An Exploration of the Greek Shadow Economy: Can Its Transfer to the Official Economy Provide Economic Succor Amid the Crisis?

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Abstract: We explore the determinants of the Greek shadow economy, its interaction with the official economy, and its relationship with corruption. In doing so, we undertake — for the first time — an interdisciplinary review of economic and political studies on the size and determinants of the shadow economy, tax evasion, undeclared work and, moreover, of their relation with corruption in Greece in order to reveal the extent and complexity of these phenomena. We estimate the size and determinants of the shadow economy via a multiple-indicators-multiple-causes (MIMIC) approach. Our findings indicate that the important determinants are factors related to macroeconomic conditions, such as unemployment and GDP growth, and institutional factors, such as tax morale and the rule of law. We also indicate that the shadow economy and corruption are complementary and that the official and the shadow economy substitute each other over the business cycle. An adoption of policy based on these findings would lead to a successful transfer of part of the shadow economy to the official economy, would boost government revenue, and would eventually reinvigorate the Greek economy from the depression that emerged as a result of the sovereign debt crisis.

Keywords: corruption, economic crisis,; Greece, shadow economy, sovereign debt crisis

JEL Classification Codes: E26, H26, H63, K42, O17

The size and development of shadow economies and their relation to corruption are hot academic and political topics around the world. There are numerous political statements and indications about the enormous losses that official economies suffer due to shadow economic activities and corruption. Among the most profound example of advanced economies being impacted by this problem is Greece, which faces a severe recession amid a sovereign debt crisis. The tight fiscal constraints, which cannot be relaxed by means of higher tax rates — the latter may temporarily raise additional tax revenue, but have substantial economic costs in terms of output contraction (see Vogel, 2012) — undermine all efforts by euro area governments to

stabilize their finances. Thus, as euro area countries strive to meet the goals of fiscal adjustment through austerity measures, it is becoming critical now to raise government revenues by transferring shadow economic activities into the official economy.

The idiosyncrasies of the Greek case are reflected in the tremendous consequences of the austerity program for the country's economic growth (for example, see Matsaganis 2012; Monastiriotis 2011; Vlachos 2013) that have led to the austerity-imposed spiral of economic contraction or "fiscal trap" (Hannsgen and Papadimitriou, 2012). Moreover, this has also been reflected in the fact that the size of the shadow economy is associated with the procyclicality of fiscal policy (Çiçek and Elgin 2011). In other words, fiscal austerity in times of an economic downturn for countries with large shadow economies, like Greece, means even harder outcomes. As a result, the reduction of the shadow economy is expected to boost government revenues and may be considered as an additional policy measure to aid in the country's struggle to overcome the crisis.

Based on literature indications, we argue that institutions are the primary determinants of the size of a shadow economy (for example, see Anoop Singh, Sonali Jain-Chandra and Adil Mohommad 2012) and that a contraction of the shadow economy will increase welfare only if it is absorbed into the official economy (Schneider 2008). Our aim here is to reveal the significance of the institutional determinants of the Greek shadow economy and its interlinkages with corruption as well as to critically assess whether the potential for increasing welfare by its transfer into the official economy would contribute to Greece's efforts to exit the sovereign debt crisis — the country's worst and longest recession ever (henceforth economic depression). Our paper consists of two parts. In the first part, we make a review of the literature on the determinants of the Greek shadow economy and, specifically, of the issues of corruption. In the second part, we conduct an estimation of the size and determinants of the shadow economy in Greece vis-à-vis the twenty-eight European Union (EU) member states and some non-EU countries. We also present an estimation of the impact of corruption on the Greek official economy vis-à-vis the respective impact in Austria and Germany.

In the next two sections, we offer a brief theoretical and empirical background of the shadow economy and its interaction with corruption. In the third section, we make a comprehensive review of the literature on the shadow economy and corruption in Greece and analyze their potential role for the emergence of the Greek crisis. In the fourth section, we discuss methodological issues and describe the econometric method we employ to explore the determinants of the shadow economy and to estimate its size and the impact of corruption on the official economy. In the fifth section, we present the empirical estimates and put forward some policy recommendations for the successful transfer of some shadow economic activities to the official economy. In the final section, we make some concluding remarks.

The Shadow Economy and Its Interactions with Corruption

In an influential paper, Friedrich Schneider and Dominik H. Enste (2000) determined the development and size of the shadow economy over an extended period of time for several countries. The authors cautioned that further research in the case of single countries is necessary in order to clarify the determinants of the shadow economy, its impact on the official economy, and its interaction with corruption. Following the developments since then, in this section, we provide a background of the definition of a shadow economy and discuss its relation to corruption. In the next section, we briefly review the factors determining the size of the shadow economy. We also discuss the main points of the debate on the interaction

between the shadow and official economies over the business cycle. We further present our findings on the relationship between corruption and the shadow economy.

The Shadow Economy: Measurement and Determinants

Although a precise definition of a shadow economy seems unattainable due to its progressive nature (for a discussion, see Schneider and Enste 2000; Feld and Schneider 2010), the general notion is that it encompasses all unregistered economic activities that contribute to official GDP (Schneider 1994). Our definition here stems from Schneider and Enste (2000, 79), who indicate that the shadow economy includes all legal production and provision of goods and services that are deliberately concealed from public authorities for the following four reasons: (i) to avoid payment of income, value added or other taxes; (ii) to avoid payment of social security contributions; (iii) to avoid having to meet certain legal standards, such as minimum wages, maximum hours, safety standards, etc.; and (iv) to avoid compliance with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.

The context of this definition, as well as the literature on the shadow economy (for example, see Ahmed, Rosser and Rosser 2007), dictate that the phenomenon should be treated as something different than the traditional underground economy (i.e., illegal actions that fit the characteristics of classical crime activities, such as burglary and drug dealing) and the informal household economy (i.e., activities not registered officially under various specific forms of national legislation). However, despite this distinction, there are some overlapping areas between the above two sectors and the shadow economy. Two examples of such overlaps are (i) prostitution in the case of the underground economy as far as tax evasion is concerned and (i) do-it-yourself activities in the case of the informal household economy as far as tax avoidance is concerned. Figure 1 illustrates the legal, shadow, illegal, and informal economies, indicating their overlapping areas that, in turn, point to a major difficulty in making estimations of the size and development of a shadow economy.

Insert Figure 1 here

Since the shadow economy is not directly observable, the most challenging task is how to measure it. The three main categories of methods of measurement (Schneider and Enste, 2002a) are: (i) direct micro-level procedures, such as surveys and tax audits; (ii) indirect procedures that utilize macroeconomic indicators as proxies for the development of the shadow economy over time, such as the currency demand approach; and (iii) statistical models that aim to estimate the shadow economy as an "unobserved" variable (such as the MIMIC model).[1]

The non-direct approaches to the shadow economy imply that its determinants are influenced by the performance (growth or downturn) of the official economy (Schneider Buehn and Montenegro 2010). The non-direct approaches, which do not explore the influence of institutional variables beyond bureaucracy and regulations (for example, see Ruge 2010), indicate that the size of the shadow economy is determined by the level of development, bureaucracy, the size of taxes and social security payments, and the extent of labor market regulations in a country.[2] The non-direct approaches that explore a greater set of institutional determinants (for example, see Feld and Schneider 2010) indicate the importance of tax morale and the quality of public sector services and state institutions.

The institutional variables in most non-direct studies, published before mid-2000s, explain more than 50 percent of the shadow economy and their total effect is greater than that of the

tax burden (Schneider 2005). Since then, there have been tax evasion models which indicate that regulation costs (with regard to labor and the operation of firms) have a greater impact from the tax burden (Adair, 2009). According to Eric Friedman et al. (2000), higher taxes are not linked to a larger shadow economy, but rather to more bureaucracy, higher corruption, and weaker legal environments. Building on this idea, Singh, Jain-Chandra, and Mohommad (2012) emphasize the quality of institutions, and indicate that it is not higher taxes per se that lead to deepening shadow economy, but weak institutions and rule of law.

When the quality (performance) of state institutions and public sector services is part of a contractual relationship between the cost of public goods/services and the access to them, it is linked to the notion of tax morale (Feld and Frey 2007). Numerous non-direct studies (for example, see Dreher, Kotsogiannis and McCorriston 2009; Dreher and Schneider 2010; Torgler and Schneider 2009; Schneider 2005, 2010) emphasize the quality of public institutions that impacts key factors, responsible for the development of a shadow economy, such as tax morale.[3]

The direct (micro-level) approaches are also crucial for understanding the development of the shadow economy. Indirect analyses gain the necessary credibility when they are grounded in microeconomic studies. Also, an appreciation of the fact that microeconomic sectors harbor the largest share of shadow economic activities is critical for a successful tax policy formulation (Spiro 2005).

Nevertheless, microeconometric analyses have not been able to indicate the sum of determinants or reveal the broader picture that macro-level approaches have done. Tax evasion surveys, such as the popular approach termed the "expenditure-based method," can give an indication of the shadow economy's size, but cannot examine its determinants (see Fontin, Lacroix and Pinard 2010; Lindsay 2007; Lyssiotou, Pashardes and Stengos 2004). On the other hand, the micro-level approaches, based on primary/qualitative data, are usually regional/sectoral rather than country-oriented, and pose difficulties in terms of sampling, randomization, and questionnaire design as individuals are reluctant to admit their participation in the shadow economy (for such a study, see Williams 2006).

Interaction Between the Shadow- and Official Economies Over the Business Cycle

It is widely accepted that weak policy enforcement, high taxes, and a preference for shadow labor lead to increased participation in shadow economic activities and amplify the fluctuations of the official economy in output and consumption. However, it is not yet thoroughly researched how and to what extent that is so (Granda-Carvajal 2012). The current consensus on the interactions of the official and shadow economies is based on the notions of "income effect" (i.e, recessions foster a decline in consumption both in the official and shadow economies) and "substitution effect" (i.e., during recessions, unemployed workers step into the shadow economy). The former implies a positive correlation between the growth rates of the shadow and official economies, and the latter indicates a countercyclical shadow economy (Bajada and Schneider 2009).

Most empirical research findings indicate that the shadow economy is countercyclical. More specifically, studies employing indirect approaches (for example, see Elgin 2012; Roca, Moreno and Sanchez 2001), studies exploring the relationship between shadow economic activities and unemployment (for example, see Bajada and Schneider 2009), and studies about

the trends and cycles of shadow employment (for example, see Loayza and Rigolini 2011), all indicate that the substitution effect prevails and the shadow economy grows during recessions.[4]

There are also findings that do not indicate the existence of asymmetries in the business cycles of the official and shadow economies. They are mainly country-specific and stem from earlier studies that focus on New Zealand (Giles 1997, 1999), Australia (Bajada 2003), Italy (Busato and Chiarini 2004), and four developing Southeast Asian countries (Eng and Wong, 2008). The validity of these studies has been criticized on the grounds of their methodology. For example, one criticism concerns the attention of some models (such as Busato and Chiarini 2004) on variables that are not correlated with the size of the shadow economy (like the co-movements of productivity), but neglect of variables and patterns that are significantly affected by the existence of shadow economic activities, such as wage volatility (Granda-Carvajal 2010). Moreover, Christopher Bajada's method has been criticized for "excess sensitivity" (Breusch 2005b).

Despite these criticisms, there can be a procyclical relationship due to the dominance of the income effect. For example, even Christopher Bajada and Friedrich Schneider (2009), who argue that the shadow economy acts as a source of financial support during periods of cyclical unemployment, observe the existence of a procyclical relationship in such countries as Australia, Italy, and New Zealand over the 1990s and mid-2000s.

Corruption and the Shadow Economy

Corruption, commonly defined as the misuse of entrusted power for private benefit (Pope 2000, 2), is one of the "greatest obstacles to economic and social development." It distorts the rule of law, weakens the institutional foundations, and severely affects the poor (see Transparency International at https://www.transparency.org/what-is-corruption/#define). Both personal and country-specific characteristics determine the risk of exposure to bribery (Mocan 2008), but increased bureaucracy is typically associated with higher corruption (Djankov et al., 2002) and the variations in policies and regulations across industries explain the incidence of corruption (Svensson 2003). The two main forms of public sector corruption are bureaucratic (administrative) corruption (where bureaucrats are bribed either for doing their duty effectively or for not performing it) and political corruption. The former affects law enforcement, while the later law enactment (Bardhan 2006), in which case the briber (or campaign funder) is interested in his/her private gain, including through the distortion of market competition (Pellegrini 2011, 19-24).

The relation between corruption and the shadow economy is not a straightforward one. With regard to the bureaucracy of an organizational structure, it is argued that only vertical centralization favors corruption and shadow economic activities. Although the generalized implication of Andrei Shleifer and Robert W. Vishny's (1993) pioneering work that a centralized and thus less expanded bureaucracy results in lower bribes is still the "rule of thumb" (as, for example, the decentralization process in Germany has created new opportunities for corruption, see von Marivic 2007), new evidence suggest that it is the type of centralization — vertical or horizontal — that is of primary importance. The argument is that vertical centralization results in higher bribes (Echazu and Bose 2008).[5] This new implication justifies the findings of a positive relationship between local autonomy and tax morale, which indicates a negative relationship between local autonomy and the shadow economy's size (Torgler, Schneider and Schaltegger 2010). As a result, decentralization may close the distance between bureaucrats and economic agents, and increase the probability of shadow economic activities (Buehn, Lessmann and Gunther 2013).

The issue of whether corruption and the shadow economy are complementary or substitutes for one another depends greatly on the level of institutional quality. A strand of the literature that developed in the 1990s suggested that corruption has a positive impact on the size of the shadow economy and that a growing shadow economy has a negative effect on official GDP growth (Schneider and Enste 2000). The rationale that justified this implication is that, as government officials may collude with entrepreneurs and taxpayers in exchange for a bribe (Hindriks, Muthoo and Keen 1999), it can be easily assumed that corruption enhances the shadow economy through the effort of agents to avoid further complications of bureaucracy and corruption (Friedman et al. 2000). The particular notion of a positive correlation between corruption and the shadow economy also dates to the 2000s. However, references concern only high levels of corruption and large shadow economies in a sense that corruption drove enterprises out of the official sector (as they strove to be more competitive), undermined the development of the official economy, and the consequent depletion of the tax base diminished state revenue (Le 2007).

Another body of literature that developed in the 2000s suggests that if the shadow economy mitigates government-induced distortions, then corruption and the shadow economy may be substitutes for one another (Choi and Thum 2005; Dreher, Kotsogiannis and McCorriston 2009). Based on this new concept, some empirical studies attempt to clarify the existence of a complementary relationship, reaching the conclusion that the shadow economy reduces corruption in high income countries and increases it in low income countries (Dreher and Schneider 2010; Schneider 2007). The rationale behind these findings is that the "ability" of agents to bring corrupt officials to court generates a choice of whether or not to participate in the shadow economy. This ability depends on the level of institutional quality, which varies between high and low income countries. Moreover, it defines whether corruption and the shadow economy are complements of or substitutes for each other (Dreher and Schneider 2010). Further evidence for this distinction is found in the existence of a long-run causality between income and corruption, which indicates that the latter vanishes as countries get wealthier and that, ultimately, there is a transition from poverty to honesty (Gundlach and Paldam 2009).

Nevertheless, the comparatively large size of the shadow economy in some high-income countries, such as Greece — whose levels of corruption are also comparatively high according to the Corruption Perceptions Index (CPI) (see www.transparency.org/research/cpi), — indicates that a country's income level is not a sufficient indicator of institutional quality. As a result, the effect of corruption on the shadow economy should not be linked with a country's income level and should be assessed by indicators which are more representative of institutional quality, such as bureaucratic structures (Echazu and Bose 2008). Empirical research from the 2010s indicates that a complementary relationship between corruption and the shadow economy is also possible for high-income countries, when these countries have a comparatively large shadow economy and relatively high levels of corruption. More specifically, the agents in countries with a large shadow economy rely on shadow economic activities and bribe bureaucrats in order to avoid detection. The consequent decrease in tax revenues reduces the quality of public services, infrastructure, and the incentives to remain in the official economy (Buehn and Schneider 2011). Thus, the relationship between corruption and institutional ineffectiveness is the primary indicator for the existence of a complementary relationship between the size of the shadow economy and corruption.

In conclusion, not only the shadow economy grows primarily due to weak institutions and rule of law (Singh, Jain-Chandra and Mohommad 2012), but institutional quality is also responsible for the levels of corruption (Dreher, Kotsogiannis and McCorriston 2009). The

country-specific formal and informal institutions, which are primarily responsible for the sizes of both corruption and the shadow economy, foster a complementary relationship in mature economies (Tonoyan et al., 2010) in a fashion similar to transitional economies (Johnson, Kaufmann and Shleifer 1997).

The Shadow Economy and Corruption in Greece

Although discussions about the extent of tax evasion in Greece and the size and nature of the Greek shadow economy can be found in the literature of the previous two decades, these issues gained significant international attention with the eruption of the sovereign debt crisis. For example, and with regard to the negative externalities that firms receive from the hidden sector (see Lisi and Pugno 2010), Paul Romer (2010) specified that corruption and bureaucratic inefficiency amount to a tax on all firms that operate in Greece.[6] Moreover, the issues of the shadow economy and tax evasion gained greater attention in the surveys of the Organisation for Economic Co-Operation and Development (OECD) about Greece (for example, see OECD 2009, 58-65; 2011, 83-86) that were published after the eruption of the Greek sovereign debt crisis. A year after the first bailout loan to Greece, the OECD (2011, 83-86) survey stated that the institutional inefficiencies responsible for low tax collection and tax evasion were mainly due to shadow economic activities (with significant references to bribery and corruption). Moreover, those activities resulted to fiscal losses of between 2.0 and4.0 percent of GDP per annum. Accordingly, a year after the second bailout loan, the International Monetary Fund (IMF) (2013, 23-26) pointed out the main drivers of Greece's large tax evasion — namely, high tax burden, "absence" of deterrence, and low tax morale — and highlighted the collapse of tax collection in the increased share of unpaid assessed taxes.[7]

In the next subsection, we make a survey of the literature on tax evasion in Greece and the size and nature of the Greek shadow economy. The aim is to reveal the peculiarities of the Greek shadow economy and its relation to the development of the country's economic and political crisis.

The Size and Determinants of the Greek Shadow Economy

Before looking at the estimations for the size of the Greek shadow economy, it is important to consider the significance of its determinants. An early study concerning the determinants of tax evasion in Greece concludes that widespread tax evasion is largely due to the historical mistrust between the Greek state and its citizens (Ballas and Tsoukas 1998). Over a decade later, and despite the positive externalities of the euro experience (prior depression), low tax morale (influenced by distrust, both in the government or state institutions and in other taxpayers) remains a major cause for the inability of fiscal authorities to meet the projected tax receipts goals (Kaplanoglou and Rapanos 2013). This form of distrust (influenced by phenomena, such as clientelism and rent-seeking discussed below) impacts two specific tax morale determinants: (i) reciprocity, in which an additional utility term for paying taxes depends in some way on the individual's relationship to the state and to peer effects; and (ii) social influences, in which the additional utility term for paying taxes depends on views or behaviors of other individuals (Luttmer and Singhal 2014, 155). Moreover, another dimension of tax morale in Greece, which is not related to trust in public institutions and is frequently termed by the Greek media the "sport of tax evasion," is better described by the norm of

evading taxes for personal gain, and can be understood as the absence of a "social norm" of tax compliance (see Alm and Torgler 2011).

In addition to low tax morale, the tax burden is equally importance for tax evasion in Greece. An empirical study focusing on Greek tax data before 2000 indicates that the shadow economy responds symmetrically to both direct and indirect tax changes and that individuals move into the shadow economy as quickly as they move out of it when taxes decrease (Christopoulos 2003). Moreover, a non-empirical, but more comprehensive approach to the determinants of the Greek shadow economy highlights the tax and social security contribution burdens, as well as the intensity of the related regulations as the major determinants (Katsios 2006). However, as already mentioned, some of the studies about the Greek shadow economy (for example, see Kaplanoglou and Rapanos 2013) reach the conclusion that it is not the size of the tax burden per se that influences the size of the shadow economy. Rather, it is the institutional quality and reciprocity reflected through the tax burden.[8]

Another non-empirical study asserts that Greece's relatively high unemployment rate and the non-stop (geographically influenced) provision of undocumented immigrant workers encourage shadow economic activities (Danopoulos and Znidaric 2007). The same study concludes that the relatively large Greek shadow economy is influenced by the high poverty levels in Greece. This conclusion also has some empirical support in the indication that the poorest regions in the EU tend to have the highest shadow economy quotas (Tafenau, Herwartz and Schneider 2010). The studies exploring the Greek shadow economy during the economic depression era imply that, since it is heavily influenced by economic conditions (unemployment) and policies (fiscal austerity and tax increases), the shadow economic activities take place in the sense of economic survival (Matsaganis, Leventi and Flevotomou 2012; Mitsopoulos and Pelagidis 2011; Schneider and Buehn 2012).

All macroeconomic studies that estimate the size of the Greek shadow economy, and are not published in Greek, examine the country as part of a broader (more than two digits) sample and generally underline the determinants explored by Friedrich Schneider (2005). These include (i) tax and social security burden, (ii) burden of state regulations, (iii) tax morale, (iv) GDP, and (v) unemployment, with such innovations as the exploration of self-employment as a determinant. One exception to these studies is a work by Maurizio Bovi (2003) on the determinants of the shadow economy in OECD countries during the 1990s, which relies on previous estimations for its data set formulation. Bovi (2003) concludes that the Greek shadow economy is institutionally pushed. He also highlights the relatively high levels of corruption, the weakness of the legal system, and strict labor market regulations in the country. The macroeconomic studies of Roberto Dell'Anno, Miguel Gómez-Antonio, and Angel Alañon-Pardo (2007), of Andreas Buehn and Friedrich Schneider (2012a), as well as of some Greek authors (such as, Pavlopoulos 1987; Vavouras et al. 1990; Negrponti-Delivani 1991; Kanellopoulos et al. 1995; Tatsos 2001, see Table 1) are empirical studies that indicate the size of the Greek shadow economy.

Insert Table 1 here

Only two of the studies on Table 1 explore the interaction of the shadow economy with the official economy over the business cycle. Dell'Anno, Gómez-Antonio, and Alañon-Pardo (2007) and Buehn and Schneider (2012a) statistically observe the existence of a substitution effect.[9]

With regard to corruption and the shadow economy, Stavros Katsios (2006) argues that there is a complementary relationship. This complementary relationship is rooted in the phenomena of

clientelism and rent-seeking, which we discuss later on. What we briefly present here are the findings of studies on the "restricted" access (i.e., protracted access to treatment) to public healthcare that has caused Greece to impose the highest out-of-pocket healthcare expense in the EU (Matsaganis, Leventi and Flevotomou 2012; Siskou et al. 2008).The Greek healthcare system — where patients frequently make "under-the-table" payments to access public services that are supposed to be free — is an ideal case study of the links between shadow economy and corruption. The inequity in access, supply, and quality of services is caused by providers that have little incentive to improve productivity and rely on informal payments (Mossialos, Allin and Davaki 2005). As a result, socio-economic factors (such as low average household income, high unemployment, obligatory and full coverage by social insurance, etc.) that disincentivize individuals to pay for private insurance do not affect the preference to pay a doctor or hospital directly or "under the table" (Siskou et al. 2009). More specifically, a study, measuring and analyzing the size and nature of informal payments by households in Greek public hospitals (Liaropoulos et al. 2008), indicates that 36 percent of the sample healthcare users made an informal payment to a doctor irrespective of their socio-economic characteristics, either because they lacked confidence in the service received (e.g., receiving sub-standard care) or for receiving the service (e.g., on doctor's demands or to avoid the waiting).

The Size and Determinants of Tax Evasion in Greece

As Figure 1 illustrates, the shadow economy includes productive (thus value-adding) activities that may be directly compared (or added) to GDP. Figure 1 also shows that the economic agents, engaging in shadow economic activities (except from illegal or household activities), do so in order to evade taxes. Tax evasion does not describe a value-adding activity and is the outcome of a financial transaction with the objective to conceal income (Schneider and Enste 2002b, 10). Since shadow economic activities and tax evasion are related, but not identical, tax evasion has become a research area of its own.

Although tax evasion in Greece increases the average private disposable income, its consequences are tremendous as it reduces tax yields, makes income distribution more unequal, and renders the tax system considerably more regressive (Matsaganis, Leventi and Flevotomou 2012). Moreover, an increase in tax revenues, which requires a great deal of progress both in the efficiency of collection and in combating tax evasion, is necessary for the consolidation needed to place the public finances back on a sustainable path. It is estimated that foregone government revenues due to tax evasion amount to 31 percent of the deficit for 2009 (Artavanis, Morse and Tsoutsoura 2012).

Early estimations of tax evasion in Greece constituted about 4 percent of GDP (Institute for Mediterranean Studies 1993) and approximately 45 percent of value-added tax (VAT) revenues (Agapetos, 1999). Another early estimation, focusing on companies listed on the Athens Stock Exchange, points to 13 percent of total confirmed taxes (Kanellopoulos 2002). A more recent study, considering indirect taxation as the driving force of tax evasion (and making some "bold" assumptions), estimates tax evasion in Greece to be about 1.5 percent of GDP for 2010 and 1.8 percent of GDP on average for the period from 1999 to 2010 (Buehn and Schneider 2012b). A study that compares the levels and effects of tax evasion before and during the Greek crisis (Matsaganis, Leventi and Flevotomou 2012) estimates the average rate of under-reporting in 2006 at 11.8 percent (of total tax reports), which resulted in a shortfall in tax receipts of 27.8 percent (of total tax receipts). For 2010, Manos Matsaganis, Chrysa Leventi and Maria Flevotomou (2012) set the average rate of under-reporting at 12 percent and the shortfall in tax receipts at 30.3 percent.

Who participates most in tax evasion? The literature points toward firms and the self-employed, thus leaving salaried employees to carry the burden of government liabilities.[10] There were arguments in the early 2000s that the self-employed are more likely to participate in unregistered activities that remain invisible to the tax authorities (Tatsos 2001). The highest estimates (from an empirical evaluation based on data for 2004–2005) of the aggregate rates of income under-reporting for the purpose of tax evasion were 24 percent for the self-employed and 53 percent for farmers (Matsaganis and Flevotomou 2010). A recent evaluation indicates that the pattern of income under-reporting by income class is U-shaped and that income from farming and self-employment earnings account for the bulk of tax evasion in Greece (Matsaganis, Leventi and Flevotomou 2012). Moreover, it is reported that the top tax evaders are professionals (with politicians protecting their own occupations), and the paper trails of firms and occupations that are low on input and output also indicate a fairly high rate of tax evasion (Artavanis, Morse and Tsoutsoura 2012).

Tax evasion then can be an explanation for the large preference of self-employment in Greece relative to the other EU countries. Although administrative barriers to entry make self-employment in Greece unattractive, the advantages of tax evasion and savings from social security payments (which effectively increase for higher incomes) become a forceful incentive to prefer self-employment to salaried employment (Mitsopoulos and Pelagidis 2011).

Undeclared Work in Greece

According to estimates, the size of undeclared work ranges from one quarter to one third of the size of the shadow economy estimates derived from the MIMIC model. The application of this method indicates that undeclared work earnings in Greece comprised 6.8 percent of GDP in 2010, with an average of 8.1 percent for 1999–2010 (Buehn and Schneider 2012b). However, these indirect estimations may digress from actual numbers. For example, 10 percent of all firms inspected by the Social Insurance Foundation in 2008 failed to pay social contributions, while 27 percent of their employees remained unregistered (Matsaganis and Flevotomou 2010).

Katsios (2006) argues that shadow production in Greece is relatively labor-intensive. a fairly recent recent study (Kanellopoulos 2012) that discusses the synthesis of undeclared work in Greece indicates that the highest shares of undeclared work in 2010 belonged to (i) immigrants (approximately 38 percent), (ii) individuals less than thirty years old (34 percent), (iii) family business assistants (21 percent), and (iv) part-time employees (31 percent). Moreover, the same study highlights that undeclared work is industry- and occupation-specific. As such, undeclared work concerns mostly the construction, service ("hotels and tourism activities"), and "trade" industries, where employment has a temporary nature and is difficult to detect (e.g., household personal assistants). Finally, this study Kanellopoulos (2012) also indicates that employment for extra income (i.e., second-job holders or employed retirees) is mostly done in the shadows. The large figures for undeclared work in Greece (approximately 30 percent in 2011 and significantly higher than the respective figures of other euro-area countries) are also the result of unemployed workers who dominate the shadow economy amid economic depression (Foundation for Economic and Industrial Research2012).[11]

Clientelism and Rent-Seeking

Government decisions not only influence the size of fiscal deficits that increase the tax burden (as in Greece), but also set the stage for the overall performance of the economy through regulations. These regulations shape labor and product markets and impact the quality of official public institutions and administration (Enste 2010). All of these are determinants of the shadow economy and are contributing factors to the level of tax morale (a key determinant of the shadow economy). Therefore, the major challenge for every government is to have public institutions that work efficiently and act as a constraint for selfish politicians (Schneider 2010). In this part of the paper, we give a general picture of the factors fostering the linkage between corruption and the shadow economy in Greece, which have also been responsible for the Greek crisis.[12]

In an attempt to classify the capitalist model of the Greek economy, Kevin Featherstone (2008) concludes that it has many of the characteristics of a neo-corporatist regime (where the government negotiates sustainable bargains with unions and employers), along with some unique features, such as the "parentela" of interest mediation. The representation of unions and employers' federations is skewed toward certain groups that over-exert their influence. On one hand, employees of the public sector enjoy disproportionate benefits. On the other, certain employers (from the private sector) benefit from market regulations, barriers to entry, and stable product demand. In short, Featherstone (2008) indicates that the problems of clientelism and rent-seeking result in high levels of perceived corruption and tax evasion in Greece. They undermine competition and the effective delivery of public services and functions, thereby generating a welfare system that is expensive, wasteful, and socially exclusive.

In an assessment of the Greek political practice, Christos Lyrintzis (2011) argues that the political elite utilizes state channels and recourses to control a large aspect of public life (such as organized interests, the civil service, local and regional authorities, and universities), and that it forces the private sector to maintain close links with parties for the exchange of assistance from state mechanisms to secure loans, business licenses, etc. Moreover, the norm of regarding government expenditure (the public sector) as a "free" good, not entailing any costs to them, strengthens the role of interest groups that defend the status quo and seek rents through political channels (Mitsopoulos and Pelagidis 2009a). These rents are obtained and sustained due to corrupt bureaucracy and lack of transparency (Mitsopoulos and Pelagidis 2007).

Rent-seeking and clientelism (thus, the competitive advantage over political rivals) — which foster a reality of inefficient allocation of public funds, tax evasion, and deterioration in the quality of public goods — are the primary causes for the inefficiencies of the public sector that have greatly contributed to the current political and economic crisis in Greece (Katsimi and Moutos 2010; Lyrintzis 2011). More specifically, the Greek paradox of rapid economic growth in the early 2000s (just prior to the eruption of the crisis) has been greatly affected by a public sector expansion (through clientelism) and the control of product and labor markets by rent-seeking groups. This creates the paradox of Greece's matching the prosperity of advanced economies, while having the quality of governance and social coherence of a developing country (Mitsopoulos and Pelagidis 2009b).[13] Moreover, clientelism highlights the role of local elites in the uneven economic growth across Greek regions (Liddle 2009).

Altogether, clientelism and rent-seeking are an example of "systemic corruption that is endogenously ingrained in institutions, behaviors, and the habits of elites against the common good" (O'Hara 2014, 304). Konstantinos Angelopoulos et al. (2010) provide an empirical example of these phenomena, indicating that rent-seeking competition in the public sector for higher subsidies and transfers, lower taxes, and suchlike, leads to fiscal privileges at the expense of the general public interest. These fiscal privileges are the outcome of both legal and illegal activities and amount to a de facto transfer of a significant GDP percentage to the shadow

economy. Spyros Skouras and Nicos Christodoulakis (2011) indicate that the corruption, taking place during Greek elections, greatly increases both tax evasion and wildfires. The former is the outcome of lose auditing, while the latter — of frivolous granting of building permits. Both examples signify the role of poor institutional quality and reveal that even a slight improvement in institutional quality can lead to substantial social welfare gains.

Methodological Issues and Goals

An overview of different findings on the size of the shadow economy leads to the implication that different estimation procedures generate different results. More specifically, direct approaches generate lower estimates than indirect approaches. This difference contributes to a major criticism against the estimates of indirect approaches when the qualitative data are regarded more accurate and reflective (see Thießen 2010). Then again, this difference can also be an indicator of the flaw of the direct approaches' data collection, if it is assumed that economic agents are reluctant and insincere in face-to-face interviews with sensitive questions (Buehn and Schneider 2012a), and that direct approaches do not record the total value-added but only the value-added by undeclared work (Feld and Schneider 2010). Moreover, the difficulties in undertaking cross-country (cross-cultural) questionnaire surveys and in generating comparable results are a further complication of indirect approaches (European Commission 2007, 3-5).

The criticism against the accuracy of the MIMIC model's estimates (see Breusch 2005a; Thießen 2010) concerns mainly the *ad-hoc* econometric specifications that make it subject to statistical errors as well as the lack of micro-foundations. For example, although the MIMIC model seems to generate more reliable estimates of the shadow economy than the traditional currency demand- or the physical input (electricity consumption) methods, it is still vulnerable to the same criticisms as these two methods (Maloney and Saavedra-Chanduvi 2007). Moreover, the MIMIC approach is not considered the most powerful single global estimation formula of the shadow economy (Truscott and Korns 2011).

Despite the criticism, there have been arguments that the MIMIC approach "provides a fruitful way of estimating the principal features of a very broadly defined underground economy" (Tedds and Giles 2005, 394). The steps toward a more dynamic MIMIC model in order to enhance its reliability, and the lack of a more persuasive indirect alternative, do not take away from the MIMIC approach's ability to generate a credible broad depiction of the shadow economy.

In view of that, we use MIMIC approach to derive the estimates about the size of the shadow economy as a percentage of GDP (official economy) for the twenty-eight EU states and eight non-EU countries. Figure 2 depicts the indicators and causal variables that have been successfully used in past studies (see Schneider and Buehn 2012; Schneider, Buehn and Montenegro 2010). In Figure 2, we reveal the relative impact of the causal variables on the shadow economy by testing the following hypotheses (for a description of both the causal and indicator variables, see Appendix Table 1A):

(a) The higher the tax burden measured by personal income tax and/or indirect taxes, the bigger the shadow economy, *ceteris paribus*.
(b) The higher the self-employment quota, the bigger the shadow economy, *ceteris paribus*.
(c) The higher the unemployment, the bigger the shadow economy, *ceteris paribus*.

(d) The more regulated official business activities, the bigger the shadow economy, *ceteris paribus*.
(e) The lower the quality of institutions measured by the rule of law (or lower levels of corruption), the bigger the shadow economy, *ceteris paribus*.
(f) The lower the tax morale, the bigger the shadow economy, *ceteris paribus*.

The estimated signs of certain causes and indicators in Figure 2 (such as unemployment and GDP) can reveal the relationship between the shadow and official economy. Country-specific correlations can also be of use if required.

We derive a rough estimation of the impact of corruption on the official economy through a Cobb-Douglas production function. The estimated influence of corruption is based on CPI scores and occurs after we have conducted a panel analysis for Austria, Germany and Greece.It is assumed that CPI scores reflect both grand and petty corruption (the higher the CPI score, the lower the perceived level of corruption). These estimations are necessary to meet the three objectives of this study: namely, to reveal (i) the significance of the institutional determinants of the Greek shadow economy: (ii) its interlinkages with corruption; and (iii) whether its absorption by the official economy can provide succor and relief from economic depression.

Discussion and Policy Recommendations

We divide this section in two parts. First, we offer a discussion of the empirical findings in the first subsection. Second, we analyze some policy orientations in relation to the findings and current developments in the next section, and — although it is not common — we make several references to the works of others at this stage. The reason for citing other authors' findings is that the discussion about proper policy orientations requires a background that is not quite similar with the literature presented in the second and third sections above.

Shadow Economy Estimates and the Impact of Corruption in Greece

Table 2 presents the estimation results and indicates that all six hypotheses are accepted. For example, the respective coefficients of specification indicate that (in absolute terms) unemployment has the highest positive impact, followed by tax burden (especially direct taxes), self-employment, and GDP growth. These values are followed by the negative impacts of business freedom, tax morale, and the rule of law. With regard to the relationship between the shadow economy and the business cycle, unemployment and GDP per capita have a negative impact on the shadow economy, at the same time as GDP growth appears to have a positive one.

Insert Table 2 here

Table 3 depicts the estimated size and development of the shadow economies within the twenty-eight EU member countries, four non-EU European countries, and five highly developed non-European OECD countries. Each group of countries is listed according to the estimated size of the shadow economy in 2011. The euro-area countries with the highest shadow economy estimates in terms of GDP are mainly located in the EU periphery, more specifically, in the Mediterranean. For example, the euro-area countries that exhibit an estimated shadow economy in 2011 of over 20 percent in terms of their GDP are Estonia,

Cyprus, Malta, Greece, Slovenia, and Italy. The largest shadow economies estimates in 2011 within the EU belong to Balkan and Baltic countries, while the smallest are found in central Europe (Austria and Luxembourg). The non-EU European countries of southeast Europe exhibit shadow economy estimates in 2011 that are well above of the EU unweighted average. In contrast, the respective estimates of Switzerland and Norway are well below of that average. The five highly developed non-European OECD countries exhibit shadow economy estimates in 2011 that are also well below of the EU average. All these differences in the estimated sizes lead me to suppose that there is a linkage between the level of development and the size of the shadow economy. However, the differences in the estimates of similarly developed countries (such as Greece and Spain) indicate that the existence of this negative relationship depends on factors which are assumed to gain in quality as the country develops and not to the level of development per se.

Insert Table 3 here

Since the estimated coefficients for the whole sample in Table 2 fail to give a straightforward conclusion on whether the substitution or the income effects dominate, the estimation of country-specific coefficients becomes necessary. We do this by exploring the correlations of the estimated shadow economies with the GDP in purchasing-power standards (PPS). Table 4 indicates that the estimated size of the shadow economy is negatively correlated to economic growth in the euro area and suggests that the substitution effect dominates.

Moreover, the co-movement of the estimated shadow economy and GDP in PPS is not similar only in three cases. In Greece, the estimated shadow economy decreased amid the economic depression in 2011, in Malta, the respective figure increased along with the country's GDP in 2010, and, in Portugal, the respective figure decreased amid a recession in 2008. Nevertheless, these exceptions do not hold if it is assumed that the developments in the shadow economy at time t_1 follow the developments in the official economy at time t_0. Alternatively, when this assumption is not considered, one can assume that this co-movement may be due to country-specific factors. For example, following the suggestion that irregular migration and the shadow economy complement one another (for example, see Maroukis, Iglicka and 2011), the number of third-country nationals found to be illegally present in Greece started to decrease in 2011 — 24 percent less than in 2010 (Eurostat n.d.). This might be an explanation for the contraction of the Greek shadow economy in 2011.

Insert Table 4 here

With regard to the impact of corruption on the official economy, the simple Cobb-Douglas model is suitable for a preliminary representation. Table 5 indicates that, according to the CPI scores for 2011, Greece ranks 80th in the respective list and falls behind all euro-area and other highly developed countries (Transparency International n.d.). Although the estimated Greek shadow economy is roughly three times the size of the Austrian and 1.8 times the size of the German estimates (see Table 3), corruption (in terms of CPI scores) in Greece is almost double than the respective levels in Austria and Germany (see Table 5). Assuming the reliability of CPI scores, the estimates for 2011 in Table 5 indicate that undeclared income due to corruption in Greece is 12.7 percent of GDP, which is more than double the respective figures in Austria and Germany. Moreover, the level of corruption (CPI scores) and the development of the shadow economy (Table 3 estimates) are positively correlated — strongly in Austria and Germany, and weakly in Greece. A sensible explanation for this variation may be

the peculiarly rapid worsening of Greece's CPI scores from 2009 onwards, although there had been a stable minor increase until 2008. The literature presented in the third section above indicates that corruption in Greece was not a phenomenon that appeared at this scale in 2009. The events starting from the third quarter of 2009 (Greek elections following the announcements of austerity measures, the issue of falsified Greek statistics, the continuously revised deficit, and the rise of Greek sovereign bond spreads) led to the eruption of the Greek sovereign debt crisis and the disclosure of several political scandals. These developments, in turn, immediately relagated Greece among highly corrupted countries and influenced its CPI scores accordingly.[14]

Insert Table 5 here

Policy Orientations for Transferring the Shadow Economy into the Official Economy During a Crisis

Schneider and Enste (2000) have pointed out that at least two thirds of the income earned in the shadow economy is immediately spent in the official economy, and thus it can have a positive effect on the official economy. As such, the shadow economy is an asset rather than a liability to the growth of the official economy, since it creates an extra-added value that can be spent in the official economy and absorbs the unemployed during downturns[15] (Dell'Anno and Solomon 2008). This suggestion is supported by the finding (see Table 4) that the shadow economy and the official economy are substitutes over the business cycle. Therefore, "a decline of the shadow economy production will increase the welfare only if a larger part of it is transferred into the official economy" (Schneider 2008, 107).

So, can Greece benefit by transferring part of the shadow economy to the official economy and how can that be accomplished? Particularly, can the benefits (if any) assist in the struggle to exit from the fiscal trap? Although the importance of tackling tax evasion for revenue-generating purposes is frequently put forward (for example, see Monastiriotis 2011) and several suggestions on anti-tax-evasion policies have been made (for example, see Vasardani 2011), there has not been any research effort to date on clarifying how the shadow economy can be transferred into the official economy and whether that can lead to an exit from the Greek crisis.

With respect to the part that can be transferred, it is useful to consider that EU countries with low levels of corruption (CPI scores) have shadow economies of up to 15 percent of their GDP (see Table 3). Since raising tax rates would increase the shadow economy and lowering tax rates would result in unsustainable budget and trade deficits, the optimal rate of taxation would lead from a macroeconomic point of view to some shadow economic activity (Dabla-Norris and Feltenstein 2005). If the optimal rate of taxation in the case of Greece would permit a shadow economy amounting to 15 percent of GDP, then a transfer/reduction of the Greek shadow economy by 9-10 percent of GDP implies a maximum gain of 4-5 percent of GDP in government revenues (from both direct and indirect taxes) because the shadow economy incorporates activities of the official economy (for example, a good or service sold in the shadow requires other goods and/or services purchased officially). As such, the accrued benefits would ease the requirements for fiscal austerity.[16]

The impressive figure of €67.9 billion of uncollected confirmed taxes (see footnote 7), the persistence of economic depression, and the importance of the tax burden as a driver of the shadow economy imply that tax cuts (and a decrease in social security contributions) are

necessary for accomplishing this transfer. Moreover, the growth effects of income tax rate cuts can offset a significant percentage of potential revenue losses (Stinespring 2011) or, more specifically, of uncollected confirmed taxes.

The vast amount of uncollected confirmed taxes is also an indicator of insufficient tax collection in terms of auditing and enforcement. The main problems that still persist are the following (discussed in several reports, such as, for example, IMF 2013, 23; OECD 2011, 83-86):

(a) tax evasion arising from personal income (where the self-employed declare income near the minimum taxable threshold) and from not issuing receipts (VAT evasion);
(b) the failure to collect VAT and social security contributions when due; and
(c) the practice of tax amnesties and debt settlements adopted by Greek governments that encourages individuals not to pay taxes when due, as the expected penalties are low.[17]

Thus, the number of audits should increase significantly since it would aid in reducing the number of tax offenders, especially in periods of high unemployment (Tagkalakis 2013). Also, policy enforcement has to be strict since several studies indicate that tax enforcement measures are negatively correlated with the shadow economy (for an evaluation, see Buehn and Schneider 2012b). Moreover, the adoption of a neoclassical "enforcement paradigm" should involve and a friendly "service-oriented" tax administration that promotes trust and discourages corruption (Alm and Torgler 2011).

Alongside the issues of tax burden and tax collection is the improvement of tax morale, which causally affects compliance behavior (Halla 2012), and reflects the level of trust in public institutions and the perceived (un)fairness of the tax system.[18] Tax administration improvements and stricter tax enforcement mechanisms may result in short to medium-term improvements of tax morale, since the perceived tax evasion of other individuals is positively linked with an individual's tax morale (Frey and Torgler 2007). However, reciprocity, social norms, cultural factors, and the rest of tax morale determinants (Luttmer and Singhal 2014), related to the level of institutional quality (and thus whose change is time demanding), imply that a significant improvement may occur in the longer term.[19]

These policies, however, have not yet been adopted by the Greek government. Such policies should aim at easing the tax burden and improving tax collection (auditing and enforcement) in order to reduce the size of the shadow economy by transferring part of it to the official economy. Ways to do that includes reducing the corporate tax rate (which is inevitable as Greece's neighboring countries have significantly lower rates), lowering the income tax rate (which is necessary in an economic depression), and shifting the tax burden from labor to consumption (aiming to increase employment, which should not concern the taxation rate of necessity goods). This is in contrast to the suggestions of other studies (for example, see Papageorgiou, Efthimiadis and Konstantakopoulou 2012) as well as policies that increase effective taxation (through the presumptions of maintaining costs and acquisition of assets) on self-employment income. Although this practice may be justified by the Greek preference for self-employment due to tax evasion, strict auditing and enforcement is required for it to succeed, in which case the positive effects of the shadow economy on the official economy during economic depression is diminished. Any increase in taxation should take place gradually and after a period of adopting the reduced rates (or preferably, of a flat taxation rate of, say, 15 percent for salaried income, firms, and the self-employed). There have to be significant improvements in terms of combating corruption and increasing the quality of the

public sector during that period, so that the level of tax morale would improve and mitigate the negative impact that potential tax increases might have on the size of the shadow economy.

An adoption of these measures by the Greek government would lead to a successful transfer of part of the shadow economy into the official one. This transfer would potentially boost government revenues and provide relief from the economic depression that emerged from the sovereign debt crisis.

Concluding Remarks

The size of the shadow economy and the levels of corruption in Greece have been and still are particularly high with respect to other developed OECD countries. Moreover, the political dimensions of the Greek crisis (reflected by the phenomena of clientelism and rent-seeking which are held responsible for the shortcomings of public administration) suggest a correlation between the size of the shadow economy and the levels of corruption. Policies targeting the shadow economy may lead to alternate sources of government revenues that would lessen the requirement of fiscal austerity and provide relief from the current economic depression.

We studied the determinants of the Greek shadow economy, its interaction with corruption and behavior over the business cycle, and the conditions fostering its transfer to the official economy. We employed the MIMIC approach to find that the size of the Greek shadow economy is among the highest ones among developed OECD countries and that there is a negative correlation between its progression and the economic cycle. Our MIMIC estimates also indicated that a reduction of the size of the Greek shadow economy to a size comparable to other developed OECD countries, with low levels of corruption, can be an alternative source for raising government revenues if the reduced part is transferred into the official economy.

Regarding the interaction of the shadow economy and corruption, our estimates of a simple Cobb-Douglas model indicate that there is a weak positive correlation between corruption and the size of the shadow economy in Greece. However, an account of the reliability of CPI scores (especially for the Greek case) and the size of undeclared income due to corruption indicate that a strong correlation may well exist.

Finally, our MIMIC estimates about the determinants of the shadow economy indicate that the level of unemployment, the tax burden, the level of self-employment, and GDP growth have a positive impact, while business freedom, tax morale, and the rule of law have a negative impact on the size of the shadow economy. Policies have to take into account these determinants and the peculiarities of the Greek case — economic depression and corruption — in order to accommodate a successful absorption of the shadow economy into the official one. Such policies should aim at lowering the tax burden, increasing tax collection efficiency in terms of auditing and enforcement, and combating corruption. As such, the negative impact on the shadow economy from potential tax increases that may be necessary later on may be constrained by improvements on the level of tax morale. By contrast, policies aiming at contracting the shadow economy's size, without accounting for its key determinants (for example, deterrence only by means of strict enforcement), would hamper the possibility of a successful transfer and take away the potential positive effects that the shadow economy may have on income levels amid economic depression.

The limitations of our findings are rooted into the use of macro-level data. This issue mainly affects the analysis about the determinants of the shadow economy, as micro-level data would allow for a more detailed exploration of phenomena, such as undeclared work, corruption, and tax morale. Nevertheless, the use of macro-level data is more appropriate when considering the aims of our study: namely, to estimate the size of the shadow economy, to

explore its relation with the official economy over the business cycle and its interaction with corruption, and to perform cross-country comparisons.

Footnotes

[1] The difference between MIMIC models and indirect macro-level approaches stems from the fact that they test the relationship between causes and indicators, respectively (Maloney and Saavedra-Chanduvi 2007, 34).

[2] Kamila Fialova and Ondrej Schneider (2011) observe that strict employment protection legislation increases the size of the shadow economy in the EU.

[3] The relationship between the shadow economy and its quantifiable determinants is not that straightforward since it is influenced greatly by the quality of institutional frameworks. For example, the shadow economy depends on government choices (towards taxation, bureaucracy, etc.) that, in turn, depend on exogenous factors (historical, cultural, etc.), and altogether generate a continuum of country-specific shadow economy equilibrium rates (Bovi and Dell'Anno 2010). Accordingly, differences of public trust in governments explain why it is possible for some countries to have higher taxes and smaller shadow economies (Elgin and Garcia 2012).

[4] Moreover, Catalina Granda-Carvajal (2012) indicates that counter-cyclicality is positively correlated with the size of the shadow economy.

[5] In vertical centralization, the hierarchical structure consists of a vertical dimension of differentiated levels of authority and responsibility. In horizontal centralization, the horizontal dimension of differentiated levels of authority and responsibility is determined by specialization and/or regionality.

[6] Firms that evade taxes have larger available cash flows (for example, through VAT evasion), or lower costs (for example, from undeclared personnel), and thus they have an advantage over firms that do not participate in the shadow economy. Beyond that, corruption and bureaucratic inefficiency amount to a tax on all firms (for example, in terms of bribing). Both phenomena create barriers to entry and negative externalities to firms that do not participate in the shadow economy.

[7] Insufficient tax collection is reflected in the sum of €67.9 billion of uncollected confirmed taxes, which is more than a third of Greece's GDP (arrears concern the third quarter of 2013 and can be accessed in Greek at www.gsis.gr/gsis/info/gsis_site/PublicIssue/profit_np/ and www.gsis.gr/gsis/info/gsis_site/PublicIssue/profit_fp/index.html).

[8] For instance, data from OECD and the World Bank ("average personal income tax and social security contribution rates on gross labor income for the average wage earner" can be accessed at http://data.worldbank.org/indicator/IC.TAX.TOTL.CP.ZS?page=1, while "total business tax rate as a percentage of commercial profits" is available at http://stats.oecd.org/) reveal that, although the tax burden in Greece has increased since 2010 (when the first bailout occurred), it is still lower that the eurozone's core countries (such as France and Germany). The picture is mixed when compared to the periphery (for example, lower than Italy's and higher than Portugal and Poland's).

[9] A much earlier study focusing on tax evasion for the period from 1987 to 1996 also reaches the same conclusions, and indicates that recession encouraged the level of tax evasion in Greece and that institutional quality and the tax burden were its primary determinants (Agapetos 1999).

[10] For example, small business owners perceive more opportunities in not complying with tax regulations as compared to employed taxpayers and also consider taxes as painful losses (Kamleitner, Korunka and Kirchler 2012).

[11] If undeclared workers are registered as unemployed, a realistic figure representing the extremely high levels of unemployment in Greece amid economic depression would be less than the official figure due to undeclared work. Nevertheless, the income from this type of work would be below the poverty threshold.

[12] As such, the discussion concerns exclusively the phenomena of clientelism and rent-seeking and not the elements that contributed to the Greek crisis. For the latter the reader should turn to Yiannis Kitromilides (2013) and Vasileios Vlachos (2013).

[13] An interpretation of the pre-crisis Greek paradox of rapid economic growth can also be reached by the following notion: since citizens have to accept some corruption and government inefficiency, "how much" depends on the quality of political institutions and on economic conditions (Aidt, Dutta and Sena 2008). As such, it can be assumed that corruption was more acceptable during Greece's economic growth of the "cheap credit" pre-crisis euro-era (and, moreover, allowed individuals to circumvent institutional deficiencies).

[14] It should be noted that the validity and reliability of corruption measurement techniques based on perception are argued to be completely unrelated to actual corruption once other relevant factors are controlled for (Mocan 2008).

[15] Another theoretical dimension is the recession-push hypothesis, where in times of high unemployment individuals are pushed into self-employment for lack of alternative sources of income, such as paid employment. Emilio Congregado, Antonio Golpe, and André van Stel (2012) find that the effect is disproportionally stronger when economic conditions worsen.

[16] Policies reducing the size of the shadow economy lead to a less procyclical fiscal response to shocks (Çiçek and Elgin 2011). Moreover, the findings that the size of the shadow economy is a significant determinant of financial instability, sovereign default risk, and public indebtedness (Elgin and Uras 2013), generate expectations for something more than a temporary relief.

[17] Tax amnesties and debt settlements may improve government revenue, but have a negative impact on tax morale.

[18] Jorge Martinez-Vazquez and Benno Torgler (2009) argue that the success of tax reforms and tax administration modernizations in Spain (a country with cultural similarities to Greece) had a lot to do with improvements in tax morale.

[19] The political dimensions of the Greek crisis (see clientelism and rent-seeking), which are deeply rooted in the inefficient use of public resources, greatly affect the level of tax morale (for an example about Italy, see Barone and Mocetti 2011). Citizens' perceptions of this phenomenon require time (and effort) to improve.

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Insert Appendix here

[Bitzenis.Vlachos.Schneider]

Figure 1. Legal/Official/Formal, Shadow, Illegal/Underground, and Informal Economy

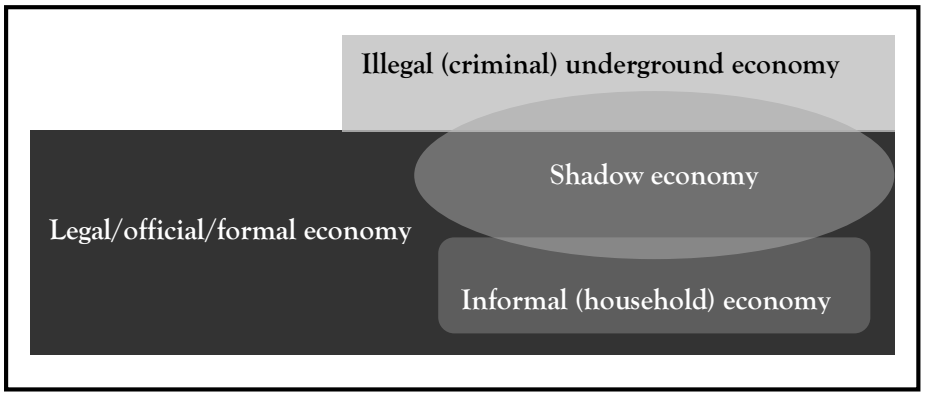

Figure 2. Interaction Between Causes, Size, and Indicators of the Shadow Economy

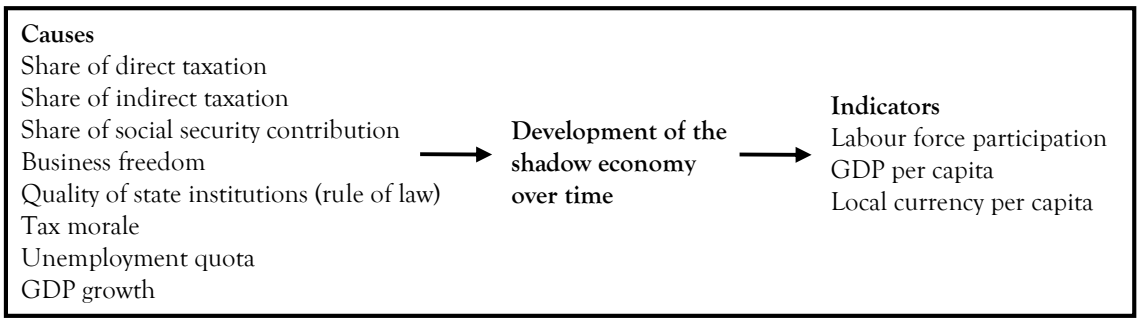

Table 1. Greek Shadow Economy Estimates

Study	Method	Size of the Greek shadow economy (% of GDP)
Schneider and Buehn (2012) provide estimates for the size of the shadow economy in 39 OECD countries (1999–2010).	MIMIC approach.	26% in 2008 (27.4% is the average value for 1999–2008)
Schneider et al. (2010) and Buehn and Schneider (2012a) provide estimates for the size of the shadow economy in 162 countries (1999–2007).	MIMIC approach.	26.5% in 2007 (27.5% is the average value for 1999–2007)
Dell'Anno et al. (2007) provide estimates for the size of the shadow economy in France, Spain, and Greece (1968–2002).	MIMIC approach.	Approximately 28% in 2002
Tatsos (2001) provides estimates for the size of the shadow economy in Greece (1967–1997).	Currency demand approach.	36.7% in 1997 (30.1% is the average value for 1967–1997)
Kanellopoulos et al. (1995) provide estimates for the size of the shadow economy in Greece (1982 and 1988).	Comparison of data from the Household Budget Survey with private consumption as registered in the National Accounts.	27.6% in 1982 and 34.6% in 1988
Negreponti-Delivani (1991) provides estimates for the size of the shadow economy in Greece (1970–1985).	Currency demand approach.	18.9% in 1984 (11% is the average value for 1958–1988)
Vavouras et al. (1990) provide estimates for the size of the shadow economy in Greece (1958–1988).	Currency demand approach.	31.6% in 1988 (26.6% is the average value for 1958–1988)
Pavlopoulos (1987) provides estimates for the size of the shadow economy in Greece (estimates for 1984).	Assuming for discrepancies on the macro level: i.e. accounting for underestimation of value-added activities.	28.6% in 1984

Note: Although Schneider and Buehn (2012) provide estimates until 2010, their estimates for 2009 and 2010 are not depicted in Table 2. They state that "data for 2009 and 2010 are not available for all causes, hence 2009 and 2010 estimates are a linear interpolation of the 2008 estimate and the country average" (Schneider and Buehn 2012, 19).

Table 2. MIMIC Model Estimations (Standardized Coefficients)

Specification	1	2	3	4	5
			Causes		
Personal income tax	0.27*** (3.27)	0.33*** (3.99)	0.37*** (4.30)	0.40*** (4.80)	0.39*** (4.74)
Payroll taxes	–0.08 (0.98)	–0.11 (1.35)			
Indirect taxes	0.24***	0.22***	0.31***	0.21***	0.24***

	(2.75)	(2.66)	(3.85)	(2.67)	(2.97)
Tax morale	−0.31***	−0.22***	−0.26***	−0.22***	−0.21***
	(3.29)	(2.40)	(2.84)	(2.51)	(2.38)
Unemployment	0.63***	0.65***	0.63***	0.55***	0.53***
	(5.92)	(6.30)	(5.96)	(5.56)	(5.47)
Business freedom	−0.29***	−0.26***	−0.29***	−0.35***	−0.35***
	(3.35)	(3.11)	(3.36)	(4.06)	(4.20)
Self-employment	0.29***	0.30***	0.34***	0.33***	0.27***
	(2.68)	(2.88)	(3.17)	(3.18)	(2.57)
Rule of Law	−0.14*	−0.14*	−0.10	−0.08	
	(1.81)	(1.83)	(1.31)	(1.03)	
GDP growth		0.30***	0.31***	0.27***	0.29***
		(3.62)	(3.70)	(3.35)	(3.52)
Education				−0.31***	−0.26***
				(3.51)	(2.83)
Corruption					0.14
					(1.56)
Indicators					
GDP per capita	−0.52	−0.52	−0.48	−0.51	−0.50
Currency in circulation	0.09	0.07	0.10*	0.10*	0.08
	(1.39)	(1.07)	(1.75)	(1.69)	(1.26)
Labor force participation	−0.56***	−0.55***	−0.52***	−0.50***	−0.51***
	(6.42)	(6.58)	(6.36)	(6.48)	(6.46)
Observations	151	151	151	151	151
Degrees Freedom	44	54	42	52	52
Chi^2	88.88	89.68	24.10	32.51	34.57
RMSEA	0.08	0.06	0.00	0.00	0.00

*Notes: Absolute z-statistics are reported in parentheses. *, **, *** indicate significance at the 10, 5.0, and 1.0 percent levels, respectively. The estimations have been presented by one of the authors at an international meeting (Schneider and Buehn 2013).*

Table 3. Shadow Economy Estimates (GDP Percentage)

Country/Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
Bulgaria	35.9	35.3	34.4	34.0	32.7	32.1	32.5	32.6	32.3
Romania	33.6	32.5	32.2	31.4	30.2	29.4	29.4	29.8	29.6
Croatia	32.3	32.3	31.5	31.2	30.4	29.6	30.1	29.8	29.5
Lithuania	32.0	31.7	31.1	30.6	29.7	29.1	29.6	29.7	29.0
Estonia	30.7	30.8	30.2	29.6	29.5	29.0	29.6	29.3	28.6
Latvia	30.4	30.0	29.5	29.0	27.5	26.5	27.1	27.3	26.5
Cyprus	28.7	28.3	28.1	27.9	26.5	26.0	26.5	26.2	26.0
Malta	26.7	26.7	26.9	27.2	26.4	25.8	25.9	26.0	25.8
Poland	27.7	27.4	27.1	26.8	26.0	25.3	25.9	25.4	25.0
Greece	28.2	28.1	27.6	26.2	25.1	24.3	25.0	25.4	24.3
Slovenia	26.7	26.5	26.0	25.8	24.7	24.0	24.6	24.3	24.1
Hungary	25.0	24.7	24.5	24.4	23.7	23.0	23.5	23.3	22.8
Italy	26.1	25.2	24.4	23.2	22.3	21.4	22.0	21.8	21.2
Portugal	22.2	21.7	21.2	20.1	19.2	18.7	19.5	19.2	19.4
Spain	22.2	21.9	21.3	20.2	19.3	18.4	19.5	19.4	19.2
Belgium	21.4	20.7	20.1	19.2	18.3	17.5	17.8	17.4	17.1
Czech Republic	19.5	19.1	18.5	18.1	17.0	16.6	16.9	16.7	16.4
Slovakia	18.4	18.2	17.6	17.3	16.8	16.0	16.8	16.4	16.0
Sweden	18.6	18.1	17.5	16.2	15.6	14.9	15.4	15.0	14.7
Denmark	17.4	17.1	16.5	15.4	14.8	13.9	14.3	14.0	13.8
Finland	17.6	17.2	16.6	15.3	14.5	13.8	14.2	14.0	13.7
Germany	17.1	16.1	15.4	15.0	14.7	14.2	14.6	13.9	13.7
Ireland	15.4	15.2	14.8	13.4	12.7	12.2	13.1	13.0	12.8
France	14.7	14.3	13.8	12.4	11.8	11.1	11.6	11.3	11.0
United Kingdom	12.2	12.3	12.0	11.1	10.6	10.1	10.9	10.7	10.5

Netherlands	12.7	12.5	12.0	10.9	10.1	9.6	10.2	10.0	9.8
Luxembourg	9.8	9.8	9.9	10.0	9.4	8.5	8.8	8.4	8.2
Austria	10.8	11.0	10.3	9.7	9.4	8.1	8.5	8.2	7.9
EU28 unweighted average	*22.6*	*22.3*	*21.8*	*21.1*	*20.3*	*19.6*	*20.1*	*19.9*	*19.6*
Non-EU European countries									
Turkey	32.2	31.5	30.7	30.4	29.1	28.4	28.9	28.3	27.7
Norway	18.6	18.2	17.6	16.1	15.4	14.7	15.3	15.1	14.8
Switzerland	9.5	9.4	9.0	8.5	8.2	7.9	8.3	8.1	7.8
Highly developed non-European OECD countries									
Canada	15.3	15.1	14.3	13.2	12.6	12.0	12.6	12.2	11.9
Australia	13.7	13.2	12.6	11.4	11.7	10.6	10.9	10.3	10.1
New Zealand	12.3	12.2	11.7	10.4	9.8	9.4	9.9	9.6	9.3
Japan	11.0	10.7	10.3	9.4	9.0	8.8	9.5	9.2	9.0
United States	8.5	8.4	8.2	7.5	7.2	7.0	7.6	7.2	7.0

Note: Arranged from highest to lowest in 2011.

Table 4. Correlation Between the Official and the Shadow Economy

Country	Pearson's product moment	Spearman's rank	Kendall's tau
Estonia	–0.97 (–0.92)	–0.79 (–0.79)	–0.62
Cyprus	–0,97 (–0,92)	–0.93 (–0.85)	–0.61
Malta	–0.97 (–0.92)	–0.72 (–0.74)	–0.50
Greece	–0.59 (–0.83)	–0.47 (–0.75)	–0.72
Slovenia	–0.97 (–0.92)	–0.87 (–0.79)	–0.78
Italy	–0.96 (–0.92)	–0.93 (–0.77)	–0.83
Portugal	–0.98 (–0.94)	–0.96 (–0.65)	–0.83
Spain	–0.98 (–0.94)	–0.97 (–0.64)	–0.89
Belgium	–0.95 (–0.96)	–0.98 (–0.90)	–0.94
Slovakia	–0.97 (–0.92)	–0.96 (–0.85)	–0.83
Finland	–0.95 (–0.91)	–0.93 (–0.77)	–0.83
Germany	–0.95 (–0.84)	–0.95 (–0.83)	–0.89
Ireland	–0.87 (–0.94)	–0.90 (–0.86)	–0.78
France	–0.96 (–0.96)	–0.92 (–0.98)	–0.83
Netherlands	–0.99 (–0.92)	–0.98 (–0.69)	–0.94
Luxembourg	–0.97 (–0.92)	–0.79 (–0.79)	–0.62
Austria	–0.92 (–0.95)	–0.97 (–0.86)	–0.89

Notes: The official economy is measured in millions of purchasing-power standards (PPS) (Eurostat n.d.). Countries are presented according to their ranking in Table 3. The values in brackets are the correlations when the developments in the shadow economy at time t_1 follow the developments in the official economy at time t_0 (time difference of twelve months). All estimates all significant at least at the 10-percent level.

Table 5. Effect of Corruption (GDP Percentage)

Country/Year	2004		2005		2006		2007		2008		2009		2010		2011	
Austria	5.1		4.5		4.6		5.1		4.6		5.5		5.2		5.3	
CPI score [ranking]	8.4	[13]	8.7	[10]	8.6	[11]	8.1	[13]	8.1	[12]	7.9	[16]	7.9	[15]	7.8	[16]
Germany	5.5		5.8		6.3		6.9		6.5		6.3		6.5		5.8	
CPI score (ranking)	8.2	[15]	8.2	[16]	8.0	[16]	7.8	[16]	7.9	[14]	8.0	[14]	7.9	[15]	8.0	[14]
Greece	11.3		10.9		9.8		9.0		8.5		10.5		11.7		12.7	
CPI score (ranking)	4.3	[49]	4.3	[47]	4.4	[54]	4.6	[56]	4.7	[57]	3.8	[71]	3.5	[78]	3.4	[80]

Notes: The impact of corruption is based on rough estimations with an error margin of +/–20 percent. Pearson's r between CPI scores and shadow economy estimates (Table 3) is 0.8 for Austria, 0.7 for Germany, and 0.2 for Greece.

Appendix

Table 1A. Description and Expected Signs of Causal and Indicator Variables

Causal variable/ indicator	Description and source	Expected sign
Personal income tax	Personal income tax to GDP, Government Finance Statistics, IMF*	positive
Payroll taxes	Taxes on income, profits and capital gains (percentage of total tax revenue); WDI**	positive
Indirect taxes	Taxes on goods and services (percentage of total tax revenue); WDI**	positive
Tax morale	The level of tax morale is scaled according to the possibility of cheating on tax. A 10-scale index with the two extreme points "never justified" (1) and "always justified" (10) signifies that higher scores (6 or more) indicate a lower level of tax morale. European and World Value Surveys***	negative
Unemployment	Unemployment rate (percentage of total labor force; WDI	positive
Business freedom	Business freedom index measuring the time and efforts of business activity ranging; 0=least business freedom, and 100=maximum business freedom; Heritage Foundation****	negative
Self-employment	Total self-employed workers (proportion of total employment); WDI**	positive
Rule of Law	Rule of Law index summarizing the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence, -2.5=no compliance, and 2.5=total compliance; World Bank Governance Indicators*****	negative
GDP growth	GDP per capita growth, annual (percentage); WDI**	positive/negative
Education	Secondary school enrolment rate (gross percentage); WDI**	negative
Corruption	Corruption index (score between 0 and 100 with higher values indicating more corruption); Heritage Foundation****	positive
GDP per capita	GDP per capita, PPP (constant 2005 international $); WDI**	negative
Currency in circulation	Monetary aggregates M0 over M1; IMF*	positive
Labor force participation	Labor force participation rate (percentage of total population); WDI**	negative

Legend: World Development Indicators (WDI); International Monetary Fund (IMF).
*Sources: *IMF online database at http://data.imf.org/?sk=7CB6619C-CF87-48DC-9443-2973E161ABEB&ss=1420495318386.*
***WDI online database at http://data.worldbank.org/data-catalog/world-development-indicators.*
****European Values Study online database at http://www.gesis.org/unser-angebot/daten-analysieren/umfragedaten/european-values-study/data-access/ and World Values Survey online database at http://www.worldvaluessurvey.org/WVSContents.jsp.*
***** Heritage Foundation Index of Economic Freedom and Freedom from Corruption Index online at http://www.heritage.org/issues/economic-freedom and http://www.heritage.org/index/freedom-from-corruption, respectively.*
****** World Bank Worldwide Governance Indicators online database at http://data.worldbank.org/data-catalog/worldwide-governance-indicators.*