An Investigation of Supply and Demand for Undeclared Work: The Case of Greece

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Paper prepared for presentation at the

"8th Conference of the Regulating for Decent Work Network"

on Ensuring decent work in times of uncertainty

at the International Labour Office Geneva, Switzerland

10-12 July 2023

Abstract

The Greek economy has been between Scylla and Charybdis during the 2010s, from economic depression to anemic recovery and to recession caused by the pandemic crisis. Although the strong post pandemic recovery has decreased the record-high levels of unemployment, labor market slack is still among the highest levels in the EU. The economic hardships of the previous decade increased the number of studies on the Greek informal economy and led the Greek Government to endorse a Diagnostic Report from ILO on undeclared work to enable the transition to declared work. The aim of this study is to investigate the determinants of undeclared work in Greece amid economic depression. To achieve this, employers' (entrepreneurs) information on undeclared work is explored through primary data from the Greek Shadow Economy Observatory in order to get insights on the factors determining the supply and demand for undeclared work and the groups of people and areas of economic activity affected by the phenomenon. The findings indicate that policies should be oriented towards strengthening the authorities performing audits and the size of penalties, since the practice of undeclared work is not differentiated for employers not facing financial difficulties. Equally if not more important is the provision of lowering the tax burden and addressing issues that would improve the level of tax morale.

Keywords: economic depression; fully/partially undeclared work; Greece; shadow economy; unemployment.

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1. INTRODUCTION

The impact of the financial and economic crisis was still visible across the euro area as several member states have not yet fully recovered in terms of Gross Domestic Product (GDP), investment and employment. The requirement for a broader-based and more sustained recovery led European Union (EU) institutions to undertake initiatives such as the European Commission's Investment Plan for Europe (known as the Juncker Plan) which led to the development of the European Fund for Strategic Investments. Despite all efforts made, Eurostat data[1] reveal that by the end of 2015, 10 out of 19 euro area member states (only France and Malta from the Mediterranean) recovered in terms of GDP (i.e. surpassing the amount reported before they were hit by the crisis), 4 members (Belgium, Germany, Malta and Finland) in terms of gross fixed capital formation[2] and merely 2 members (Germany and Malta) in terms of employment. The worst recovery performance belonged to the periphery and the south in particular, with Greece being the tip of the iceberg. Greece borne the brunt of the crisis in the euro area as the country suffered from economic depression and remained the only member state receiving financial assistance. Eurostat data[3] reveal that by the end of 2015, Greece lost more than a quarter of the GDP and approximately two thirds of the gross fixed capital formation reported in 2007. In addition, unemployment almost quadrupled from 2008 and remained the highest in the euro area.[4]

The failure of the orientation of economic policies and of the measures adopted in the euro area to secure a sustained economic recovery and to minimize economic divergence (particularly between the core and the periphery) favored the factors determining the size of the shadow economy (such as the tax burden, the size of real income and the level of unemployment).[5] Although the increased size of the latter could be seen as a positive externality to the individuals mostly hit by the crisis (such as the unemployed) in terms of providing an income source, it occured at the cost of losing entitled legal rights.

Within this context, this paper aims to explore the factors determining the supply and demand for undeclared work and the groups of people and areas of economic activity affected by the phenomenon. The focus of analysis is Greece and the data are from the Greek Observatory of the Shadow Economy (http://www.paraoikonomia.gr/). The novelty of this

[1] See Eurostat data at http://ec.europa.eu/eurostat/data/database.
[2] Data from UNCTAD (see UNCTAD Statistics at http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx) reveal that by the end of 2014, only 4 member states have not recovered in terms of inward Foreign Direct Investment stock.
[3] Ibid., as in footnote 1.
[4] Reference years indicate the last time the indicator improved (i.e. before the indicators were hit by the crisis). With the exemption of 2014 where GDP marginally increased, GDP in Greece decreased from 2008 onwards (chain linked volumes, index 2005=100).
[5] See Bitzenis et al. (2013; (2016a).

study concerns the first-time analysis of primary data on undeclared work collected from entrepreneurs.

The paper is organized as follows. The next section gives all the necessary background information to the study by discussing the literature findings on the drivers and characteristics of undeclared work in general and in Greece. The third section presents the research questions and the method employed for exploring them. The fourth section presents and discusses the findings. The sixth and final section puts forward the conclusions, presents the limitations of this study and makes recommendations for further research.

2. BACKGROUND

This section makes a brief presentation of the impact of the economic crisis in Greece and the size of the country's shadow economy (2008-2015), discusses the factors that determine the size and impact of undeclared work and indicates some facts and developments with respect to undeclared work in Greece.

2.1 The multidimensional crisis and the size of the shadow economy in Greece

As already mentioned in the introduction, Greece has not yet recovered from the global financial and economic crisis that erupted in 2007. What distinguishes Greece's experience of the crisis from the rest of the euro area is its escalation into a multidimensional/multifaceted crisis which dragged the country into economic depression.[6] Apart from declining income levels and investment, the experience of economic depression has suppressed employment levels to the lowest in the EU. As Table 1 indicates, Greece's economically active population has started to decline after 2009 for the first time since the policy regime change in 1974. Although this decline is also a European as it is a Greek experience, the decrease of employment levels in Greece is phenomenal for a state not being in war. Approximately one million more of the economically active persons remain unemployed after 2009 and any marginal increase of the employment rate would magnify the decrease of the unemployment rate as long as economically active population declines. The decline of the latter is due to males either retiring or searching for employment abroad, while females have failed to catch up with the marginal increase of employment indicated by males last year.

[6] Vlachos (2013) reviews the literature on the development of the Greek crisis and identifies its roots in institutional deficiencies that (were revealed/emphasized by the crisis' impact and) contributed to a parallel development of a political crisis. As Mitsopoulos and Pelagidis (2009) have argued, Greece matches the prosperity of advanced countries at the same time as the quality of governance and social coherence is closer to that of a developing country. For a discussion about the shadow economies of transitional European states see Sergi (2003, pp. 107-114).

Insert Table 1 here

The multifaceted Greek crisis is reflected in the failure of the country's successive governments to deliver prolonged reforms related to the country's economic adjustment programs. These institutional deficiencies have been related with the country's high shadow economy,[7] which is estimated at an average of a quarter of the country's GDP and is one of the highest in the euro area (Bitzenis et al., 2016a; Schneider et al., 2015). Although the estimates indicate that the size of the Greek (and of other euro area member states) shadow economy is decreasing, caution is required because this is not an outcome of policies aiming to transfer activities from the shadow to the formal economy but rather an outcome influence by the decrease in the values of its major determinants such as GDP and self-employment (Bitzenis et al., 2016a) and moreover, of the Greek experience of capital controls.

The size of both the shadow economy and unemployment in Greece indicate the need for immediate action to tackle undeclared work.[8] To this end a report was prepared by the International Labour Organization (2016) to assist Greece in setting out a national action plan, which emphasizes on the failure of Greek policies to improve the benefits of and incentives for declared work, and to deal with formal institutional failings, i.e. to improve tax morale as the main reasons for not transforming undeclared into declared work (International Labour Organization, 2016: 11). The failure of addressing these issues to date and the heavily focused policy measures on enforced compliance on the one hand, and the persistence of fiscal consolidation (in terms of reducing income levels and increasing the tax burden) and the unfavorable business environment on the other, put diversity gains at risk by increasing the differences in rates of unemployment and pay between sexes and against the younger population.[9]

2.2 Undeclared work: drivers, characteristics and policies

The definition at EU level is that any paid activities that are lawful as regards their nature, but not declared to public authorities, taking into account differences in the regulatory systems of the Member States are most commonly either partially/under-declared or fully

[7] The term shadow economy is preferred over informal economy because it refers only to activities of the informal economy that can be transferred to the formal economy (Bitzenis et al., 2016b).
[8] The Memorandum of Understanding (2015) between the European Commission and Greece requires for immediate action as it states on p. 22 *that authorities will adopt an integrated action plan (key deliverable) to fight undeclared and under-declared work in order to strengthen the competitiveness of legal companies and protect workers as well as raise tax and social security revenues*. The document is available at http://ec.europa.eu/economy_finance/assistance_eu_ms/greek_loan_facility/pdf/01_mou_20150811_en.pdf
[9] See Vassilopoulou et al. (2016).

undeclared work.[10] There is also a reference at EU level about another less common type: undeclared own account or self-employed work. The typology in the relevant literature is more extensive without references to which type is more common and distinguishes between i) informal waged employment, which is broken down further into wholly undeclared waged work and under-declared wage-oriented work (envelope wages), and ii) informal own-account that is broken down further into informal self-employment (employed but declaring self-employed to escape wage tax) and paid favors (Williams, 2014). The simplest EU level distinction between partially and fully undeclared work is adopted for the analyses presented later on in this paper.

Undeclared work is explained by 4 competing theories[11] (Williams, 2014; Williams and Jan Windebank, 2015):

- Modernization theory, where undeclare work takes place due to economic under-development and the lack of modernization.
- Neo-liberal theory, where high taxes, public sector corruption and intervention in the free market lead to the phenomenon of undeclared work.
- Political economy (structuralist) theory, where inadequate levels of state intervention to protect citizens result in undeclared work.
- Post-development/structuralist theory, where undeclared work is the outcome of individuals who "operate as social actors and undertake own-account informal work for kin, neighbours, friends and acquaintances for reasons other than financial gain" (Williams, 2014: 738).

With regard to drivers and determinants of informality, the International Labour Organization (2016: 9) states that the new institutional approach to the undeclared economy (and undeclared work) emphasizes on the role of tax morale.[12] Beyond tax morale, Di Porto et al. (2016) refer to labour taxation and labour market regulations as the two major causes for operating in the informal sector. The authors develop an extension of the "search and matching model" and calibrate it to the labour market and institutional characteristics of France, Italy and Spain. The authors find across all three countries that in a time of fiscal constraints, lower taxation, less stringent firing restrictions, higher penalty fees and higher monitoring rate are effective but do not always produce optimal outcomes, and argue that increases in payroll taxes for temporary contracts to finance the intensification of inspections

[10] See European Commission's Directorate-General for Employment, Social Affairs and Inclusion at http://ec.europa.eu/social/main.jsp?catId=706&intPageId=2983&langId=en

[11] There are also alternate categorizations of the perspectives on undeclared work (see Chen, 2016). The reason for referring to the 4 competing theories is due to their empirical evaluation/exploration (see Williams and Jan Windebank, 2015).

[12] Williams and Horodnic (2016) find a strong association between participation in undeclared work and the level of tax morale and moreover, confirm the political economy approach (vis-à-vis the others) and highlight the importance of solutions not so far considered, such as improving educational attainment, older citizens mentoring for younger people and improving women's participation in the labour force.

lead to better outcomes. Moreover, Bennett and Rablen (2015) explore the urban labour markets in developing economies and find that if the government wishes to reduce informality, reduction of the costs of formality is generally more effective than increasing the costs of informality. With regards to partially declared work, Williams and Padmore (2013) find that 1 in 18 formal employees in the EU receives an envelope wage from their formal employer for lower the tax and social security burden. The authors indicate that this practice is more common in small firms and that while in North and Western EU envelope wages are received for overtime or extra work, in Central, Eastern and Southern EU envelope wages are more common for regular work.

Finally, the policies to tackle undeclared work are put into force by measures directed towards its demand and supply sides. The latter concerns the weak end of the bargain in times of economic recession/depression and high unemployment and measures that could prove to be productive are those that could improve detection such as whistle blowing and increasing inspections (Bitzenis, 2016a). Williams (2015) discusses the policies and measures for addressing the demand side and distinguishes between direct and indirect controls. The former regards deterrents (i.e. improved detection, increased penalties and perception of risk) and incentives (i.e. simplification of compliance for start-ups, tax incentives and amnesties for established entrepreneurs) and the latter is about reducing the asymmetry between formal and informal institutions (i.e. increasing tax morale).

2.3 Undeclared work in Greece: previous findings

Greece's "state" or "Mediterranean style capitalism" (see Anagnostopoulos and Siebert, 2015; Zambarloukou 2015; Koukiadaki and Kokkinou, 2016) favors corrupt practices, rent-seeking activities and the procurement of privileges from the state (Vlachos, 2013) and results in the inside-outside dichotomy or duality of the Greek labour market. The low-skilled, self-employed or those employed in small firms, who may receive low wages, work in unstable and precarious conditions, and face a highly competitive environment face many difficulties entering into the core of the labour market which consists of those who work either in the highly unionized public sector or in large private sector firms and receive relatively high wages and enjoy far better working conditions (Tsakloglou and Cholezas, 2005). The majority of peripheral workers become a vulnerable group that tries to survive between flexible and undeclared work, with the latter being the least protected and most common type of precarious employment in Greece (Zambarloukou, 2015).[13] This form of duality still persists despite the

[13] This does not mean that undeclared work is mainly precarious employment but rather the opposite.

experience of the economic adjustment programmes,[14] and the liberalization and deregulation of the Greek labour market (see Koukiadaki and Kretsos, 2012; Koukiadaki and Kokkinou, 2016) have increased precarious employment further (Gialis et al., 2015).[15]

In their discussion about undeclared work in Greece, Bitzenis et al. (2016a) emphasize on the fact that indirect estimations of undeclared work in Greece digress from actual numbers (the authors discuss the size of undeclared work in Greece during the period 2010-2011 and refer to its participants). Indirect estimates of undeclared work earnings in Greece comprised 6.8 percent of GDP in 2010, with an average of 8.1 percent for the period of 1999-2010 (Buehn and Schneider, 2012). The Inspectorate Service of the Social Insurance Foundation announced that 27 percent of employees remained unregistered in 2008 (Matsaganis and Flevotomou, 2010: 23) and 30 percent in 2011 (Foundation for Economic and Industrial Research, 2012:[16] 5). Kanellopoulos (2012) notes that since these inspections are not random (and rather targeted), the generalization of these rates to total unemployment is not safe. The author proposes the use of Labour Force Survey indicators and indicates that undeclared work in Greece was 11.7 percent during the period 2006-2011. Based on the same indicators, Kanellopoulos (2012: 33-34) highlights that in 2006 and 2010 undeclared work was highly concentrated on households as employers of domestic workers, construction, trade, hotels and restaurants, and agriculture and those being systematically undeclared were foreigners, domestic assistants, workers employed part-time, young people aged up to 29 years, working children of the household head, as well as assistants in the family business. The indicators with respect to participation come to terms with the pre-crisis argument of Katsios (2006) that shadow production in Greece was relatively labor intensive.

Bitzenis et al. (2016a) assume that if all undeclared workers are registered as unemployed then Greece's huge unemployment levels are not realistic (as well as the official remuneration). Findings of a questionnaire survey contacted by the Greek Ministry of Labour, Social Insurance and Social Solidarity in 2012 are in support of this assumption since they indicate that only 4.4 percent of undeclared work is partially undeclared (Kapsalis, 2015:[17] 31). However, against this assumption are the findings of 2013 Eurobarometer survey, which indicate that wholly undeclared waged employment was 13.3 percent and 54 percent was partially declared (International Labour Organization, 2016: 9).[18]

[14] There has been a differential adjustment across Greek private and public sectors (Christopoulou and Monastiriotis, 2016) due to the greater contraction of wages and the rapid transformation in the labour relations of the private sector, and the hiring freeze of the public sector.

[15] The upsurge of precarious employment in Europe and Prosser's (2015) finding that deregulatory strategies of public authorities are particularly significant drivers of precarious employment are a critique of the neo-liberal approach to undeclared work.

[16] Report published in Greek available at http://iobe.gr/docs/research/RES_01_02122012REP_GR.pdf

[17] Report published in Greek available at http://www.inegsee.gr/wp-content/uploads/2015/06/Meleti-43-INE.pdf

[18] To this end, Ioannides et al. (2014) have argued that overtime labour is commonly undeclared (especially by small enterprises) as a result to the weak employees' position against their employers due to rising unemployment rates.

A report published by the International Labour Organization refers to the relatively high level of self-employment and large share of micro- and small enterprises in Greece as being frequently seen as the catalyst for the prevalence of the undeclared economy and consequently, undeclared work (International Labour Organization, 2016: 24). Gialis et al. (2015) argue that a large part of self-employment is informal own-account for concealing dependent employment. Furthermore, the International Labour Organization (2016: 31) report asserts that undeclared work arises when the failings and imperfections of formal institutions result in an asymmetry between the morality of the state reflected in laws and regulations and the morality of citizens regarding the acceptability of these laws and regulations. This is emphasized by the importance of tax morale in the results of statistical analyses of 2013 Eurobarometer survey data presented in the end of this report. In particular, tax morale, age and financial difficulties are all statistically significant estimates in the logistic regressions of the likelihood of working in the shadow economy.

Unfortunately, the International Labour Organization report as well as all previous research on undeclared work in Greece, do not analyze data obtained from employers. Although all findings are valuable, it is important to obtain analyses of such data because due to economic depression and high unemployment levels the employer has the key role in the Greek play of undeclared work.[19]

3. METHOD

This paper aims to explore the determinants of undeclared work in Greece through direct-survey data from the Greek Shadow Economy Observatory. The survey took place in 2015-2016 and unlike the data analyzed in reports and papers discussed in the previous section, the respondents were all entrepreneurs with employees in their businesses.

The data is explored via a binary probit regression:

$$y_i^* = x_i\beta + e_i \qquad \textbf{(1)}$$

where *i* are response categories and *y** is the linear combination of predictors *x* multiplied by the regression coefficients *β* plus the disturbance term *e*. The two different models testing the data for fully and partially undeclared work are represented by the following equation:

$$full_i \backslash part_i = sup_j + dem_j + work_j + area_j + res_k \qquad \textbf{(2)}$$

where *full* is fully undeclared work, *part* is partially undeclared work, *i* is a response category (1=undeclared, 0=no undeclared employees), *sup* and *dem* are groups of predictors shaping

[19] Vlachos and Bitzenis (2016) assessed firm tax compliance based on data from the World Bank 2005 survey about employers' perspectives before the crisis and found the tax burden and corruption to be key determinants. For patterns of corruption see Economakis et al. (2010).

the supply and demand for undeclared work respectively, *work* is a group of predictors concerning those working undeclared, *area* is a group of predictors concerning undeclared work in areas of economic activity, *j* is a response category (seldom=1, average prob.=4, very probably=7), *res* is area of residence and *k* is a response category (1=rural, 2=semi-urban, 3=urban). Response categories *i* and *j* are seven-level Likert type scales. The slash implies that two different analyses are conducted for fully and partially undeclared work. The variables are selected according to the discussion in Section 2 and their definitions, frequencies and descriptive statistics are presented on Table 2. Each of the analyses for fully and partially undeclared work takes place in two stages. Firstly, the main effects of the predictor with the highest mean response score of each group are reported. Then the main effects of the response score of the rest of the predictors against the response score of the predictor with the highest mean response score (benchmark) of each group are reported. The five hypotheses to be tested from the probit estimates are formulated according to the discussion in Section 2 about undeclared work in Greece:

I. The supply factors differ between fully and partially undeclared work. Since the Greek Ministry of Labour finds an enormous difference between the sizes of fully and partially undeclared work, these factors are expected to differ.
II. The demand factors differ between fully and partially undeclared work (for the same reasons as in hypothesis I).
III. Fully and partially undeclared work are more common in younger population. Since unemployment of young people in Greece indicates the highest rates, undeclared work is expected to be greater.
IV. Fully and partially undeclared work are more frequent to the services sector (assumption based on Labour Force Survey indicators).
V. Fully and partially undeclared work are more frequent to rural areas (assumption based on Labour Force Survey indicators on agriculture).

The final element presented on Table 1 indicates the categorization of the sample in relation to household income versus household expenses. If the respondent's income is greater than the expenses then he/she would be less inclined to engage in activities of the shadow economy such as undeclared work due to economic survival. On the contrary, the respondents facing great financial difficulties would be less inclined to engage in these activities due to tax morale and/or to the small (perceived or actual) risk of detection, and more due to reasons that directly affect their income level (such as an increased tax burden). Based on these suppositions, the sample is categorized into two groups according to household income versus household expenses and the Wilcoxon signed rank test is used for assessing whether this difference in financial difficulties has an effect in times of economic depression. Accordingly, the sixth hypothesis to be tested is:

VI. Financial difficulties lead to undeclared work.

The assessment of the particular hypothesis is useful for the orientation of economic policy with regard to whether measures to restrict the phenomenon of undeclared work should pay attention to tax morale and the (perceived or actual) risk of getting detected. Contrary to the preceding binary probit analyses, for the assessment of hypothesis VI the dependents partially or fully undeclared work have seven-level Likert type scale response categories (1=none, 4=five, 7=10 undeclared employees) as they appear on the questionnaire (see questions 1a and 1b at http://www.paraoikonomia.gr/quest2/?page_id=162).

Insert Table 2 here

4. FINDINGS

Table 3 indicates the probit estimates for fully undeclared work. Model 1 includes the variables with the highest mean response score (benchmark) of each group. Model 2 includes these variables as benchmarks for each group. The purpose of reporting the findings of Model 1 is to illustrate the effect of the response categories of the benchmark variables of Model 2 on fully undeclared work. The seventh response category (i.e. very probably) is the reference in each of the 4 benchmark variables and the findings indicate that fully undeclared work is not linked with the rise of the probability for each of these variables to be true. This leads to the exploration of the contrasting relationships between variables in Model 2. The p-values of the LR and the normality test statistics indicate that Model 2 fits the data well and that the residuals are normally distributed. With regard to supply motives, all variables indicate a greater effect than the benchmark variable on the outcome of working fully undeclared with *sup_audit* being statistically significant. The average marginal effect (slope) indicates that an increase in the probability of *sup_audit* increases the probability of working fully undeclared by 12.9 percent.[20] With regard to demand motives, all variables indicate a greater effect than the benchmark variable on the outcome of working fully undeclared, except from *dem_aud*. *dem_fines* is statistically significant and the slope indicates that an increase in the probability of *dem_fines* increases the probability of working fully undeclared by 21.2 percent. With regard to participants, all variables indicate a greater effect than the benchmark variable on the outcome of working fully undeclared, except from *work_females* and *work_stud*. The latter is statistically significant and the slope indicates that an increase in the probability of *work_stud*

[20] The corresponding mean value of *sup_audit* can be helpful for understanding this effect. For example, if the mean value of *sup_audit* is the outcome of dividing the mean (of the seven- level Likert type scale) of *audit_s* with the corresponding mean of *extra*, then an increase of the mean of *audit_s* by one of the seven- level Likert type scale, ceteris paribus, increases the mean value of *sup_audit* and consequently, the marginal effect occurs.

decreases the probability of working fully undeclared by 18.1 percent. With regard to areas of economic activity, the picture is mixed with half of the variables indicate a higher and the other half a lower effect than the benchmark variable on the outcome of working fully undeclared. Finally, ranks (response categories) 1 and 2 of variable *res* have a lower effect than the reference rank 3 on the outcome of working fully undeclared.

In summary, the statistically significant estimates reported on Table 3 indicate that the probability of fully undeclared work:

- increases, when the probability of authorities being not able to perform audits increases over the probability of earning extra/supplemental income (demand side motives).
- increases, when the probability of receiving small fines/penalties when detected increases over the probability of high taxation/social security contribution burden (supply side motives).
- decreases, when the probability of tertiary education students to work fully undeclared increases over the respective probability of immigrants.

Insert Table 3 here

Table 4 indicates the probit estimates for partially undeclared work. Models 1 and 2 are as on Table 3. Similar to Table 3, the findings of Model 1 on Table 4 indicate that partially undeclared work is not linked with the rise of the probability for each of these variables to be true. As such, the exploration of the contrasting relationships between variables in Model 2 is required. The p-values of the LR and the normality test statistics indicate that Model 2 fits the data well and that the residuals are normally distributed. With regard to supply motives, only *sup_audit* indicates a differentiated (and greater) effect than the benchmark variable on the outcome of working partially undeclared. With regard to demand motives, only *dem_aud* indicates a greater effect than the benchmark variable on the outcome of working partially undeclared. *dem_aud* is statistically significant and the slope indicates that an increase in the probability of *dem_aud* increases the probability of working partially undeclared by 9 percent. With regard to participants, the picture is mixed and the effects of *work_males*, *work_stud* and *work_grad30* are statistically significant. The respective slopes indicate that an increase in the probability of *work_males* increases the probability of working partially undeclared by 9.8 percent, an increase in the probability of *work_grad30* increases the probability of working partially undeclared by 11.2 percent, and an increase in the probability of *work_stud* decreases the probability of working partially undeclared by 13 percent. With regard to areas of economic activity, only area_accom and area_con indicate a lower effect than the benchmark variable

on the outcome of working partially undeclared. *area_rep* is statistically significant and the slope indicates that an increase in the probability of *area_rep* increases the probability of working partially undeclared by 7.3 percent. Finally, ranks 1 and 2 of variable *res* have a greater effect than the reference rank 3 on the outcome of working partially undeclared. *res1* (rank 1) is statistically significant and increases the probability of working partially undeclared by 6.5 percent.

In summary, the statistically significant estimates reported on Table 4 indicate that the probability of partially undeclared work:

- increases, when the probability of authorities being not able to perform audits increases over the probability of of high taxation/social security contribution burden (demand side motives).
- increases, when the probability of males and young graduates (less than 30 years of age) to work partially undeclared increases over the respective probability of immigrants.
- decreases, when the probability of tertiary education students to work partially undeclared increases over the respective probability of immigrants.
- increases, when the probability of participation in partially undeclared work in the repairs sector increases over the respective probability of the food and beverage service sector.
- increases, when the probability of participation in partially undeclared work in rural areas increases over the respective probability of urban.

Insert Table 4 here

The differences (some of which are statistically significant) in the findings reported on Tables 3 and 4 lead to the acceptance of hypotheses I and II. Although the absence of audits appears the most important for the supply side in fully and partially undeclared work, the lack of negotiating capacity appears important only in fully undeclared work. Small fines/penalties appear more important for the demand side in fully undeclared work, while the absence of audits appears more important in partially undeclared work. Although young graduates (less than 30 years of age) appears to participate the most in fully and partially undeclared work and tertiary education students the least, males[21] become the second most active category of participants in partially undeclared work and pensioners exhibit an alternate picture regarding their participation. An alternate picture also occurs in the case of undeclared work in the

[21] The findings indicate a great difference on the participation of males versus females, especially in partially undeclared work.

transport sector and in urban areas, which become the least important residential area regarding participation in partially undeclared work.

The findings reported on Tables 3 and 4 reject hypothesis III. Firstly, tertiary education students are the least category of participants in undeclared work. Secondly, young graduates (less than 30 years of age) are the leading category that participates in undeclared work (with partially undeclared being the highest on both Tables). Therefore, the findings indicate that not all young people but young graduates (less than 30 years of age) are most of all categories working undeclared.

The findings reported on Tables 3 and 4 also reject hypothesis IV. Firstly, although there are no statistically significant estimates, the manufacturing sector exhibits a higher estimate than the repairs sector with regard to fully undeclared work. The latter sector exhibits the highest estimate with regard to partially undeclared work.

Hypothesis V is also rejected. The statistically significant probability of participation in undeclared work in rural areas is the highest only in the case of partially undeclared. Although there are no statistically significant estimates, urban takes the lead in fully undeclared work.

Tables 5 and 6 indicate the results of the Wilcoxon signed rank test results for fully and partially undeclared work. The top section of Table 5 indicates the descriptive statistics for two groups of employers who reveal information about fully undeclared work on seven-level Likert type scale response categories (as discussed in previous section). *full1* for employers with household income greater or equal to the expenses and *full2* for less. The ranks section provides data on the comparison of the two groups (median response rating is 2 for both groups). Finally, the test statistics section indicates the Z statistic with which the Wilcoxon signed-ranks test is reported. The test shows that employers' financial difficulties do not result in a statistically significant change in fully undeclared work ($Z = -0.939$, $p = 0.348$).

Insert Table 5 here

Table 6 indicates the Wilcoxon signed rank test result for partially undeclared work. The structure is the same as the previous Table and the groups are *part1* and *part2* and median response ratings are 3 for the former and 4 for the latter group. The test shows that employers' financial difficulties do not result in a statistically significant change in partially undeclared work ($Z = -0.116$, $p = 0.908$).

Insert Table 6 here

The results of the Wilcoxon signed rank tests reported on Tables 5 and 6 lead to the rejection of hypothesis VI because employers without financial difficulties do not reveal statistically significant differences on fully and partially undeclared work.

5. CONCLUSION

The failure of the economic adjustment programmes to assist Greece to exit from the crisis has deepened the country's economy into a depression that exerts a great influence on the major determinants of the Greek shadow economy (indicated by previous research) and as such, the motives of economic agents in Greece to engage in activities of the shadow economy. The unprecedentedly high unemployment rates in times of peace and the deterioration of working conditions reflected in the loss of employment rights, minimum wage decline and high levels of undeclared work are all indicative of how human and social rights issues have been dealt in Greece since the eruption of the economic and financial crisis in 2007.

In response to the need for immediate action to tackle undeclared work in Greece, this paper aims to indicate the drivers and determinants of undeclared work in Greece through direct survey data, which reflects the employers' (entrepreneurs) views and experiences of undeclared work, is used for testing 6 hypotheses via 2 binary probit analyses of fully and partially declared work and 2 Wilcoxon signed rank tests for comparing two categorical (related) groups, respectively.

The findings indicate that the supply and demand side motives differ between fully and partially undeclared work. The absence of audits is the most important driver for the supply side leaving the lack of negotiating capacity despite the extremely high levels of unemployment. The same driver is the most important for the demand side only in the case of partially undeclared work. Small fines/penalties is the important driver for the demand side in the case of fully undeclared work. With regard to the effect of economic depression on the youth, whose unemployment rates have reached unprecedented levels, young graduates (less than 30 years of age) is the category that participates the most in fully and partially undeclared work. Young people up to 18 years of age and tertiary education students participate less than other categories. Another category with great probability of participation is that of males, exhibiting the second highest estimate in partially undeclared work. Females are the category least affected in both forms of undeclared work. With regard to areas/sectors of economic activity, the services sector and in particular repairs which exhibit the highest estimate in partially undeclared work is topped by the manufacturing sector with regard to fully undeclared work. Although the estimates of the manufacturing sector are not significant, the findings are important since sectors with traditionally high activity in the shadow economy such

as the food and beverages services and accommodation, exhibit lower estimates than other sectors. Participation in partially undeclared work is the highest only in the case rural areas. Urban areas exhibit the highest estimates in fully undeclared work without statistically significant estimates. The findings indicate that employers without financial difficulties do not differentiate their stance towards undeclared work from those with financial difficulties.

The findings provide new policy orientations. Previous research and reports emphasized on the effect of deregulation, austerity and the size of the tax burden due to the experience of economic adjustment, and the level of tax morale. The indifferent stance of employers with or without financial difficulties towards undeclared work indicates the requirement of reinforcing the authorities responsible for audits and establishing fines and penalties that will act as deterrents. Moreover, the reality of financial difficulties remains amid economic depression and action is also necessary. The size of the tax and social security burden could be lessened in the case of establishing lower tax (and social security contribution) rates for new Greenfields for a certain time period. The lower tax rates could be materialized only in new Greenfields because the goals of the economic adjustment programme are based on the size of current tax and social security burden (which will remain unchanged for established firms). The size of these new investments could speed up recovery, give incentives to declared work and consequently, halt the brain drain and as such gradually reverse the participation of young graduates (under 30 years of age) in undeclared work. Last but not least is the issue of tax morale discussed in relative literature. As stated earlier, employers not facing financial difficulties have a stance towards undeclared work that is influenced more by the small (perceived or actual) risk of detection. Relating to previous research this may also be the outcome of low tax morale. Policies for improving tax morale should not be directed only towards fighting undeclared work because they concern all activities in the shadow economy and also corruption. Policies for deterring undeclared work that would improve tax morale concern establishing audits for every firm on a regular basis (e.g. annually or every two years), formatting specialized teams with regard to economic sectors or professions and providing incentives to whistleblowers.

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Table 1 – Active population and employment in Greece (15-64 years old in millions)

INDICATOR/YEAR	1994	2008	2009	2010	2011	2012	2013	2014	2015	2016Q1
Active population (Total)	4.03	4.91	4.95	4.95	4.86	4.83	4.78	4.75	4.74	4.73
Employment (Total)	3.66	4.52	4.47	4.31	3.98	3.64	3.46	3.48	3.55	3.54
Active population (Males)	2.52	2.87	2.86	2.83	2.76	2.72	2.69	2.65	2.62	2.61
Employment (Males)	2.36	2.72	2.66	2.54	2.34	2.13	2.03	2.02	2.05	2.06
Active population (Females)	1.51	2.04	2.09	2.11	2.10	2.11	2.09	2.10	2.12	2.12
Employment (Females)	1.30	1.80	1.81	1.77	1.64	1.51	1.43	1.46	1.50	1.49

Source: Eurostat at http://ec.europa.eu/eurostat/data/database (accessed on 17/09/2016).

Table 2 – Variables: Definitions, frequencies and descriptive statistics

Definition	Frequencies & descriptive statistics			
	N	mean	median	std. dev.
Supply: lack of negotiating capacity (neg)	447	3.71	4	2.048
Supply: inability of authorities to perform audits (audit_s)	446	4.55	5	1.83
Supply: earn extra/supplemental income (extra)	453	5.57	6	1.575
Demand: small fines/penalties (fines)	451	3.18	3	1.883
Demand: inability of authorities to perform audits (aud_d)	453	4.51	5	1.862
Demand: economic downturn/survival (surv)	452	5.83	6	1.289
Demand: high taxation/social security contribution rates (tax)	455	6.09	7	1.238
Participants: women (females)	449	5.15	5	1.449
Participants: men (males)	449	4.78	5	1.427
Participants: young people up to 18 years old (18)	454	5.81	6	1.546
Participants: tertiary education students (stud)	454	6.05	7	1.289
Participants: tertiary education graduates less than 30 years old (grad30)	451	5.29	5	1.417
Participants: immigrants (imm)	454	6.09	7	1.488
Participants: pensioners (pens)	449	5.32	6	1.897
Participants: persons with disabilities (dis)	437	2.86	2	1.874
Area: food and beverage service activities (food)	456	5.77	6	1.49
Area: accommodation (accom)	452	5.04	5	1.67
Area: manufacturing and processing (man)	450	4.72	5	1.641
Area: construction (con)	449	5.12	5	1.631
Area: transportation (tran)	447	4.27	4	1.751
Area: wholesale & retail trade (trad)	449	4.48	4	1.627
Area: repairs (rep)	444	5.03	5	1.565
Area of residence (res)	447	2.86	3	0.398
Form: Partially (part)	389=1 (yes), 53=0 (no)			
Form: Fully (full)	331=1 (yes), 109=0 (no)			
Household income (I) versus expenses (E)	162=1 (I≥E), 271=2 (I<E)			

Source: Greek Shadow Economy Observatory (total cases of 461 employers).

Table 3 – Probit estimates for fully undeclared work

Variables	Model 1		Variables	Model 2		Marginal effects	
Dep. var.: full	coef.	st. err.	Dep. var.: full	coef.	st. err.	Slope	mean
constant	6.617***	0.969	constant	-0.233	0.506	-	-
extra1	-0.780*	0.429	sup_neg	0.295	0.196	0,082	0,770
extra2	0.476	0.490	sup_audit	0.464*	0.280	0,129	0,939
extra3	0.077	0.384	extra (benchmark)	-	-	-	-
extra4	0.593**	0.296	dem_fines	0.761**	0.306	0,212	0,576
extra5	0.363	0.241	dem_aud	-0.107	0.291	-0,030	0,791
extra6	0.158	0.192	dem_surv	0.030	0.405	0,008	0,982
tax1	-0.568	1.114	tax (benchmark)	-	-	-	-
tax2	-4.780***	1.307	work_females	-0.030	0.250	-0,008	0,980
tax3	-5.761	0.829	work_males	0.075	0.307	0,021	0,929
tax4	-6.221***	1.350	work_18	0.189	0.176	0,053	1,059
tax5	-5.960***	1.052	work_stud	-0.648**	0.325	-0,181	1,127
tax6	-5.992***	1.239	work_grad30	0.316	0.286	0,088	0,968
imm1	-0.829*	0.495	imm (benchmark)	-	-	-	-
imm2	-0.528	0.435	work_pens	0.233	0.217	0,065	0,933
imm3	-0.851**	0.419	work_dis	0.180	0.236	0,050	0,518
imm4	-0.137	0.274	food (benchmark)	-	-	-	-
imm5	-0.069	0.334	area_accom	-0.414	0.287	-0,116	0,924
imm6	-0.373*	0.198	area_man	0.360	0.296	0,100	0,897
food1	-0.045	0.679	area_con	-0.282	0.274	-0,079	0,995
food2	-0.518	0.435	area_tran	-0.025	0.238	-0,007	0,826
food3	-0.009	0.372	area_trad	0.019	0.231	0,005	0,853
food4	0.143	0.264	area_rep	0.302	0.255	0,084	0,961
food5	0.329	0.228	res1	-0.336	0.482	-0,106	
food6	0.125	0.196	res2	-0.038	0.279	-0,011	
N	381		N	381			
Prediction success	319 (77.1%)		Prediction success	303 (79.5%)			
LR test (χ^2)	38.049	(0.060)	LR test (χ^2)	54.110		(0.000)	
Normality test (χ^2)	2.657	(0.265)	Normality test (χ^2)	4.546		(0.103)	

Notes: Robust standard error estimates significant at *** p<0.01, ** p<0.05, * p<0.1. Variables in Model 2 are compared to the benchmark variable (indicated in parentheses). Slopes are average marginal effects, except for *res*, for which margins rank are reported holding the rest of the variables at their means. P-values are in parentheses for Likelihood Ratio (LR) and normality test statistics.

Table 4 – Probit estimates for partially undeclared work

Variables	Model 1		Variables	Model 2		Marginal effects	
Dep. var.: part	coef.	st. err.	Dep. var.: part	coef.	st. err.	Slope	mean
constant	7.042	12.820	constant	0.581	0.679	-	-
extra1	-1.316***	0.456	sup_neg	-0.001	0.205	0,000	0,770
extra2	-0.077	0.485	sup_audit	0.456	0.295	0,050	0,939
extra3	-0.273	0.401	extra (benchmark)	-	-	-	-
extra4	-0.272	0.297	dem_fines	-0.268	0.309	-0,030	0,576
extra5	0.149	0.297	dem_aud	0.815*	0.429	0,090	0,791
extra6	-0.007	0.238	dem_surv	-0.596	0.537	-0,066	0,982
tax1	-12.663	9.746	tax (benchmark)	-	-	-	-
tax2	-4.823	5.721	work_females	-0.100	0.420	-0,011	0,980
tax3	-5.547	11.305	work_males	0.883**	0.419	0,098	0,929
tax4	-5.858***	1.601	work_18	0.277	0.287	0,031	1,059
tax5	-5.508	13.472	work_stud	-1.176**	0.466	-0,130	1,127
tax6	-5.793	7.955	work_grad30	1.014**	0.494	0,112	0,968
imm1	5.645***	0.521	imm (benchmark)	-	-	-	-
imm2	-0.244	0.457	work_pens	-0.364	0.316	-0,040	0,933
imm3	-0.154	0.500	work_dis	0.114	0.319	0,013	0,518
imm4	0.332	0.418	food (benchmark)	-	-	-	-
imm5	-0.215	0.387	area_accom	-0.116	0.321	-0,013	0,924
imm6	0.007	0.251	area_man	0.018	0.353	0,002	0,897
food1	6.099***	0.476	area_con	-0.496	0.336	-0,055	0,995
food2	-0.869*	0.481	area_tran	0.214	0.291	0,024	0,826
food3	-0.711*	0.386	area_trad	0.021	0.313	0,002	0,853
food4	-0.179	0.276	area_rep	0.656**	0.295	0,073	0,961
food5	0.233	0.299	res1	4.717***	0.300	0,065	
food6	0.077	0.248	res2	0.403	0.316	-0,011	
N	416		N	382			
Prediction success	370 (88.9%)		Prediction success	345 (90.3%)			
LR test (χ^2)	34.278	0.128	LR test (χ^2)	42.054	0.003		
Normality test	10.271	0.006	Normality test	5.315	0.070		

Notes: Robust standard error estimates significant at *** p<0.01, ** p<0.05, * p<0.1. Variables in Model 2 are compared to the benchmark variable (indicated in parentheses). Slopes are average marginal effects, except for *res*, for which margins rank are reported holding the rest of the variables at their means. P-values are in parentheses for Likelihood Ratio (LR) and normality test statistics.

Table 5 – Wilcoxon signed rank test results for fully undeclared work

Groups' descriptive statistics	N	Mean	Std. Dev.	Minimum	Maximum	Percentiles		
						25th	50th (Med.)	75th
full1 (I≥E)	154	2.55	1.555	1	7	1	2	4
full2 (I<E)	262	2.71	1.48	1	7	2	2	4

Ranks		N	Mean Rank	Sum of Ranks
full2 - full1	Negative Ranks[a]	54	59.62	3219.5
	Positive Ranks[b]	65	60.32	3920.5
	Ties[c]	31		
	Total	150		

Test statistics	full2 - full1
Z[d]	-0.939
Asymp. Sig. (2-tailed)	0.348

Notes: [a]full2 < full1, [b]full2 > full1, [c]full2 = full1, [d]based on negative ranks.

Table 6 – Wilcoxon signed rank test results for partially undeclared work

Groups' descriptive statistics	N	Mean	Std. Dev.	Minimum	Maximum	Percentiles		
						25th	50th (Med.)	75th
part1 (I≥E)	155	3.43	1.667	1	7	2	3	5
part2 (I<E)	263	3.63	1.673	1	7	2	4	5

Ranks		N	Mean Rank	Sum of Ranks
part2 - part1	Negative Ranks[a]	54	59.62	3219.5
	Positive Ranks[b]	65	60.32	3920.5
	Ties[c]	23		
	Total	151		

Test statistics	full2 - full1
Z[d]	-0.116
Asymp. Sig. (2-tailed)	0.908

Notes: [a]part2 < part1, [b]part2 > part1, [c]part2 = part1, [d]based on negative ranks.