes,
2. to avoid payment of social security contributions,
3. to avoid certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and
4. to avoid certain administrative obligations, such as completing statistical questionnaires or other administrative forms.

Thus, we exclude both illegal underground economic activities[4] (drug dealing, etc.) and all household services and production. [5]

Although the issue of the shadow economy has been investigated for a long time, the "appropriate" methodology to assess its scope has not yet been agreed upon.[6] There are basically three methods of assessment:

(1) Direct procedures at a micro level that aim at determining the size of the shadow economy at one particular point in time. An example is the survey method,
(2) Indirect procedures that make use of macroeconomic indicators in order to proxy the development of the shadow economy over time,
(3) Statistical models that use statistical tools to estimate the shadow economy as an "unobserved" variable.

When using survey methods, structured interviews are undertaken (usually face-to-face), in order to minimize the number of respondents dishonestly replying or totally declining answers to sensitive questions. The design of the survey is similar to that of the contingent valuation

3. See also the excellent discussion of the definition of the shadow economy in Pedersen (2003, pp.13-19) and Kazemier (2005a) who use a similar one.
4. With this definition the problem of having classical crime activities included could be avoided, because neither the MIMIC procedure nor the currency demand approach captures these activities: e.g. drug dealing is independent of increasing taxes, especially as the included causal variables are not linked (or causal) to classical crime activities. See e.g. Thomas (1992), Kazemir (2005a, b) and Schneider (2005).
5. For a broader discussion of the definition issue see Thomas (1992), Schneider, Volkert and Caspar (2002), Schneider and Enste (2002, 2006) and Kazemier (2005a, b).
6. For the strengths and weaknesses of the various methods see Bhattacharyya (1999), Breusch (2005a, b), Dell'Anno and Schneider (2009), Dixon (1999), Feige (1989), Feld and Larsen (2005), Giles (1999a, b, c), Schneider (1986, 2001, 2003, 2005, 2006), Schneider and Enste (2000a, b, 2002, 2006), Tanzi (1999), Thomas (1992, 1999).

method (CVM) in environmental economics (Kopp et al. 1997): A first part of the questionnaire aims at shaping respondents' perception as to the issue at hand, in a second part, questions about respondents' activities in the shadow economy are asked, and the third part contains the usual socio-demographic questions.

In the survey studies by Feld and Larsen (2005, 2008, 2010) the interviewers lead up to the sensitive questions by asking respondents about their do-it-yourself activities at home, and then continued to the shadow economy in the following way:

> *"The next questions are about what are popularly called 'black activities'. There is considerable evidence that a large part of the population accept 'black activities' and 'black transactions' – i.e. activities which circumvent the Inland Revenue, where all parties benefit because they do not pay tax or VAT, etc. This can involve 'black activities' which you pay for in cash, but can also include reciprocal favors between friends, acquaintances and family members."*
>
> *"Have you engaged in activities of this kind during the past year?"*

In addition to the survey studies by Merz and Wolff (1993), Feld and Larsen (2005, 2008, 2010) and Enste and Schneider (2006) for Germany, the survey method has also been applied in the Nordic countries and Great Britain (Isachsen and Strøm 1985, Pedersen 2003) as well as in the Netherlands (van Eck and Kazemier 1988, Kazemier 2006). While the questionnaires in these studies are broadly comparable in design, recent attempts by the European Union to provide survey results for all EU member states report difficulties regarding comparability (Renooy et al. 2004, European Commission 2007): the wording of the questionnaires becomes more and more cumbersome depending on the culture of different countries with respect to the underground economy.

The estimation of the shadow economy of highly developed OECD countries (with a stronghold on Austria and Germany) is also based on a combination of the MIMIC procedure and the currency demand method, i.e. a combination of methods (2) and (3).[7] The MIMIC procedure assumes that the shadow economy remains an unobserved phenomenon (latent variable) which can be estimated using quantitatively measurable causes of illicit employment, e.g. tax burden and regulation intensity, and indicators reflecting illicit activities, e.g. currency

7. These methods are presented in detail in Schneider (1994a, b, c, 2005) and Schneider and Enste (2000b, 2002, 2006). Furthermore, these studies discuss advantages and disadvantages of the MIMIC- and the money demand methods as well as other estimation methods for assessing the size of illicit employment; for a detailed discussion see also Feld and Larsen (2005).

demand, official GDP and official working time. A disadvantage of the MIMIC procedure is the fact that it produces only relative estimates of the size and the development of the shadow economy. Thus, the currency demand method[8] is used to calibrate the relative into absolute estimates by using two or three absolute values of the absolute size of the shadow economy.

These two sets of approaches are most widely used in the literature. Although each has its drawbacks, and although biases in the estimates of the shadow economy almost certainly prevail, no better data are currently available. In tax compliance research, the most interesting data are from tax audits by the US Internal Revenue Service (IRS), e.g., its Taxpayer Compliance Measurement Program (TCMP) (Andreoni, Erard and Feinstein 1998). The approach of the IRS is broader in a certain sense as tax evasion from all sources of income is considered, while the two methods discussed before aim at capturing the shadow economy or undeclared work and thus mainly measure tax evasion from labor income. Even the data obtained from the TCMP is biased however because the actually detected tax non-compliance could only be the tip of the iceberg. Although the perfect data on tax non-compliance does therefore not exist, the imperfect data in this area can still provide interesting insights also regarding the size, the development and the determinants of the shadow economy.

3. CAUSES AND COUNTERMEASURES

An important motive for economic agents to engage in the shadow economy is income tax evasion. While the shadow economy and tax evasion are not congruent, activities in the shadow economy in most cases imply the evasion of direct or indirect taxes, so factors affecting tax evasion will most certainly also affect the shadow economy.

According to Allingham and Sandmo (1972) tax compliance depends on its expected costs and benefits. The benefits of tax non-compliance result from the individual marginal tax rate and the true individual income, the portion of individual income generated in the shadow economy being mostly labor income, while capital income is less important. The expected costs of non-compliance derive from deterrence enacted by the state. Tax non-compliance thus depends on the state's auditing activities which raise the probability of detection and the

8. This indirect approach is based on the assumption that cash is used to make transactions within the shadow economy. By using this method one econometrically estimates a currency demand function including independent variables like tax burden, regulation etc. which "drive" the shadow economy. This equation is used to make simulations of the amount of money that would be necessary to generate the official GDP. This amount is then compared with the actual money demand and the difference is treated as an indicator for the development of the shadow economy. On this basis the calculated difference is multiplied by the velocity of money and one gets a value added figure for the shadow economy. See footnote 6 for references discussing this method critically.

fines individuals face when they are caught. As individual morality also plays a role, additional costs could also pertain beyond pure punishment by the tax administration in the form of psychic costs like shame or regret, but also additional pecuniary costs if, e.g., reputation loss results.

Kanniainen, Pääkönen and Schneider (2004) incorporate many of these insights in their model of the shadow economy by also considering labor supply decisions. They hypothesize that ceteris paribus tax hikes unambiguously increase the shadow economy, while the mitigating effect of public goods financed by those taxes depends on the ability to access public goods. Morality is also included in this analysis. But the costs for individual non-compliers resulting from moral norms appear to be mainly captured by state punishment although self-esteem also plays a role.

A shortcoming of these analyses is the neglected endogeneity of tax morale and good governance. To overcome these weaknesses Feld and Frey (2007) argue that tax compliance is the result of a complicated interaction between tax morale and deterrence. While it must be clear to taxpayers what the rules of the game are and as deterrence measures serve as signals for the tax morale a society wants to elicit (Posner 2000a, b), deterrence could also crowd out the intrinsic motivation to pay taxes. Moreover, tax morale is not only increased if taxpayers perceive the public goods received in exchange for their tax payments worth it. It also increases if political decisions for public activities are perceived to follow fair procedures or if the treatment of taxpayers by the tax authorities is perceived to be friendly and fair. Tax morale is thus not exogenously given, but is influenced by deterrence, the quality of state institutions and the constitutional differences among states.

Although this leaves us with a rich set of variables that might influence the size of the shadow economy, it is only the starting point. As labor supply decisions are involved, labor and product market regulations are additionally important. Recent theoretical approaches thus suggest following a differentiated policy to contain the shadow economy's expansion. This cautionary note becomes even stronger when the following empirical evidence is considered:

(i) Deterrence

Despite the strong focus on deterrence both in theory and in policies fighting the shadow economy, there is surprisingly little empirical evidence. In their survey on tax compliance, Andreoni, Erard and Feinstein (1998) report rather small effects. Blackwell (2009) finds strong deterrence effects of fines and audits in experimental tax evasion. Regarding the shadow economy, there is little evidence, however, which might be due to the fact that data

on the legal background and the frequency of audits are not available on an international basis and are difficult to collect even for OECD countries.

A recent study by Feld, Schmidt and Schneider (2007) demonstrates this for Germany. The legal background is quite complicated as fines and punishment differ according to the severity of the offense and true income of the non-complier in addition regional variation on sentences by the courts in different **Länder**. Moreover, the tax authorities at the state level do not reveal how intensively auditing is taking place. With the available data on fines and audits, Feld, Schmidt and Schneider (2007) conduct a time series analysis using the estimates of the shadow economy obtained by the MIMIC approach. According to their results, deterrence does not have a consistent (negative) effect on the German shadow economy. In fact the direction of causation is ambiguous leaving room for an impact of the shadow economy on deterrence instead of deterrence on the shadow economy.

Feld and Larsen (2005, 2008, 2010) follow a different approach by using individual survey data for Germany. After replicating Pedersen (2003), who reports a negative impact of the subjectively perceived risk of detection by state audits on the probability of working in the shadows for the year 2001, they add subjectively perceived measures of fines and punishment. Fines and punishment do not exert a negative influence on the shadow economy in any of the annual waves of surveys, nor in the pooled regressions for the years 2004-2007 (about 8000 observations overall). The subjectively perceived risk of detection has a robust and significant negative impact in individual years only for women. In the pooled sample for 2004-2007, which minimizes sampling problems, the probability of detection has a significantly negative effect on the probability of working in the shadow economy also for men (keeping the one for women) and is robust across different specifications.[9]

Pedersen (2003) reports negative effects of the subjectively perceived risk of detection on the probability of conducting undeclared work in the shadows for men in Denmark in 2001 (marginally significant), for men in Norway in 1998/2002 (highly significant),[10] men and women in Sweden in 1998 (highly significant in the first and marginally significant in the second case), and no significant effect for Great Britain in 2000. Moreover, van Eck and Kazemier (1988) report a significant negative impact of a high perceived probability of detection on participation in the hidden labor market for the Netherlands in 1982/1983. In none of these studies perceived fines and punishments are included as explanatory variables.

9. An earlier study by Merz and Wolff (1993) does not analyze the impact of deterrence on undeclared work.
10. The earlier study by Isachsen and Strøm (1985) for Norway does also not properly analyze the impact of deterrence on undeclared work.

The large scale survey studies on Germany by Feld and Larsen (2005, 2010) thus appear to be the most careful analysis of deterrence effects on undeclared work up to date.

Overall, this is far from convincing evidence on the proper working of deterrence as it is always the combination of audits and fines that matters according to theoretical analysis, but also to pure plausibility arguments. The reasons for the unconvincing evidence of deterrence effects are discussed in the tax compliance literature by Andreoni, Erard and Feinstein (1998), Kirchler (2007) or Feld and Frey (2007). They range from interactions between tax morale and deterrence, thus the possibility that deterrence crowds out tax morale, to more mundane arguments like misperceptions of taxpayers. Likewise, these reasons could be important for the evidence on the deterrence effects on work in the shadow economy. As the latter mainly stems from survey studies, the insignificant findings for fines and punishment may also result from shortcomings in the survey design.

(ii) Tax and Social Security Contribution Burdens

Other than deterrence, tax and social security contribution burdens are almost universally acknowledged to be among the main causes for the shadow economy. See Thomas (1992), Lippert and Walker (1997), Schneider (1994a, b, c, 1997, 1998a, b, 1999, 2000, 2003, 2005, 2009), Johnson, Kaufmann, and Zoido-Lobatón (1998a, b), Tanzi (1999), Giles (1999a), Mummert and Schneider (2001), Giles and Tedds (2002) and Dell'Anno (2003) as more recent studies. Since taxes affect labor-leisure choices and stimulate labor supply in the shadow economy, the distortion of the overall tax burden is a major concern. The bigger the difference between the total labor cost in the official economy and after-tax earnings (from work), the greater the incentive to reduce the tax wedge and to work in the shadow economy. Since the tax wedge depends on the level and increase of the social security burden/payments and the overall tax burden, they are key drivers of the existence and the increase of the shadow economy.

But even tax reforms with major tax rate deductions will not necessarily lead to a substantial decrease of the shadow economy. Schneider (1994a, b, c) for instance shows for Austria that a major reduction in the direct tax burden did not decrease the size of the shadow economy because legal tax avoidance was abolished and other factors, like regulations, were not changed; hence for a considerable part of the taxpayers the actual tax and regulation burden remained unchanged, and often they mainly prevent a further increase. Social networks and personal relationships, high profit from irregular activities and associated investments in real and human capital prevent people from transferring to the official economy. For Canada,

Spiro (1993) found similar reactions of people facing an increase in indirect taxes (VAT, GST).

Additional empirical evidence on the influence of the tax burden on the shadow economy is provided by Schneider (1994c, 2000, 2004, 2005) and Johnson, Kaufmann and Zoido-Lobatón (1998a, b); they report a statistically significant influence of taxation on the shadow economy. For Austria the driving force of the shadow economy is the direct tax burden (including social security payments) followed by the intensity of regulation and complexity of the tax system. Schneider (1986) obtains a similar result for Scandinavian countries (Denmark, Norway and Sweden). In all three countries various tax variables: average direct tax rate, average total tax rate (indirect and direct tax rate) and marginal tax rates have the expected positive effect (on currency demand) and are highly statistically significant. These findings are also supported by Kirchgässner (1983) for Germany and by Klovland (1984) for Norway and Sweden. In the survey studies by Feld and Larsen (2005, 2010), perceived tax rates do not have a robust and significant effect on the probability of engaging in undeclared work. Contrary to deterrence, respondents also had huge difficulties of properly assessing their tax burden.

(iii) Intensity of Regulations

Increased intensity of regulations, for example labor market regulations, trade barriers, and labor restrictions for immigrants. is another important factor which reduces the freedom (of choice) for individuals engaged in the official economy. Johnson, Kaufmann, and Zoido-Lobatón (1998b) find significant empirical evidence of the influence of (labor) regulations on the shadow economy; and the impact is clearly described and theoretically derived in other studies, e.g. for Germany (Deregulierungskommission/ Deregulation Commission 1991).[11] Regulations lead to a substantial increase in labor costs in the official economy. Since most of these costs can be shifted to employees, regulations provide for another incentive to work in the shadow economy where they can be avoided. Johnson, Kaufmann, and Shleifer (1997) predict that ceteris paribus countries with higher general regulation of their economies tend to have a higher share of the unofficial economy in total GDP. They conclude that it is the enforcement and not the overall extent of regulation which is the key factor for the burden levied on firms and individuals which drives firms into the shadow economy. Friedman, Johnson, Kaufmann and Zoido-Lobaton (2000) arrive at a similar conclusion. In their study

11. The importance of regulation on the official and unofficial (shadow) economy is more recently investigated by Loayza, Oviedo and Servén (2005a, b). Kucera and Roncolato (2008) extensively analyze the impact of labor market regulation on the shadow economy. Berthold, Fehn and Thode (2003) analyze the role of regulations for German unemployment.

every available measure of regulation is significantly correlated with the share of the unofficial economy and the estimated sign of the relationship is unambiguous: more regulation always leads to larger shadow economy. These findings show that governments should put more emphasis on improving enforcement of laws and regulations, rather than increasing their number.

(iv) Public Sector Services

An increase of the shadow economy can lead to reduced public revenues from taxes which in turn reduce the quality and quantity of publicly goods and services. Ultimately, this can lead to an increase in the tax rates for firms and individuals in the official sector, quite often combined with a deterioration in the quality of the public goods (such as the public infrastructure) and of the administration, leading to an even stronger incentive to participate in the shadow economy. Johnson, Kaufmann, and Zoido-Lobatón (1998a, b) present a simple model of this relationship. According to their findings smaller shadow economies occur in countries with higher tax revenues achieved by lower tax rates, fewer laws and regulations and less bribery facing enterprises. Countries with a better rule of law, which is financed by tax revenues, also have smaller shadow economies. Transition countries have higher levels of regulation leading to a significantly higher incidence of bribery, higher effective taxes on official activities and a large discretionary framework of regulations and consequently a higher shadow economy. Their overall conclusion is that "wealthier countries of the OECD, as well as some in Eastern Europe, find themselves in the 'good equilibrium' of relatively low tax and regulatory burden, sizeable revenue mobilization, good rule of law and corruption control, and a [relatively] small unofficial economy. By contrast, a number of countries in Latin American and the former Soviet Union exhibit characteristics consistent with a 'bad equilibrium': tax and regulatory discretion and burden on the firm is high, the rule of law is weak, and there is a high incidence of bribery and a relatively high share of activities in the unofficial economy." (Johnson, Kaufmann and Zoido-Lobatón 1998a, p. I).

(v) Other Public Institutions

Quality of public institutions is another key factor of the development of the informal sector. Johnson et al. (1998a, b), Friedman et al. (2000), Dreher and Schneider (2009), Dreher, Kotsogiannis and Macorriston (2007, 2009) argue that the efficient and discretionary application of tax systems and regulations by government may play a crucial role in the decision of conducting undeclared work, even more so than the actual burden of taxes and regulations. In particular, corruption of bureaucracy and government officials seems to be

associated with larger unofficial activity, while a good rule of law by securing property rights and contract enforceability, increases the benefits of being formal.

Hence, it is important to analyze theoretically and empirically the effect of political institutions like the federal political system on the shadow economy. If the development of the informal sector is considered as a consequence of the failure of political institutions in promoting an efficient market economy, then the effect on institutions of the individual's incentive to operate unofficially can be assessed. In a federal system, competition among jurisdictions and the mobility of individuals act as constraints on politicians because "choices" will be induced that provide incentives to adopt policies which are closer to a majority of voters' preferences. Frequently efficient policies are characterized by a certain level of taxation, mostly spent in productive public services. In fact, the production in the formal sector benefits from a higher provision of the productive public services and is negatively affected by taxation, while the shadow economy reacts in the opposite way. As fiscal policy gets closer to a majority of voters' preferences in federal systems, the size of the informal sector goes down. This leads to the hypothesis that the size of the shadow economy should be lower in a federal system than in a unitary state, ceteris paribus.

(vi) Tax Morale

In addition to the direct incentives discussed before, the efficiency of the public sector has an additional indirect effect on the size of the shadow economy because it affects tax morale. According to Feld and Frey (2007) tax compliance is driven by a psychological tax contract that entails rights and obligations from taxpayers and citizens on the one hand, but also from the state and its tax authorities on the other hand. Taxpayers are more heavily inclined to pay their taxes honestly if they get valuable public services in exchange. However, taxpayers are honest even in cases when the benefit principle of taxation does not hold, i.e. for redistributive policies, if the political decisions underlying such policies follow fair procedures. Finally, the treatment of taxpayers by the tax authority plays a role. If taxpayers are treated like partners in a (tax) contract instead of subordinates in a hierarchical relationship, taxpayers will stick to their obligations of the psychological tax contract more easily. Kirchler (2007) presents another comprehensive discussion of the influence of such factors on tax compliance.

Regarding the impact of tax morale on the shadow economy, there is scarce and only recent evidence. Using data on the shadow economy obtained by the MIMIC approach, Torgler and Schneider (2009) report the most convincing evidence for a negative effect of tax morale. They particularly address causality issues and establish a causal negative relation from tax

morale to the size of the shadow economy. This effect is also robust to the inclusion of additional explanatory factors and specifications, and also in line with earlier evidence by Körner et al. (2006). Using survey data, Feld and Larsen (2005, 2010) likewise report a robust negative effect of tax morale in particular and social norms in general on the probability of respondents to conduct undeclared work. Interestingly, the estimated effects of social norms are quantitatively more important than the estimated deterrence effects. Van Eck and Kazemier (1988) also report a significant effect of tax morale on the participation in the hidden labor market.

(vii) Summary of the Main Causes of the Shadow Economy

Table 2 summarizes the various factors driving the shadow economy. It is based on studies using the MIMIC and currency demand approach. As there is no evidence on deterrence using this approach – at least with respect to the broad panel data base on which this table draws – this policy variable does not show up. This is an obvious but unavoidable shortcoming due to the lack of internationally comparable deterrence data. In *Table 2* two columns are presented, showing the various factors influencing the shadow economy with and without the independent variable, "tax morale". This table clearly demonstrates that the increase of tax and social security contribution burdens is by far the most important single contributor to the increase of the shadow economy. This factor does explain some 35–38% or 45–52% of the size of the shadow economy with and without including the variable "tax morale". The variable tax morale accounts for some 22–25% of the size of the shadow economy,[12] there is a third factor, "quality of state institutions", accounting for 10-12% and a fourth factor, "intensity of state regulation" (mostly for the labor market) for 7-9%. In general *Table 2* shows that the independent variables tax and social security burden, followed by variables tax morale and intensity of state regulations are the three major driving forces of the shadow economy.

The few studies based on survey data do not allow for a similar table due to the low number of observations, but also due to some still open questions on sampling, randomization and questionnaire design. For example, the problem as to how an accessible formulation of questions regarding marginal tax burdens could look like is still not resolved. Aside socio-demographic factors, it is safe to conclude however that social norms and the individually perceived probability of detection are the two most important influential factors to explain

12. The importance of this variable with respect to theory and empirical relevance is also shown in Frey (1997), Feld and Frey (2002a, b, 2007) and Torgler and Schneider (2009).

participation in the shadow economy. Comparing these two, the evidence lends towards a relatively stronger influence of social norms.

Table 2: Main Causes of the Increase of the Shadow Economy

Factors influencing the shadow economy	Influence on the shadow economy (in %)	
	(a)	(b)
(1) Increase of the Tax and Social Security Contribution Burdens	35-38	45-52
(2) Quality of State Institutions	10-12	12-17
(3) Transfers	5-7	7-9
(4) Specific Labor Market Regulations	7-9	7-9
(5) Public Sector Services	5-7	7-9
(6) Tax Morale	22-25	-
Influence of all Factors	84-98	78-96

(a) Average values of 12 studies.
(b) Average values of empirical results of 22 studies.
Source: Schneider (2005)

4. DIRECT EMPIRICAL EVIDENCE FOR GERMANY AND AUSTRIA

4.1. Germany

The previous section highlights the importance of the perception of taxpayers about the shadow economy and their (moral) reaction to this phenomenon: Under which circumstances do people decide to work in the shadow economy? This section summarizes some results for Germany from Halla and Schneider (2005), Torgler (2002), Torgler and Schneider (2005, 2009), Feld and Frey (2002a, b, 2007) and Feld and Larsen (2005).

Table 3: Work in the Shadow Economy – Survey Results for 2007

(1) Do you work regularly in the shadow economy?	Values in percent
No	77.3
Yes	20.7
	(25% male, 16% female)
No answer	2.0
(2) Do you regularly demand shadow economy activities?	Values in percent
No	69.2
Yes	30.8
	(35.4% male, 26.5% female)

Representative questionnaire, Germany, January 2007, error margin +/- 1.8 percentage points, *Source*: IW Köln, Germany

Table 3 indicates for the year 2007 to what extent people *regularly* work in the shadow economy. 20.7% of German respondents admit working in the shadows, and 30.8% of respondents regularly demand shadow economy activities.

Table 4: Reasons for Shadow Economy Activities – Survey Results for Germany, January 2007

Reasons why shadow economy activities are demanded	Values in percent
(1) One saves money – or they are much cheaper than the official ones	90%
(2) The tax and social security burden is much too high	73%
(3) Due to the high labor costs in the official economy one would not demand these activities (extreme assumption: *no shadow economy – 22% demand in the official economy; 30% do-it-themselves; and 48% no demand at all!*)	68%
(4) The firms offer them themselves	52%
(5) It's so easy to get quick and reliable workers	31%

Representative questioning, Germany, January 2007, error margin +/- 1.8 percentage points, *Source*: IW Köln

Table 4 shows why shadow economy activities are demanded. The most important result is that it is possible to save money – or: shadow economy activities are much cheaper than the official ones. The second most important reason is that tax and social security burdens are too high (73% of the respondents) and reason number 3 is that due to the much higher labor costs in the official economy these regular services are priced out of the market. Especially the third answer is interesting, because it indicates that only 22% of the demand of the shadow economy have substitutive character (i.e. they would be demanded in the official economy if there were no shadow economy) and 30% of the respondents would do it themselves. From this survey the conclusion emerges that about 48% of these activities would not take place if there were no shadow economy.

Table 5: Hourly Wage Rates of Shadow Economy Activities – Survey Results for Germany, 2004

Activity/Type of Worker	Town/Area	Wage rate in the shadow economy (in €) per hour	Wage rate in the official economy (in €) per hour
Painter	Berlin München Rhein/Ruhr	10 – 17 9 – 15 10 – 12	42
Mechanics	Hamburg Berlin München	13 – 23 15 – 19 15 – 23	58
Cost of moving household furniture and other goods (distance 300km)	Berlin München Rhein/Ruhr	300 – 380 400 – 450 350 – 420	1.800

Representative questioning, May 2003, error margin +/- 5%, *Source*: Schneider (2004)
1) complete (total) costs

Table 5 shows examples of hourly wage rates of shadow economy activities in Germany What is surprising here is the huge range of wage rates in the shadow economy, for example the varying "price" for an hour of shadow market work by a painter ranges from € 9 to € 17. *Table 5* demonstrates also the large difference (a factor between 4 and 5) between the wage rates in the shadow and in the official economy.

Table 6: Participation in Shadow Economy in Germany, 2001 - 2006

Carried out black activities within the last 12 months

	Participa-tion rates	Hours: minutes per week
2001	10.4	8 : 14
2004	8.8	7 : 30
2005	11.1	6 : 40
2006	7.2	7 : 16

Notes: 18-74-year olds
Source: Feld and Larsen (2008)

The survey results by Feld and Larsen (2005, 2008) reveal smaller participation rates in the unofficial economy for the years 2001, 2004, 2005 and 2006 than those reported by the IW Köln for 2007, probably due to a more conservative approach in the face-to-face interviews as described above. These surveys asked who has carried out black activities *during the last 12 months*. The results are reported in *Table 6*. In 2001, 10.4 percent of the respondents answered yes. This share decreased to 8.8 percent in 2004 only to increase to 11.1 percent the year after and then decrease again to 7.2 percent in 2006. It thus looks as if the participation rate varies around an average which would be almost exactly one in ten which is half the figure of the IW Köln.

Regarding the socio-demographic distribution of the participation rates interesting differences can be observed. As *Table 7* shows, working in the shadow economy is more widespread among men than among women, among the young than among the old, among skilled workers and self-employed than among unskilled workers and salaried employees. The variation in the figures across time also reflects the sampling problems mentioned before.

Table 8 contains the average black hourly wages for the period 2001 to 2006. These average wages are in line with those reported in *Table 5*. But they give a more comprehensive assessment as the amounts are calculated for all Germany and for all occupations. Given the small number of observations in the quid pro quo case the higher volatility does not play an important role for the overall wages. Interestingly, the black hourly wages remain relatively constant across time and they underline the strong differences to hourly wages in the regular economy as indicated for some examples on *Table 5*.

Table 7: Proportion Who Has Carried Out Shadow Economy within the Last 12 Months by Gender, Age, and Occupation

	Carried out black activities			
	2001	2004	2005	2006
	%			
Men	14.5	13.4	13.9	9.0
Women	6.5	4.5	8.5	5.3
18-19-year-olds	16.6	24.3	13.9	8.8
20-29-year-olds	19.1	13.4	21.0	11.1
30-39-year-olds	13.2	12.2	13.3	11.2
40-49-year-olds	10.0	10.3	9.4	4.8
50-59-year-olds	7.4	5.1	8.5	7.6
60-69-year-olds	5.6	2.6	8.2	4.3
70-74-year-olds	1.0	3.0	2.9	1.3
Self-employed/ assisting spouse	12.1	1.7	9.9	16.2
Salaried employees	7.1	8.9	10.2	5.0
Skilled workers	19.2	16.6	13.8	13.7
Unskilled workers	8.2	8.9	14.0	6.9
Unemployed	20.7	17.1	19.1	7.0
Pensioners	4.2	3.6	6.3	3.2
Students	27.3	14.6	15.3	8.2
Other	8.7	6.1	10.8	6.3
Total	10.4	8.8	11.1	7.2
No. of persons	5,686	2,143	2,144	1,083

Note: 18-74-year-olds
Source: Feld and Larsen (2008).

Finally, *Table 9* compares the size of the German shadow economy, using the survey and the MIMIC method, undertaken with the data by IW Köln. Also an attempt is made to explain the frequent, large differences between the survey method and the MIMIC and/or currency demand approach. According to the latter the size of the German shadow economy in 2006 is 15 percent of "official" GDP. Using the survey method, values between 5 and 6 percent obtain. Hence, there is quite a huge difference. Using the figures by Feld and Larsen (2005, 2008), the implied GDP share of undeclared work is even smaller at between 3 and 4 percent (see *Table 12*).

Table 8: Average Black Hourly Wages by Form of Payment

	2001	2004	2005	2006
		Euro[1)]		
Cash	9.5	10.2	9.0	9.2
Quid pro quo[2)]	11.0	10.4	16.9	13.4
Cash and quid pro quo[2)]	10.4	10.5	10.5	10.5
Total	10.3	10.4	13.3	11.8

Notes: 18-74-year-olds who have carried out black activities within the last 12 months 1) 2001: DM converted to Euro by using the average synthetic exchange rate. 2) Quid pro quo: hypothetical wages.
Source: Feld and Larsen (2008).

The explanation of those differences originates from the survey method: Usually not the total overall value added is recorded, but only the value added of undeclared work. If material is added, another 3-4 percent comes up. Moreover, other illegal activities (prostitution and

illegally working firms in the construction sector) must be considered such that another 4-5 percentage points of official GDP is gained. Finally, the statistical offices when calculating the official national accounts (also in Germany) add (or include) some shadow economy activities in the "official" GDP. Thus another 1-2 percent of black activities from official GDP are obtained which sums up to about 15 percent. If these different kinds of shadow activities in percent of overall shadow economy activities are calculated, undeclared work has the biggest share of between 33 and 40 percent, followed by other illegal activities in the shadow economy with between 25 and 35 percent. The MIMIC cum currency demand approach and the survey approach can thus be reconciled with each other.

Table 9: A Comparison of the Size of the German Shadow Economy Using the Survey and the MIMIC-Method, year 2006

Various kinds of shadow economy activities/values	Shadow Economy in % of official GDP	Shadow Economy in bill. Euro	% share of the overall shadow economy
(1) Survey method: Shadow economy activities (based on "black" hours worked)	5.0 – 6.0	117 – 140	33 – 40
(2) Material (used)	3.0 – 4.0	70 – 90	20 – 25
(3) Illegal activities (goods and services)	4.0 – 5.0	90 – 117	25 – 33
(4) already in the official GDP included illegal activities	1.0 – 2.0	23 – 45	7 - 13
Sum (1) to (4)	13.0 – 17.0	300 – 392	85 – 111
Overall (total) shadow economy (estimated by the MIMIC and calibrated by the currency demand procedure)	15.0	340	100

Source: Enste and Schneider (2006) and own calculation.

4.2. Austria

A representative survey of the population by Schneider (2002) asked for the attitudes of the Austrian public towards the shadow economy and estimated the size of the shadow economy in the construction and craftsman sector (including repairing). Three groups of respondents were asked: A representative sample of the Austrian population between 16 and 65 years old, 55 self-declared shadow economy workers in the construction and craftsmen sector, and 320 managers (owners) of construction and craftsmen firms.

The following results were obtained: There are 918,000 Austrians who supplied shadow economy activities in the construction and craftsmen sector. Their average hourly earnings in the shadow economy varied between €15.30 and €15.60, and the average yearly income from shadow economy activities varied between €1,117.00 and €1.142.00. This means that 73 hours per year were spent working in the shadow economy. Among the 55 self-declared shadow economy workers a wage rate of €11.50 per hour and annual earnings in the shadow

economy of €2,480.00 were reported using the fact that these groups worked 245 hours per year in the shadow economy. Managers (owners) of construction and craftsmanship firms report a wage rate for shadow economy workers of €17 per hour and average earnings per year of €4,590.00, assuming that 270 hours per year were used for shadow economy activities by their employees/workers. 62% of the managers acknowledge that a large percentage of their employees work in the shadow economy. 7% of the managers think that their employees work between 0 and 2 hours per week in the shadow economy; 29% assume that they work between 6 and 10 hours, 28% between 3 and 5 hours and 14% think that their employees work more then 10 hours per week in the shadow economy; 22% of all managers have no knowledge of this fact. 39% of managers are not in favor (do not support) moonlighting by their workers but 61% are in favor (do support).

Table 10 presents the aggregate values of the size of the shadow economy in the construction and craftsmen sector in the year 2002, based on these questionnaires. It clearly demonstrates that the size of the shadow economy in the construction and craftsmen sector varies considerably from a total value of €2.6 billion up to €4.2 billion. These differences originate from different hourly wages rates, ranging from €11.50 to €17 and from the different amount of hours worked per year in the shadow economy ranging from 245 to 270. Hence the survey method "covers" between 31.2% and 50.9 % of the value obtained by a macro (MIMIC) approach. These results still leave a considerable leeway, but the rather large differences may be explained by the following facts: *Table 10* contains earnings and not the value added of the shadow economy. Shadow economy demanders are overwhelmingly households, the whole area of the shadow economy activities between firms (which are especially a problem in the construction and craftsmen sectors) are not considered. All foreign shadow economy activities achieved by foreigners (illegal immigrants) are not considered. The amount earned in the shadow economy (hourly wage rates and hours worked per year) varies considerably.

Table 10: Size of the Supplied Shadow Economy in the Construction and Craftsmen Sector, Austria 2002, Based on the Questionnaire Findings

Variable/Indicator	Questioned people			
	results from declared moonlighters[1)] (1)	results from managers of construction and craftsmen firms[1)] (2)	results from declared moonlighters[1)] (3)	results from managers of construction and craftsmen firms[1)] (4)
∅ *amount of hours* worked in the shadow economy *per year* per worker[1)]	245	245	270	270
∅ *hourly* shadow economy wage rate	€11.5	€17	€11.5	€17
∅ average *yearly* earning	€2,814	€4,165	€3,105	€4,590
∅ *aggregated* yearly amount of hours worked in the shadow economy 1)	225.1 million	225.1 million	248.1 million	248.1 million
Total earnings of the shadow economy in the year 2002	€2,588.65 million	€3,826.7 million	€2,853.15 million	€4,217.7 million
Total shadow economy earnings in % of the value added of the shadow economy in the construction and craftsmanship sector (including repairing); absolute value €8,284 billion in 2002	31.2	46.1	34.4	50.9

[1)] As the amount of hours worked varied considerably between the lower (245 hours per year) bound and the upper bound (270 hours per year), both values have been used for both groups.

[2)] Basis of the calculation: 918,000 (part-time) shadow economy workers in the construction and craftsmen sector. The figure is calculated from the survey results, error margin +/- 2.2 percentage points.

Source: Own calculations.

5. INDIRECT EMPIRICAL EVIDENCE FOR OTHER OECD COUNTRIES

5.1. Econometric Estimation

The theoretical considerations in section 2 suggest seven hypotheses below, all ceteris paribus, which will be empirically tested subsequently using the MIMIC approach:

1. An increase in direct and indirect taxation increases the shadow economy;
2. An increase in social security contributions increases the shadow economy;
3. The more the country is regulated, the greater the incentives is to work in the shadow economy;
4. The lower the quality of state institutions, the higher the incentives to work in the shadow economy;
5. The lower tax morale, the higher the incentives to work in the shadow economy;
6. The higher unemployment, the more people engage in shadow economy activities;
7. The lower GDP per capita in a country, the higher is the incentive to work in the shadow economy.

The sample consists of 21 highly developed OECD countries between 1990 and 2005 (pooled cross section time series data). Due to lack of data, the effect of deterrence cannot be empirically tested. The size of fines and punishment and the probability of detection are only available for one or two countries across time. The following estimation results thus rather correspond to the factors reported in *Table 2*.

Table 11: MIMIC Estimation of the Shadow Economy of 21 Highly Developed OECD Countries, 1990/91, 1994/95, 1997/98, 1999/2000, 2001/02, 2002/03, 2003/04 and 2004/05.	
Cause Variables	**Estimated Coefficients**
Share of direct taxation (in % of GDP)	λ1 = 0.384** (3.06)
Share of indirect taxation (in % of GDP)	λ2 = 0.196(*) (1.84)
Share of social security contributions (in % of GDP)	λ3 = 0.506** (3.86)
Burden of state regulation (index of labor market regulation, Heritage Foundation, score 1 least regular, score 5 most regular)	λ4 = 0.213(*) (1.96)
Quality of state institutions (rule of law, World Bank, score -3 worst and +3 best case)	λ5 = -0.307* (-2.61)
Tax morale (WVS and EVS, Index, Scale tax cheating always justified =1, never justified =10)	λ6 = -0.582** (-3.66)
Unemployment rate (%)	λ7 = 0.324** (2.61)
GDP per capita (in US-$)	λ8 = -0.106** (-3.04)
Indicator Variables	**Estimated Coefficients**
Employment rate (in % of population 18-64)	λ 9= -0.626** (-2.72)
Average working time (per week)	λ10 = -1.00 (Residuum)
Annual growth rate of GDP (adjusted for the mean of all 22 OECD countries)	λ11 = -0.274** (-3.03)
Change of local currency per capita	λ12 = 0.312** (3.74)
Test-statistics	RMSE[1)] = 0.0016* (p-value = 0.903) Chi-square[2)] = 26.43 (p-value = 0.906) TMCV[3)] = 0.049 AGFI[4)] = 0.763 N = 168 D.F.[5)] = 67

Notes: t-statistics are in parentheses (*); *; ** indicates significance at the 90%, 95%, or 99% confidence levels.

1) Steiger's Root Mean Square Error of Approximation (RMSEA) for test of close fit; RMSEA < 0.05; the RMSEA-value varies between 0.0 and 1.0.
2) If the structural equation model is asymptotically correct, then the matrix S (sample covariance matrix) will be equal to Σ (θ) (model implied covariance matrix). This test has a statistical validity with a large sample (N ≥ 100) and multinomial distributions; both are given using a test of multinomial distributions.
3) Test of Multivariate Normality for Continuous Variables (TMNCV); p-values of skewness and kurtosis.
4) Test of Adjusted Goodness of Fit Index (AGFI), varying between 0 and 1; 1 = perfect fit.
5) The degrees of freedom are determined by 0.5 (p + q) (p + q + 1) – t; with p = number of indicators; q = number of causes; t = the number for free parameters.

Table 11 presents some econometric results using the MIMIC approach (latent estimation approach) for these 21 OECD-countries for which we have eight data points of the years 1990/91, 1994/95, 1997/98, 1999/2000, 2001/02, 2002/03, 2003/04 and 2004/05. Aside the usual explanatory variables like direct and indirect taxation, social security contributions and state regulation we have added two further causal factors, i.e. tax morale and the quality of state institutions. In addition to the employment rate, the annual growth rate of GDP and the change of currency *per capita*, we use the average working time (per week) as an additional indicator variable. Using this indicator variable the problem might arise that this variable is influenced by state regulation, so that it is not exogenous; hence the estimation may be biased. The estimated coefficients of all eight cause variables are statistically significant and have the expected signs. The tax and social security burden variables are the most important ones, followed by the tax morale variable which has the single biggest influence. Also the independent variable "quality of state institutions" is statistically significant and quite important to determine whether one is engaged in shadow economy activities or not. The development of the official economy measured by unemployment and GDP per capita has a quantitatively important influence on the shadow economy.

Turning to the indicator variables they all have a significant influence and the estimated coefficients have the expected signs. The most important independent variables are the employment rate and the change of currency per capita. The variable currency per capita or annual change of currency per capita is heavily influenced by banking innovations; hence this variable is pretty unstable with respect to the length of the estimation period. Similar problems are already mentioned by Giles (1999a) and Giles and Tedds (2002). Summarizing, the econometric results demonstrate that in these OECD countries the social security contributions and the share of direct taxation have the biggest influence, followed by tax morale and the quality of state institutions.

5.2. The Dynamics and Size of the Shadow Economy in German-Speaking and Other OECD Countries

Table 12 summarizes the existing estimates of the German shadow economy (measured in percentage of official GDP) (see also Feld et.al. 2007). In our paper there is no extensive discussion about the various methods to estimate the size and development of the shadow economy; we do also not discuss the strength and weaknesses of each method. See Schneider and Enste (2000), Schneider (2005), Feld and Larsen (2005, 2008, 2010), Pedersen (2003), and Giles (1999a, b, c). The oldest estimate uses the survey method of the Institute for

Demoscopy (IfD) in Allensbach, Germany, and shows that the shadow economy was 3.6% of official GDP in 1974. In a much later study, Feld and Larsen (2005, 2008) concluded that undeclared work reached 4.1% in 2001, 3.1% in 2004, 3.6% in 2005 and 2.5% in 2006. Due to the extraordinarily low rate of participation based on a relatively small sample, the results for 2006 must be interpreted with extra great care. The results for 2006 should be regarded as tentative and, at the most, as an indication that black activities do not appear to have increased from 2005 to 2006. Using the (much lower) shadow economy wage rate these estimates shrink however to 1.3% in 2001 and 1.0% in 2004, respectively. If we look at the discrepancy method, for which we have estimates from 1970 to 1980, the German shadow economy is much larger: approximately 11% for the 1970s, and using the discrepancy between official and actual employment, roughly 30%. The physical input methods from which estimates for the 1980s are available deliver values of around 15% for the second half of that decade. The (monetary) transaction approach developed by Feige (1989) places the shadow economy at 30% between 1980 and 1985. Yet another monetary approach, the currency demand approach – the first person to undertake an estimation for Germany was Kirchgässner (1983, 1984) – provides values of 3.1% (1970) and 10.1% (1980). Kirchgässner's values are quite similar to the ones obtained by Schneider and Enste (2000, 2002), who also used a currency demand approach to value the size of the shadow economy at 4.5% in 1970 and 14.7% in 2000. Finally, if we look at latent MIMIC estimation procedures, the first ones being conducted by Frey and Weck-Hannemann (1984), and later, Schneider and others followed for Germany, again, the estimations for the 1970s are quite similar. Furthermore, Schneider's estimates using a MIMIC approach (Schneider 2005, 2009) are close to those of the currency demand approach.

Thus, we can see that different estimation procedures produce different results. It is safe to say that the figures produced by the transaction and the discrepancy approaches are unrealistically large: the size of the shadow economy at almost one third of official GDP in the mid-1980s is most likely an overestimate. The figures obtained using the currency demand and hidden variable (latent) approaches, on the other hand, are relatively close together and much lower than those produced by other methods (i.e. the discrepancy or transaction approaches). This similarity is not surprising given the fact that the estimates of the shadow economy using the latent (MIMIC) approach were measured by taking point estimates from the currency demand approach. The estimates from the MIMIC approach can be regarded as the upper bound of the shadow economy, and the estimates obtained from the survey approach provide its lower bound. Both bounds could of course be wrong.

Table 12: The Size of the Shadow Economy in Germany According to Different Methods (in Percentage of Official GDP)

Method	Shadow economy in Germany (in percentage of official GDP) in:								Source
	1970	1975	1980	1985	1990	1995	2000	2005	
Survey	-	3.6 [1)]	-	-	-	-	-	-	IfD Allensbach (1975)
	-	-	-	-	-	-	4.1 [2)]	3.6 [2)]	Feld and Larsen (2005, 2008)
Discrepancy between expenditure and income	11.0	10.2	13.4	-	-	-	-	-	Lippert and Walker (1997)
Discrepancy between official and actual employment	23.0	38.5	34.0	-	-	-	-	-	Langfeldt (1984a, b)
Physical input method	-	-	-	14.5	14.6	-	-	-	Feld and Larsen (2005)
Transactions approach	17.2	22.3	29.3	31.4	-	-	-	-	
Currency demand approach	3.1	6.0	10.3	-	-	-	-	-	Kirchgässner (1983)
	12.1	11.8	12.6	-	-	-	-	-	Langfeldt (1984a, b)
	4.5	7.8	9.2	11.3	11.8	12.5	14.7	-	Schneider and Enste (2000)
Latent ((DY)MIMIC) approach	5.8	6.1	8.2	-	-	-	-	-	Frey and Weck (1984)
	-	-	9.4	10.1	11.4	15.1	16.3	-	Pickhardt and Sarda Pons (2006)
	4.2	5.8	10.8	11.2	12.2	13.9	16.0	15.4	Schneider (2005, 2007)
Soft modeling	-	8.3 [4)]	-	-	-	-	-	-	Weck-Hannemann (1983)

1) 1974.
2) 2001 and 2005; calculated using wages in the official economy.

5.3. Size and Dynamics of the Shadow Economy in 21 OECD Countries

MIMIC approach gives only relative sizes of the shadow economy, so another approach to calculate absolute figures must be used. For the calculation of the absolute sizes of the shadow economies from these MIMIC estimation results, we take the already available estimates from the currency demand approach for Austria, Germany, Italy and the United States (from studies of Dell'Anno and Schneider 2003, Bajada and Schneider 2005, and Schneider and Enste 2002). As we have values of the shadow economy (in % of GDP) for various years for the above mentioned countries, we can use them in a benchmark procedure to transform the index of the shadow economy from the MIMIC estimations into cardinal values. This procedure is described in great detail in the paper Dell'Anno and Schneider (2003, 2009). Our paper focuses on the size and development of the shadow economy for entire countries and not for specific regions. Recently first studies have been undertaken to measure the size of the shadow economy as well as the "grey" or "shadow" labor force for urban regions or states (e.g. California).[13] Herwartz, Schneider and Tafenau (2009) estimate the size of the shadow economy of 234 EU-NUTS regions for the year 2004 for the first time demonstrating a considerable regional variation in the size of the shadow economy.

Table 13 presents the findings for 21 OECD countries until 2007. They clearly reveal that since the end of the 90's the size of the shadow economy in most OECD countries continued to decrease. The unweighted average for all countries in 1999/2000 was 16.8% and dropped to 13.9% in 2007. This means, that since 1997/98 – the year in which the shadow economy was the biggest in most OECD countries, it has continuously shrunk. Only in Germany, Austria and Switzerland the growing trend lasted longer and was reversed two or three years ago. The reduction of the share of the shadow economy from GDP between 1997/98 and 2007 is most pronounced in Italy (-5.0%) and in Sweden (-4.0). The German shadow economy ranges in the middle of the ranking, whereas Austria and Switzerland are located at the lower end. With 20% to 26%, South European countries exhibit the biggest shadow economies measured as a share from official GDP. They are followed by Scandinavian countries whose shadow economies' shares in GDP range between 15 and 16%. One reason for the differences in the size of the shadow economy between these OECD countries includes, among others, that for example there are fewer regulations in the OECD country USA compared to the OECD Country Germany where everything what is not explicitly allowed is forbidden.

14. See e.g. Marcelli, Pastor and Joassart (1999), Marcelli (2004), Chen (2004), Williams and Windebank (1998, 2001a, b), Flaming, Hayolamak, and Jossart (2005), Alderslade, Talmage and Freeman (2006), Brück, Haisten-DeNew and Zimmermann (2006).

Table 13: The Size of the Shadow Economy in 21 OECD Countries between 1989/90 and 2007 Estimated Using the Money Demand and MIMIC Methods (in % of Official GDP)

	Shadow Economy									
OECD-countries	Average 1989/90	Average 1994/95	Average 1997/98	Average 1999/00	Average 2001/02	2003	2004	2005[1]	2006[1]	2007[1]
1. Australia	10.1	13.5	14.0	14.3	14.1	13.7	13.2	12.6	11.4	10.7
2. Belgium	19.3	21.5	22.5	22.2	22.0	21.4	20.7	20.1	19.2	18.3
3. Canada	12.8	14.8	16.2	16.0	15.8	15.3	15.1	14.3	13.2	12.6
4. Denmark	10.8	17.8	18.3	18.0	17.9	17.4	17.1	16.5	15.4	14.8
5. Germany	11.8	13.5	14.9	16.0	16.3	17.1	16.1	15.4	14.9	14.6
6. Finland	13.4	18.2	18.9	18.1	18.0	17.6	17.2	16.6	15.3	14.5
7. France	9.0	14.5	14.9	15.2	15.0	14.7	14.3	13.8	12.4	11.8
8. Greece	22.6	28.6	29.0	28.7	28.5	28.2	28.1	27.6	26.2	25.1
9. Great Britain	9.6	12.5	13.0	12.7	12.5	12.2	12.3	12.0	11.1	10.6
10. Ireland	11.0	15.4	16.2	15.9	15.7	15.4	15.2	14.8	13.4	12.7
11. Italy	22.8	26.0	27.3	27.1	27.0	26.1	25.2	24.4	23.2	22.3
12. Japan	8.8	10.6	11.1	11.2	11.1	11.0	10.7	10.3	9.4	9.0
13. Netherlands	11.9	13.7	13.5	13.1	13.0	12.7	12.5	12.0	10.9	10.1
14. New Zealand	9.2	11.3	11.9	12.8	12.6	12.3	12.2	11.7	10.4	9.8
15. Norway	14.8	18.2	19.6	19.1	19.0	18.6	18.2	17.6	16.1	15.4
16. Austria	6.9	8.6	9.0	9.8	10.6	10.8	11.0	10.3	9.7	9.4
17. Portugal	15.9	22.1	23.1	22.7	22.5	22.2	21.7	21.2	20.1	19.2
18. Sweden	15.8	19.5	19.9	19.2	19.1	18.6	18.1	17.5	16.2	15.6
19. Switzerland	6.7	7.8	8.1	8.6	9.4	9.5	9.4	9.0	8.5	8.2
20. Spain	16.1	22.4	23.1	22.7	22.5	22.2	21.9	21.3	20.2	19.3
21. USA	6.7	8.8	8.9	8.7	8.7	8.5	8.4	8.2	7.5	7.2
Unweighted average for 21 OECD countries	12.7	16.2	16.8	16.8	16.7	16.5	16.1	15.6	14.5	13.9

Source: Own calculations.

The individual's freedom is limited in many areas by far-reaching state interventions. Another reason is the large differences in the direct and indirect tax burden with the lowest in the U.S. and Switzerland in this sample.

6. INTERACTION OF SHADOW AND OFFICIAL ECONOMY

6.1. Shadow Economy Labor Market and Productivity

Having examined the size, rise and fall of the shadow economy in terms of value added over time, the analysis now focuses on the "shadow labor market", as within the official labor market there is a particularly tight relationship and "social network" between people who are active in the shadow economy. Pioneering work in this area has been done by L. Frey (1972, 1975, 1978, 1980), Cappiello (1986), Lubell (1991), Pozo (1996), Bartlett (1998) and Tanzi (1999). Moreover, by definition every activity in the shadow economy involves a "shadow labor market" to some extent:[14] Hence, the "shadow labor market" includes all cases, where the employees or the employers, or both, occupy a "shadow economy position".

Why do people work in the shadow economy? In the official labor market, the costs firms (and individuals) have to pay when "officially" hiring someone are increased tremendously by the burden of tax and social security contributions on wages, as well as by the legal administrative regulation to control economic activity. In various OECD countries, these costs are greater than the wage effectively earned by the worker – providing a strong incentive to work in the shadow economy.

More detailed theoretical information on the labor supply decision in the underground economy is given by Lemieux, Fortin and Fréchette (1994) who use micro data from a survey conducted in Quebec City (Canada). In particular, their study provides some economic insights regarding the size of the distortion caused by income taxation and the welfare system. The results of this study suggest that hours worked in the shadow economy are quite responsive to changes in the net wage in the regular (official) sector. Their empirical results attribute this to a (mis-) allocation of work from the official to the informal sector, where it is not taxed. In this case, the substitution between labor market activities in the two sectors is quite high. These empirical findings indicate that "participation rates and hours worked in the underground sector also tend to be inversely related to the number of hours worked in the regular sector" (Lemieux, Fortin and Fréchette 1994, p. 235). These findings demonstrate a

large negative elasticity of hours worked in the shadow economy with respect both to the wage rate in the regular sector as well as to a high mobility between the sectors.

Illicit work can take many shapes. The underground use of labor may consist of a second job after (or even during) regular working hours. A second form is shadow economy work by individuals who do not participate in the official labor market. A third component is the employment of people (e.g. clandestine or illegal immigrants), who are not allowed to work in the official economy. Empirical research on the shadow economy labor market is even more difficult than of the shadow economy on the value added, since one has very little knowledge about how many hours an average "shadow economy worker" is actually working (from full time to a few hours, only); hence, it is not easy to provide empirical facts. For developing countries some literature about the shadow labor market exists (Dallago 1990, Pozo 1996, Loayza 1996, Chickering and Salahdine 1991 and OECD 2009)

Kucera and Roncolato (2008, p. 321) also deal with informal employment. They address two issues of crucial importance to labor market policy:

(i) The intensive labor market regulations as one (major) cause of informal employment, and

(ii) the so-called "voluntary" informal employment. Kucera and Roncolato give a theoretical overview on both issues and also a survey of a number of empirical studies, in which mainly the effect of official labor market regulations on informal employment is analyzed, where they find a significant and quantitatively important influence.

The latest OECD study (2009) concludes that informal employment is the norm, not the exception, in many parts of the world. More than half of all jobs in the non-agricultural sectors of developing countries – over 900 million workers – can be considered informal. If agricultural workers in developing countries are included, the estimates size to roughly 2,000 million people. In some regions, including Sub-Saharan Africa and South Asia, over 80% of non-agricultural jobs are informal. Most informal workers in the developing world are self-employed and work independently, or owe and manage very small enterprises. According to the OECD study (2009), informal employment is a result of both, people being excluded from

14. Compare also the latest OECD report with the title "Is Informal Normal: Toward More and Better Jobs" by the OECD (2009).

Table 14: Estimates of the Size of the "Shadow Economy Labor Force" and of the Official and Shadow Economy Productivity in Some OECD Countries 1974-1998

Countries	Year	Official GDP per capita in US-$[1)]	Total Economy (Shadow Economy plus official GDP per capita in US-$)	Size of the Shadow Economy (in % of official GDP) Currency Demand Approach[2)]	Shadow Economy Labor Force in 1000 people[3)]	Shadow Economy Participants in % of official Labor Force[4)]	Sources of Shadow Economy Labour Force
Austria	90-91 97-98	20,636 25,874	25,382 29,630	5.47 8.93	300-380 500-750	9.6 16.0	Schneider (1998a, b) and own calculations
Denmark	1980 1986 1991 1994	13,233 18,496 25,946 34,441	18,658 26,356 36,558 48,562	8.6 9.8 11.2 17.6	250 390 410 420	8.3 13.0 14.3 15.4	Mogensen, et. al. (1995) and own calculations
France	1975-82 1997-98	12,539 24,363	17,542 34,379	6.9 14.9	800-1,500 1,400-3,200	3.0-6.0 6.0-12.0	De Grazia (1983) and own calculations
Germany	1974-82 1997-98	11,940 26,080	17,911 39,634	10.6 14.7	3,000-4,000 7,000-9,000	8.0-12.0 19.0-23.0	De Grazia (1983), F. Schneider (1998a, b) and own calculations
Italy	1979 1997-98	8,040 20,361	11,736 29,425	16.7 27.3	4,000-7,000 6,600-11,400	20.0-35.0 30.0-48.0	Gaetani-d'Aragona (1979) and own calculations
Spain	1979-80 1997-98	5,640 13,791	7,868 19,927	19.0 23.1	1,250-3,500 1,500-4,200	9.6-26.5 11.5-32.3	Ruesga (1984) and own calculations
Sweden	1978 1997-98	15,107 25,685	21,981 37,331	13.0 19.8	750 1,150	13.0-14.0 19.8	De Grazia (1983) and own calculations
European Union	*1978* *1997-98*	*9,930* *22,179*	*14,458* *32,226*	*14.5* *19.6*	*15,000* *30,000*	-	*De Grazia (1983) and own calculations*
OECD (Europe)	*1978* *1997-98*	*9,576* *22,880*	*14,162* *33,176*	*15.0* *20.2*	*26,000* *48,000*	-	*De Grazia (1983) and own calculations*

1) Source: OECD, Paris, various years
2) Source: Own calculations from Schneider (2000, 2001).
3) Estimated full-time jobs, including unregistered workers, illegal immigrants, and second jobs.
4) In percent of the population aged 20-69, survey method.

official jobs and people voluntarily opting out of formal structures, e.g. in many middle income countries incentives drive individuals and businesses out of the formal sector.

In *Table 14* the estimates for the shadow economy labor force in highly developed OECD countries (Austria, Denmark, France, Germany, Italy, Spain and Sweden) are shown. Shadow economy labor force consists of estimated full-time "black" jobs, including unregistered workers, illegal immigrants and second "black" jobs. In Austria the shadow economy labor force has arrived at 500.000 to 750.000 or 16% of the official labor force (mean value) in the years 1997-1998. In Denmark the development of the 80s and 90s shows that the part of the Danish population engaged in the shadow economy ranged from 8.3% of the total labor force (in 1980) to 15.4% in 1994 – quite a remarkable increase of the shadow economy labor force; it almost doubled over 15 years. In France (in the years 1997/98) the shadow economy labor force reached a size of between 6 and 12% of the official labor force or between 1.6 and 3.2 million in absolute figures. In Germany this figure rose from 8 to 12% in 1974 to 19% and to 22% (8 millions) in the year 1997/98. For France and Germany this is again a very strong increase in the shadow economy labor force. In other countries the amount of the shadow economy labor force is quite large, too: in Italy 30-48% (1997-1998), Spain 11.5-32% (1997-1998) and Sweden 19.8 % (1997-1998). In the European Union about 30 million people are engaged in shadow economy activities in the years 1997-1998 and in all European OECD countries 48 million work illicitly. These figures demonstrate that the shadow economy labor market is lively and may provide an explanation, why for example in Germany, one can observe such a high and persistent unemployment.

Additionally, *Table 14* contains a preliminary calculation of the total GDP per capita (including the official and the shadow economy GDP per capita) in US-$. In all countries investigated, total GDP per capita is much higher – on average in all countries around 40%. This clearly shows that the productivity in the shadow economy is roughly as high as in the official economy – a clear indication that the work effort (i.e. the incentive to work effectively) is as strong in the shadow economy as in the official one.

6.2. Shadow Economy and Aggregate Efficiency

Most studies of economic development rest on official output figures. However, in so doing they neglect a sizeable part of economic activity, which takes place in the informal sector, and therefore goes unrecorded in official statistics. Nevertheless, as Tanzi (1999) remarks, though some of those activities may be illegal, others are legal and socially valuable. They should

therefore be taken into account when measuring a country's output. Recently, Meon, Schneider and Weill (2010) analyzed the impact of adding the shadow economy to official output figures on estimated production functions and technical efficiency across up to 97 countries. Including the shadow economy hardly affects the ranking of countries in terms of efficiency. However, it results in an increase of observed efficiency scores. Adding the shadow economy to official output figures thus allows for a more precise estimate of countries' outputs. Those results are important in several aspects. First, they show that estimates of the production function based on total output differ from those based on official output figures. Second, they therefore imply that ignoring the shadow economy leads to mistakes in measured efficiency. Finally, their results provide guidance to the empirical literature on economic output and productivity at large. Given that official output figures overlook a sizeable share of total activity, future research on the determinants and effects of a country's production should clearly start with a reflection as to which definition of output, official or total, is relevant to the question at hand. Their results suggest that the answer to this question need not always be official output.

6.3. Shadow Economy and Unemployment

Although there has been considerable discussion on the size of the shadow economy, comparatively little attention has been given to the relationship between unemployment and working in the shadow economy. As Tanzi (1999) points out, "the current literature does not cast much light on these relationships even though the existence of large underground activities would imply that one should look more deeply at what is happening in the labour market" (p. 347). The objective of the paper by Bajada and Schneider (2009) is to examine the extent of participation in the shadow economy by the unemployed. Their paper has investigated the relationship between the unemployment rate and the shadow economy. Previous literature on this topic has suggested that the relationship between these two variables is ambiguous, predominantly because a heterogeneous group of people working in the shadow economy exists and there are also various cyclical forces at work, such that they produce a net effect that is weakly correlated with unemployment. In this paper they have provided a suggestion for disentangling these cyclical effects, so as to study the component of the shadow economy that is influenced directly by those who are unemployed. They refer to this effect as the 'substitution effect' which typically increases during declining periods of legitimate economic activity (and increasing unemployment). Equipped with this approach for

measuring the 'substitution effect', they discover that a relationship exists between changes in the unemployment rate and shadow economy activity.

By examining the growth cycle characteristics of the 'substitution effect' component of the shadow economy Bajada and Schneider (2009) determine that the growth cycles are symmetric (in terms of steepness and deepness) and that changes in the unemployment rate, whether positive or negative, had similar impacts on changes in the substitution effect component. They suggest that the shadow economy is a source of financial support during periods of unemployment for those genuinely wanting to participate in the legitimate economy. Although this does not exclude the possibility that long-term unemployed may also be participating in the shadow economy, it would appear that short-term fluctuations in unemployment directly contribute to short-term fluctuations in the shadow economy.

When Bajada and Schneider consider the various unemployment support programs across 12 OECD countries, there appears to be no real systematic relationship between the generosity of the social security systems and the nature of short-term shadow economic activity by the unemployed. Even the various replacement rates across the OECD countries appear to have little consequence on the rate at which the unemployed take on and cut back shadow economy activity. There is however some evidence to suggest that extended duration spells last anywhere between less than 3 months to approximately 9 months.

On the whole Bajada and Schneider argue that dealing with unemployment participation in the shadow economy, a way of correcting the inequity it generates is best handled by more stringent monitoring of those receiving unemployment benefits rather than reducing replacement rates a way of encouraging re-integration into the work force. A strategy of reducing replacement rates would not only fail to maintain adequate support for those experiencing financial hardship during periods of unemployment, it is likely to have little impact on reducing participation by the unemployed who are willing and able to engage in shadow economy activity.

6.4. Shadow Economy and Do-it-yourself Activities

Bühn, Karmann and Schneider (2009) use a MIMIC model to consistently disentangle the size and development of the shadow economy and of DIY (Do-it-yourself) activities in Germany the first time. They report a statistically highly significant impact of regulation as well as tax burdens and social security contributions on the shadow economy. For DIY activities, they observe a statistically highly significant positive influence of unemployment. In general, the

estimated models show satisfactory statistical properties. According to their calculations the German shadow economy increased from 2% in 1970 to 17% in 2005. DIY activities amounted to 4% of official GDP in 1970, slightly increased to 4.49% in 1995, and remained relatively constant until 2005. Taking both sectors together, they find that in Germany the hidden economy and do-it-yourself activities reached a remarkable size of more than 20% of official GDP in 2005. While the shadow economy is primarily driven by political and economic factors like taxation and regulation, DIY activities exhibit a pattern of responding to slowly and steadily changing variables like unemployment and social preferences. Their results suggest that shadow economies are contingent on governmental behavior while DIY activities are driven by individual constraints, self-help and mutual aid. Because of their significant amount and specific dynamics, a comprehensive analysis of the hidden economy must consider DIY activities.

What type of policy conclusions did they draw from these results? If the shadow economy and/or DIY activities should be reduced, fewer regulation, lower taxes and social security contributions might be the two most efficient means of shifting more activity into the official economy. Reducing both the intensity of regulation and the amount of contributions to the social security system in Germany might also result in a lower level of unemployment. This would reduce individuals' incentives to engage in DIY activities. Though their results should be regarded as first steps in measuring the size of the overall hidden economy, they have demonstrated that both shadow economic and DIY activities are important and should be taken into account when seeking to stimulate the official economy through policy measures.

7. CONCLUSIONS

In this survey on the most recent developments in research on the shadow economy and undeclared work, we start from the observation that in most OECD countries *the* policy instrument of choice to prevent people from working in the shadows has been deterrence. While deterrence policy is well-founded from a theoretical point of view, the empirical evidence on its success is weak. There is almost no study using the MIMIC approach to estimate the size of the shadow economy that tests on the impact of deterrence empirically. The only study for Germany does not find any significant effect. In survey studies on undeclared work, the perceived probability of being detected has a consistent robust significantly negative effect, but perceived fines and punishment do not. Compared to the impact of tax morale, deterrence is quantitatively less important. The studies based on the

MIMIC approach also report strong effects of tax morale, but underline the higher importance of tax policies and state regulation to increase the shadow economy.

Also, the pure inter-temporal development of the shadow economy, in particular its most recent decline cannot be interpreted as a success of deterrence policies. The discussion of the recent literature underlines that economic opportunities for employees, the overall situation on the labor market, not least unemployment are crucial for an understanding of the dynamics of the shadow economy. Individuals look for ways to improve their economic situation and thus contribute productively to aggregate income of a country. This holds regardless of their being active in the official or the unofficial economy. A strong emphasis on deterrence may thus backfire.

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