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Market and Political Power Interactions in Greece: An Empirical Investigation

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Market and Political Power Interactions in Greece:

An Empirical Investigation[*]

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Abstract: In this paper, using a dynamic panel of 21 OECD countries, we find that, unlike the other OECD countries in the sample, wage setting institutions, competition conditions, public finances and external imbalances can account for the behavior of the public sector wage premium (WPR) and the self employed taxation gap (TSL) in Greece and to a lesser extent in Spain and Portugal, in a manner that is consistent with an "insiders-outsiders society" (IOS). That is, a politicoeconomic system characterized by groups of selfish elites that enjoy market power, but at the same time cooperate in influencing government in protecting and promoting their collective self interests. Then, we find that for Greece as well as Spain and Portugal, WPR and TSL have an adverse effect on both TFP and output growth. Finally, the effect of WPR and TSL on the business cycle (shock propagation mechanism) is investigated via a panel VAR analysis. Again, impulse response function analysis suggests that the shock propagation mechanism of WPR and TSL for Greece and to a lesser extent for Spain and Portugal, are quite different from the rest of the OECD countries. For example, in Greece, unlike the other OECD countries in the sample, a positive temporary shock in WPR causes TFP and output to fall and the public and current account deficits to increase. We take the TFP/output growth and the shock propagation mechanism results to provide strong evidence that Greece and to a lesser extent Spain and Portugal behave like IOS. For that matter, these results are important in order to understand the Greek crisis.

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1. INTRODUCTION

The motivation for this paper is the apparent divergence in the GDP per capita path of Greece relative to the OECD average, starting about forty years ago, depicted in Figure 1a, below. This divergence relates to both the long term growth as well as the business cycle. The divergence in the long term growth pattern is illustrated in Figure 1b, whereby the HP filter trend component of real per capita GDP is plotted for Greece and the OECD. And, the divergence in the business cycle is illustrated in Figure 1c whereby the HP filter cyclical component of real per capita output is shown to be very volatile and persistent in Greece, while lagging procyclically relative to the OECD.[1] Moreover, as strikingly shown in Figure 1c, the recent recession plaguing most OECD countries has been considerably more severe in Greece than in the OECD. Over the last eight years (2008 - 2014), the cumulative percentage GDP change in Greece and the OECD average has been -27% and +2%, respectively.[2] So, the obvious question is: Why are these phenomena happening? And, how can they be stopped?

Figure 1: Real Per Capita GDP in PPP Values (1970-2014)
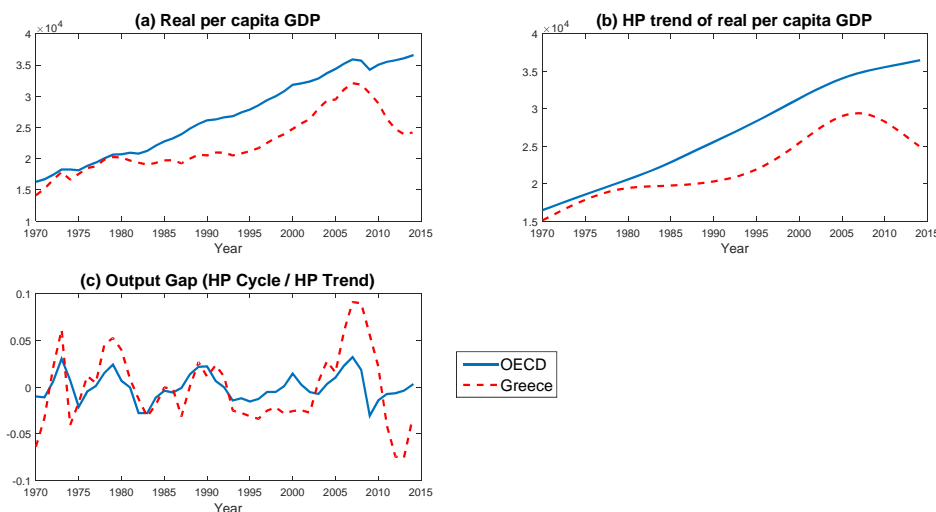
In this paper, we follow the assessments of influential economists such as Olivier Blanchard (2012, 2015) and Edmund Phelps (2015) and seek answers to these questions in the way the Greek politicoeconomic system is organized and in particular, the way it affects the country's total factor productivity.[3] Thus, in this paper, we identify certain public finance features of Greece that make

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[1] See also Tables A1a and A1b in the Appendix where the second moment properties of the output gap are shown.

[2] A similar picture emerges when comparing Greece to the Euro Area average, with the cumulative percentage GDP change in the latter over the same period being -2.7% (see Figure A1 in the Appendix).

[3] In his defense of the 2010 and 2012 debt restructuring programs of Greece that IMF co-sponsored, Olivier Blanchard (2015), IMF's chief economist at the time, argued that: "*Given the dismal productivity growth record of Greece before the program, a number of structural reforms were seen as necessary, ranging from a reform of the tax administration, to reduce barriers to entry in many professions, to reforms of pensions, to reforms of collective bargaining, to reforms of the judicial system, etc.*" And, 2006 Nobel laureate in Economics, Edmund Phelps (2015) argued that: "*Too many politicians and economists blame austerity – urged by Greece's creditors – for the collapse of the Greek economy. But*

this country stand out among a representative group of OECD countries. And, we connect these features to the dismal behavior of its GDP per capita path, over the last four decades, as well as its present crisis. Specifically, Greece stands out among OECD countries having the highest public sector wage premium, defined as the ratio of the average wage in the public relative to the private sector (WPR). In addition, Greece stands out among OECD countries having the lowest self employed taxation gap, defined as the ratio of the effective tax rate on the income of the self employed over labor income (TSL). High values of the public sector wage premium might be related to the influence exerted by public sector employees organized in powerful unions. And, low values of the self employed taxation gap might be related the influence exerted by self employed, organized in powerful professional associations. According to the theoretical work of Kollintzas et al. (2016), these features are indicative of an "insiders – outsiders society," whereby the politicoeconomic system is characterized by groups of selfish elites that enjoy market power, but at the same time cooperate in influencing government, in order to maintain and promote their privileges over the rest of society. Their theoretical model incorporates the insiders-outsiders labor market structure of Lindbeck and Snower (2001) and the concept of an elite government of Acemoglu (2006). The combination of these two concepts has important implications for the workings of the economic and political systems and leads to labor misallocation and inefficient fiscal policies. The latter two, in turn, are associated with low total factor productivity (TFP) and output growth.

Running panel regressions, we find substantial evidence that the relationship between WPR and TSL and a number of explanatory variables commonly used in the literature is different in Greece relative to other OECD country groups and most importantly that these differences are consistent with the IOS theory. In particular, we show that, unlike the other OECD countries, explanatory variables related to wage setting institutions, competition conditions, public finances and external imbalances can account for the behavior of WPR and TSL in Greece and to a lesser extent in Spain and Portugal, in a manner that is consistent with insiders-outsiders society theory. Thereby, we establish that WPR the TSL are likely candidates as proxies for the strength of the insiders – outsiders society.

Then, we proceed to investigate the role of WPR and TSL for the behavior of TFP and output growth. In doing so, we regress each one of these variables on TFP. And, we run Barro regressions incorporating WPR or TSL in the usual list of explanatory variables. We find that for Greece as

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the data show neither marked austerity by historical standards nor government cutbacks severe enough to explain the huge job losses. What the data do show are economic ills rooted in the values and beliefs of Greek society. Greece's public sector is rife with clientelism (to gain votes) and cronyism (to gain favors) – far more so than in other parts of Europe."

well as Spain and Portugal, WPR and TSL have an adverse effect on both TFP and output growth. Finally, the relationship between these variables and the business cycle (shock propagation mechanism) is investigated via a panel VAR analysis. Again, the impulse response function (IRF) analysis suggests that the shock propagation mechanism of both WPR and TSL for Greece and to a lesser extent Spain and Portugal, are quite different from the rest of the OECD countries. For example, in Greece, unlike the other OECD countries, a positive temporary shock in WPR causes TFP and output to fall and the public and current account deficits to increase. We take both (i.e., the TFP/output growth and the shock propagation mechanism) results to provide strong evidence that Greece and to a lesser extent Spain and Portugal behave like the insiders-outsiders society of the theory.

This paper relates to the literature on the causes and remedies of relatively low growth of per capita GDP in Greece. In particular, it shares with the growth accounting studies of Dimelis et al. (1997), Bosworth and Kollintzas (2002), Kollintzas et al. (2012), Gogos et al. (2014) and Leounakis and Sakellaris and (2014), the result that TFP is to blame for this low growth outcome. It is also consistent with the result of Sonderman (2012) that TFP growth in Greece and Portugal falls behind that of the other Euro Area counties. Further, this paper shares with Alogoskoufis (1995) the view that the low TFP growth in Greece was a consequence of the "bad institutions" that characterized the politicoeconomic system developed after 1974.

The economics profession largely regards the Greek crisis as a sovereign debt crisis, manifested in the high and unsustainable levels of the debt to GDP ratio in the sense of Reinhart and Rogoff (2010). To this end, this paper relates to the unsustainability issue in two ways. First, by explaining the relatively slow output growth brought about by low TFP growth. Second, by explaining one of the reasons leading to the increase in government deficit and debt. Namely, financing government wages and public infrastructure of insiders.[4] In that sense, this is a contribution to the extensive literature on the Greek crisis. But, with the exception of Ioannides and Pissarides (2015), that also consider the role of market structure and labor institutions, this literature emphasizes other aspects of the causes and remedies of the deep recession.[5]

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[4] This is a manifestation of the common pool property of public finances. See Section 3.2 and the references provided in Footnote 16.

[5] These aspects include: debt dynamics (see, e.g., House and Tesar (2015) and Schumacher and Weder di Mauro), external dependence and sudden stop issues (see, e.g., Gross (2013) and Reinhart and Trebesch (2015), Gourinchas, et al. (2016)), contagion effects (e.g., Mink and De Haan (2013)), political economy aspects of the policies selected by national, supranational and international institutions to deal with the crisis (see, e.g., DeGrawe (2013) and Ardagna and Caselli (2014)), bargaining outcomes in dealing with the crisis and the role of austerity (e.g., Zettelmeyer et al. (2013)) and the interaction between external government debt crisis and a bank run prolonging the ensuing recession (e.g., Arellano et al. (2015)).

The rest of the paper is organized as follows: In Section 2, we summarize the salient features characterizing the structure and the workings of the insiders-outsiders society. In Section 3, we present the data and study the behavior of WPR and TSL, two variables that capture important features of the insiders - outsiders society. In Section 4, we examine the importance of WPR and TSL for TFP and long term growth. In Section 5, we investigate the role of WPR and TSL for the shock propagation mechanism. And, Section 6 concludes.

2. A CASUAL EXPLANATION AND A FORMAL THEORY

In a precursor and a companion to this paper Kollintzas et al. ((2012) and (2016), respectively), proposed a theory that explains the dismal behavior of Greece's GDP per capita path, over the last four decades, as well as the economic crisis plaguing presently its economy. According to this theory, the politicoeconomic system of Greece is the main culprit.

In essence, since the re-establishment of democracy in 1974, Greece developed its own brand of capitalism. Although this initially may have helped the country grow, eventually handicapped and finally jeopardised its ability to grow as well as its ability to deal with the sovereign debt crisis that broke out in 2010. This happened because the politicoeconomic system that emerged had two remarkable features: First, it allowed for the creation and operation of certain groups of economic agents we shall refer to as "elites" or "insiders". These insiders enjoyed considerable market and/or political power. Examples of main groups of insiders are civil servants and employees of public sector corporations (i.e., the so called "ΔEKO") as well as professionals of certain sectors, organized in powerful unions and professional associations, respectively. Second, although each group of insiders behaved independently in the market for its labor services (i.e., ignoring the effects of its actions on the other groups of insiders and society as a whole), it, nevertheless, cooperated with all other groups of insiders within the dominant political parties and government so as to influence government decisions. We refer to this politicoeconomic system as the "insiders – outsiders society" or simply IOS.[6] The main consequence of IOS is to lower the growth rate of total factor productivity (TFP) and in extreme cases to lower even the level of TFP.

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[6] Several political analysts have recognized that the two dominant parties that alternated in power since 1974 (i.e, the center right party "New Democracy," founded by Konstantinos Karamanlis and the center left party "PASOK," founded by Andreas Papandreou) were to a great extent controlled by major unions, especially those of the public sector and ΔEKO, and professional associations. These unions and professional associations were represented in party organization, parliament and, eventually, government. In fact, there are numerous examples where a union or a professional association leader became minister in a ministry that controlled the underlying business sector (see, e.g. Lygeros (2012) and Doxiadis (2013)). Such an interaction has been emphasized in: (i) the "neo-corporatism" political science literature (see, e.g., Schmitter (1977), Sargent (1985), and Cawson (1986)), in general; and, (ii) the "variety of capitalism" literature (see, e.g., Molina and Rhodes (2007)) for Southern Europe and Featherstone (2008) for Greece).

Now, the workings of IOS, that could at the same time serve as a narrative of what actually happened in Greece, may be summarized as follows: In noncompetitive markets, the powerful civil servant and public corporation unions succeed in securing very high wages and incomes for their members. These wages lead, in turn, to very high prices for all state services (e.g., law and order, licensing, utilities, and almost all basic networks (e.g., power, water and sewage, phone, garbage disposal, rail, sea transport, oil refineries, natural gas, etc)). The latter are both basic inputs in the economy's production process. Hence, this implies important factor allocation distortions that jeopardize total factor productivity and overall competitiveness. In competitive, by their very nature, markets, economic power is expressed through market regulation in such a way as to ensure minimum compensations and preferential tax treatments for the members of important professional associations (e.g., doctors, lawyers, notaries, engineers, pharmacists). Minimum compensations work like the wages in the public sector and ΔEKO and preferential tax treatments increase disproportionally the tax burden of outsiders, leading likewise to lower total factor productivity and increased production costs throughout the economy. At the same time, the major political parties and government are influenced by the powerful unions and professional associations. In such a way, these elites cooperate in the governance of the country to ensure their interests (e.g., financing wages and salaries, develop and maintain the underlying public infrastructure and obtain favorable market restrictions and tax exemptions). But all this results in relatively high taxes and/or budget deficits and government borrowing. This leads to further distortions in the economy, further reducing total factor productivity, output and growth. In relatively low stages of development, the advent of IOS may promote growth. However, as the power of insiders grows stronger, the detrimental effect of the above mentioned distortions becomes dominant. At such a point, the stronger the power of insiders, the lower is the level of TFP.

To comprehend the particularity of the Greek case, it is worth noting that such a strategic interdependence does not happen in Anglo-Saxon countries, because there, unions / professional associations have little power. And, does not happen in the Scandinavian countries where, although strong, unions / professional associations work together, thereby taking account of possible negative effects of their decisions on the whole of society.

It is then this decrease in total factor productivity stemming from both market and fiscal policy distortions that explains the "low flight" of the Greek economy over the past forty years, as well as the severity of the recession and the ineffectiveness of policies to deal with the crisis.

3. DATA, STYLIZED FACTS AND A TEST

3.1 The Public Sector Wage Premium and the Self Employed Taxation Gap

In this paper, we investigate whether there is formal empirical support for the view that the reason Greece's growth and business cycle behavior is different than the OECD is because its politicoeconomic system behaves like the insiders – outsiders society of the theory, unlike that of most OECD countries. Obviously, in order to do this, we first need to identify variables that can serve as indicators of the degree a real world politicoeconomic system behaves like the insiders – outsiders society of the theory. For that reason, here, we focus on two public finance variables that are in the "heart" of the insiders – outsiders society theory. These are the public sector wage premium, defined as the ratio of the average wage in the public sector over the average wage rate in the private sector (WPR) and the self employed taxation gap, defined as the ratio of the effective tax rate on the income of the self employed over labor income (TSL). As it turns out, Greece stands out among OECD countries in both of these variables.[7]

The standard measure for comparing wages across sectors, is the average compensation rate. OECD defines the compensation rate in a sector as the ratio of the compensation of employees and the number of Employees in that sector. Compensation of Employees is defined as the total remuneration in cash or in kind, payable by enterprises to employees in return for work done by the latter, during the accounting period. It includes wages and salaries and employers' social security contributions. The number of employees refers to dependent employment and thus excludes the self employed. Details for the construction of the public sector wage premium are in the Appendix. Ideally, we would have preferred to work with data on public sector enterprises and on public sector wages by government function. However, to our knowledge such data are not in general available.[8]

TSL is a ratio of effective tax rates in the spirit of Mendoza et al. (1994). Such effective tax rates provide evidence for the distribution of the tax burden across different sources of income and are defined as the ratios between the revenues from particular taxes and the corresponding tax bases. The effective tax rate paid by the self-employed (i.e., the numerator in TSL) is computed as the ratio of the revenues from the taxation of the self-employment income, augmented to include

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[7] The time series of WPR and TSL for Greece are plotted in Figure A2 in the Appendix. Additional public finance variables that according to insiders-outsiders society theory should adversely affect both growth and the business cycle and at the same time Greece stands out among the Euro Area countries, were discussed in Kollintzas et al (2012). These are the ratio of "General Public Services" and "Economic Affairs" over GDP. The former relates to procurement spending and the latter relates to subsidies. Certain components of both of these types of public spending are considered to be primary targets of special interest groups and political clientelism. Data availability precludes us from considering these variables in our sample.

[8] A cursory look at circumstantial evidence on wages in Greek public corporations (ΔEKO) indicates that they are much higher compared to public sector wages as well as same sector public corporations in other countries. For example, Table A3 in the Appendix shows evidence on ΔEH (the Greek Power Company) in 2008 and 2009 (i.e., before the crisis erupted) and the German power company EON (one of the biggest power companies in Europe).

revenues from social security contributions, over the income of the self-employed. Likewise, the effective tax rate on labor income (i.e., the denominator in TSL) is calculated as the ratio of the labor income taxes paid by the employees plus revenues from social security contributions, over the total labor cost of dependent employment. Details for the construction of the effective tax rates are in the Appendix.

As the bars representing medians in Figure 2 indicate, public sector wage premia are quite different across our sample of twenty one OECD countries. These are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Netherlands, Norway, Portugal, Spain, Sweden, UK, USA. We use annual data that, for the most part, characterize the time period from 1970 to 2010. The selection of the OECD countries considered was made on the basis of data availability alone, with the exception of the non inclusion of Switzerland. The latter has an unusually small number of public sector employees that makes comparisons with the other countries, inappropriate. Data definitions and sources, in detail, are given in the Appendix.

Figure 2: Public sector wage premium (WPR, Median 1970-2010)
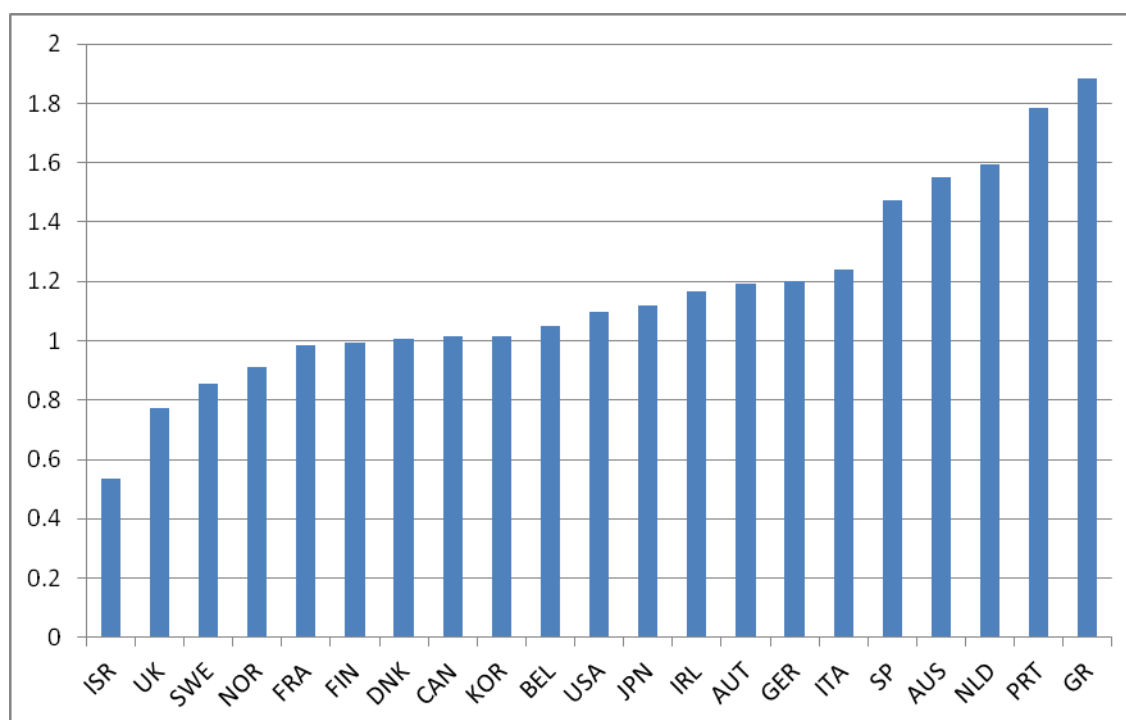
As already noted, Greece tops the list in Figure 2, with considerably higher public sector wage premium. Note also that Spain and Portugal also rank very high on this list.[9]

Equally strikingly, as shown in Figure 3, Greece is characterized by a huge effective tax rate differential between the self employed and employees (i.e., dependent employment). In particular,

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[9] This ranking still emerges from micro data, as well. See Giordano, et al (2011).

the effective tax rate of the self employed is less than one third when compared to the effective tax rate of employees. As in the case of WPR, Spain and Portugal occupy two of the top five spots in the list of countries with the lowest ratio of the effective tax rate of the self employed over the effective tax rate of employees.

Figure 3. Ratio of the Effective Tax Rate of the Self Employed over the Effective Tax Rate of Employees (TSL, Median 1970-2010)
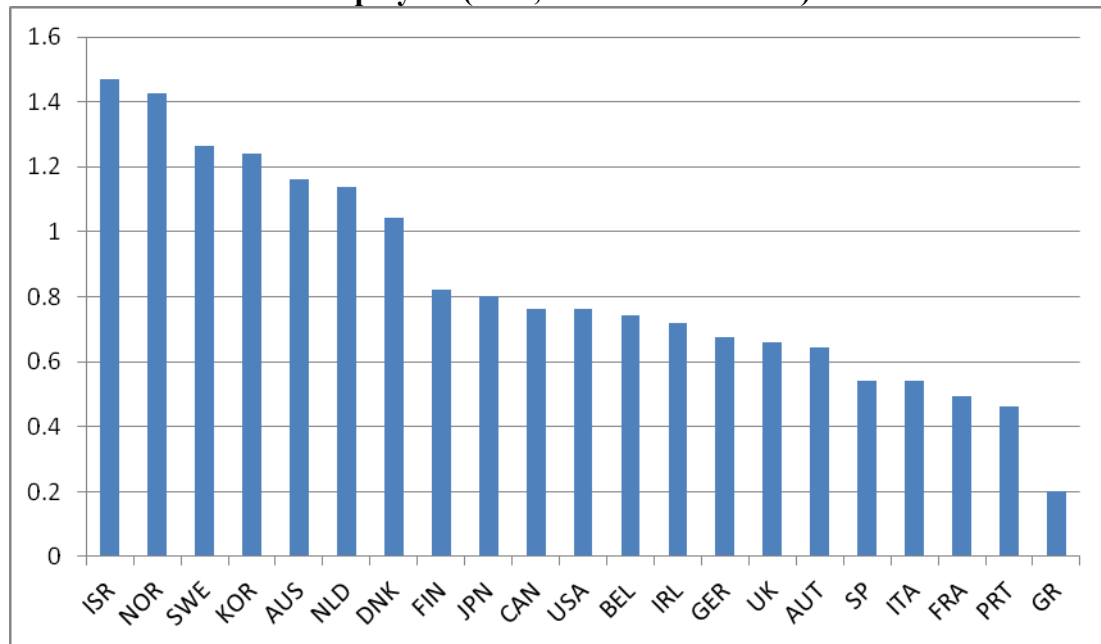
In order to examine whether Greece's growth and business cycle behavior differs from that of most OECD countries, because its politicoeconomic system behaves like the insiders – outsiders society of the theory, we consider two control groups: The first is Spain and Portugal (SP) and the second consists of the remaining OECD countries for which the pertinent time series data are available (ROECD). In what follows, for the most part, the ROECD group consists of eighteen countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Japan, Korea, Netherlands, Norway, Sweden, UK and USA. In some cases, as explicitly mentioned, this group consists of fewer countries, depending on data availability.

SP may be thought as another control group that, unlike ROECD, apart from the stylized facts pertaining to WPR and TSL (very high wage premium and very low self employed tax rate gap), shares, to some extent, with Greece the divergence and crisis severity characteristics, as well.[10] Moreover, as acknowledged by several authors, they are characterized by similar labor market institutions. And, in particular, as in Greece, the wage setting process in the public sector is

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[10] Real per capita GDP in Spain and Portugal is plotted in Figure A3 in the Appendix.

characterized by trade union fragmentation and, at the same time, lack of co-ordination.[11] Also, Greece, Spain and Portugal share the common characteristic that all labor market (and other) institutions where developed in the mid seventies after the fall of the respective military regimes and return to democracy. As it turns out, the relationship between WPR and TSL vis-a-vis long term growth and business cycle are, in general, quite similar between Greece and the SP group and quite different when compared to the ROECD group. Moreover, these similarities and differences are consistent with the view that Greece and to some extent Spain and Portugal, are countries organized like insider – outsider societies.

3.2 What makes Greece different?

The first question posed is whether WPR (the public sector wage premium) and TSL (the self-employed taxation gap) behave differently in Greece relative to the other OECD countries in the sample. This way, in addition to checking the differences of Greece from ROECD, we can also check whether the differences between SP and ROECD, on the one hand, and Greece and SP, on the other hand, are consistent with IOS theory. We start by estimating the following equations:

$$Z_{it} = \alpha_0 + DUM'\alpha_1 + u_{it}; \qquad i = 1,...N; \quad t = 1,...,T \tag{1}$$

where, i denotes the country and t the time index, Z_{it} is either WPR or TSL, α_0 is a constant, $DUM' = \begin{bmatrix} DUMMY\_GR, DUMMY\_SP \end{bmatrix}$ is a pair of dummy variables equal to one for Greece and the SP countries (Spain and Portugal), respectively; α_1 is a vector of coefficients; and u_{it} is the error term. Estimates are based on pooled OLS with robust standard errors.

 Tables 1a and 1b that consider the two dummies referring to Greece and the SP group as the unique explanatory variables, give a positive answer to the above mentioned question. The coefficients of the dummies are positive and significant in the case of WPR and negative and significant in the case of TSL.[12] These regressions therefore indicate that on average WPR (TSL) are higher (lower) in Greece as well as the SP group. This confirms the stylized facts presented in Figures 2 and 3 above.

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[11] See Sections 3.5.2 and 3.9 in European Commission (2013) and Visser (2013). See also Ghenakos (2013) and Vourvachaki (2013) for a recent assessment of product market reforms and wage setting institutions, respectively, in Greece.
[12] Keep in mind that the higher the wage premium and the lower the TSL ratio the stronger the IOS characteristics.

Table 1a. WPR vs Dummies for Greece and the Spain-Portugal group (SP).				
Variable	**Definition**	**Coefficient**	*t-statistic*	**Probability**
Constant		1.097009	446.3274	0.0000
DUMMY GR	Greece=1	0.870273	25.74714	0.0000
DUMMY SP	Spain-Portugal=1	0.574199	35.20437	0.0000
Adjusted R-squared	0.497914			
No. of obs.	797			

Table 1b. TSL vs Dummies for Greece and the Spain-Portugal group (SP).				
Variable	**Definition**	**Coefficient**	*t-statistic*	**Probability**
Constant		0.880478	92.07494	0.0000
DUMMY GR	Greece=1	-0.61386	-45.8529	0.0000
DUMMY SP	Spain-Portugal=1	-0.43048	-34.904	0.0000
Adjusted R-squared	0.274175			
No. of obs.	770			

What lies behind this differentiated behavior of Greece and the SP group vis-à-vis the ROECD group? To answer this we need first to look at what determines the behavior of WPR and TSL in each group of countries.

There is a large literature on the determinants of the behavior of the public sector wage premium (e.g., Dickens and Katz (1987), Katz and Summers (1989), Gibbons and Katz (1992), Bender (1998), Gregory and Borland (1999), Forni and Giordano (2003), Afonso and Gomes (2008), Gaju, et al. (2010), Depalo and Giordano (2011), Giordano et al. (2011), Christopoulou and Monastiriotis (2013)). Following this literature, it is useful to divide these determinants in to six groups: a) demographic characteristics, b) the state of the business cycle, c) labor institutions, d) competition/regulation conditions, e) political institutions and f) public finances and external imbalances. Our panel data set includes most of the variables encountered in all six categories.

Looking at all these variables, clearly, some may and others may not relate directly to IOS theory. In other words, the above literature occasionally uses variables that we identify as possibly related to IOS, without of course making the underlying connection. What is the profile of the subset of variables that relates to IOS theory? Ideally, this subset should include variables that measure the involvement of government in the economy and especially in basic sectors, union power in these basic sectors, strategic behavior of unions whether private or public, especially the degree of independence from- or cooperation with other unions and other government agencies; and, most importantly, the degree to which unions internalize the effects of their decisions on the rest of society. In addition, we would be interested in variables that capture the extent of anti-competitive regulations in markets with powerful professional associations. Finally, we would be interested in variables that capture the extent government is influenced/controlled by the various

groups of insiders, like the public sector unions and professional associations. Thus, the first two groups, i.e., demographic characteristics and state of the business cycle, contain variables that do not directly relate to IOS theory, while the latter four do relate.

Before considering the variables in detail, it is important to emphasize three points. First, the specific variables considered for our empirical analysis that will be presented below, is the product of a compromise between theory and data availability. Second, the variables in the latter four groups, may relate to WPR and TSL for other reasons as well, that other pertinent theories may suggest. To mention only one from the plethora of examples one can think of, as explained below, the years of democracy might be thought as an indicator of the degree of maturity of an Insiders-Outsiders society and thus relate positively with the wage premium and negatively with TSL. On the other hand, however, the years of democracy may indicate better (mature) institutions for societies that have not been plagued by IOS features. Third, when it comes to TSL, there is no empirical literature regarding the determinants of such ratios of effective tax rates. However, the inverse of the tax gap associated with TSL can be equivalently perceived as a kind of after tax wage premium enjoyed by the self employed (associated mainly to professional associations) relative to dependent labor. Consequently, we choose the same set of explanatory variables as in the case of WPR.

Next, we present the explanatory variables used in the empirical investigation and discuss their possible relationship to WPR and TSL. Data sources and definitions in detail are in the Appendix.

Demographic factors: the percentage of population with age over 25 with completed tertiary schooling (POPT25), the dependency ratio, i.e., people younger than 15 and older than 64 as a share of working age population (DEP_RATIO) and, urban population as a share of total population (URBAN_POP). POPT25, a proxy for education, to the extent that public sector employees have more human capital than the rest of the economy, is expected to relate positively with the wage premium. Also, to the extent that urban areas are in general associated with higher wages as there is relative more employment in services and manufacturing, URBAN_POP is expected to relate negatively with the wage premium. Finally, the dependency ratio, is an additional control for the impact of demographic characteristics.

State of the business cycle: the output gap (YGAP). In general one would expect, private sector wages to vary more, relative to public sector wages, over the business cycle.

Labor Institutions: union membership (UM), defined as the ratio of employees that are trade union members, divided by the total number of employees; The ratio of union density of public sector workers to the union density of private sector workers (UD_RATIO); An index of

coordination of wage-setting (COORD); An index of centralization of wage bargaining, taking into account both union authority and union concentration at multiple levels (CENT).[13] These variables as well as the variables on political institutions below are defined and compiled in the ICTWSS database (see Visser (2013)). The UD_RATIO can be thought of as a proxy of the relative power of the public sector unions. COORD can be thought of as a measure of union cooperation and CENT can be thought of as a measure of internalization of wage setting externalities. UM can be thought of as a measure of the power of unions, in general. Given our theory, in countries with IOS characteristics, one should expect WPR (TSL) to correlate positively (negatively) with UD_RATIO and negatively (positively) with CENT and CORD. Since UM characterize wage setting in the economy as a whole, and, for example, high UM may be associated with higher wages in both the private and the public sector, it's correlation with WPR is not clear. On the other hand, in countries with IOS characteristics, one should expect a negative correlation with TSL: although high UM implies that all unions have relatively high power, still it is professional associations that set tax breaks as their priority.

Competition / Regulation conditions: regulation index in energy, transport and communication (index of anti-competitive regulations in the respective product markets, ETCR) and regulation index in Legal professional services (PSL). The source for these variables is the OECD Product Market Regulation (PMR) database.[14] ETCR is an indication of public sector involvement in markets, while PSL captures the degree of regulation in professionals' markets. A higher value of both indices is associated with a greater degree of regulation. Obviously, in countries with IOS characteristics, both these variables are expected to positively (negatively) correlate with WPR (TSL).

Political institutions: the number of years a country has been under a democratic regime (TENSYS); the number of years the governing party has been in office (PRTYIN); the fraction of seats held by the government, i.e., the margin of majority (MAJ). These variables may be important in countries that do have IOS characteristics, as they may capture the extent government is influenced/controlled by the various groups of insiders. In such a case, governments with strong majority or parties that stay in office for many years, find conditions more favourable to promote the interest of insiders. Thus, in countries with IOS characteristics, one should expect a positive (negative) correlation with WPR (TSL). In what concerns TENSYS, one would expect, in general, a

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[13] Ioannides and Pissarides (2015) focus on the key role of product and labor market reforms (or lack thereof) on the Greek crisis. Gregory and Borland (1999) and Forni and Giordano (2003) emphasize the importance of labor market institutions for the behavior of the public sector wage pemium. In particular, Gregory and Borland include UD_RATIO so as to capture the power of unions in the public sector and Forni and Giordano include early measures of coordination and centralization in the wage setting process so as to capture the degree of cooperation between public and private sector unions.

[14] For the construction of these indices see Conway and Nicoletti (2006).

negative (positive) correlation with WPR (TSL), as many years of democracy may indicate efficient institutions. Moreover, at the same time, countries new to democracy, characterized by inefficient institutions and possibly on the process of establishing IOS characteristics, might exhibit a positive (negative) relationship respectively, as it takes time to build an insiders – outsiders society once democracy is established. Note that Greece, Spain and Portugal are three countries where democracy was re-established only in the mid-seventies, while as shown in Figures 2 and 3, all three share a very high WPR and a very low TSL, compared to the other OECD economies in the sample.

Public finances and external imbalances: the total tax revenues-to-GDP ratio (TAX_Y); the Public debt-to-GDP ratio (BY); the VAT efficiency index, i.e., the ratio of the VAT effective tax rate to the standard VAT rate (VEF). And, last but not least the twin deficits: the Government Deficit to GDP ratio (DEFY) and the Current Account Deficit to GDP ratio (CAY). The first two variables (TAX_Y, BY) are associated with the resources available to IOS in order to finance wages, tax breaks and maintain and develop the underlying public sector infrastructures. As already mentioned, the insiders-outsiders society relates to the debt sustainability issue, for it explains chronic public deficits along with relatively low growth.[15] Also, it relates to the "common pool property" of public finances, whereby there is an inherent bias towards higher government spending (lower tax revenues), due to the externality present in the financing of specific government goods and services (tax cuts).[16] This externality is generated by the fact that those that enjoy the benefits of specific government benefits (tax cuts) are fewer and possibly different than those that pay for these benefits (share the cost of no tax cuts, such as with debt financing). And, as a result, there is higher demand for spending (tax cuts). In a way, the insiders-outsiders society incorporates the common pool problem, as the reason that an outsider does not react to the insiders behavior, is also due to the free rider apathy of those that share the cost of insiders' benefits. VEF is a measure of the efficiency of the tax collection mechanism, related to tax avoidance, especially of professionals' groups. Prima facie, VEF has a dual relationship with IOS. Presumably, to the extent that higher efficiency implies more funds for state coffers, it benefits insiders. On the other hand, if tax inefficiencies are brought about by tax avoidance, this may be an indication of tax avoiding professionals. Finally, the inclusion of CAY and DEFY reflect the link between IOS and twin deficits. As emphasized in Kollintzas et al (2012), the workings of the insiders-outsiders society explain the "twin deficits" formation, as a consequence of demand-side as well as supply-side

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[15] This effect has been emphasized in the early literature on sovereign debt sustainability (see, e.g., Giavazzi and Spaventa (1988) and Dornbusch and Draghi (1990)).
[16] See Hallerberg and von Hagen (1999), Hallerberg et al. (2009), von Hagen and Harden (1994), Milesi-Ferretti (2004), Velasco (1999), Kontopoulos and Perotti (1999) and Eichengreen et al. (2011).

effects. The former depend on the dominance of income and wealth effects on consumption and therefore imports, possibly associated with legal and illegal rents of insiders, over general Ricardian-type effects. The latter are associated with rents of insiders that may or may not be associated with the budget deficit. For example, high wages in heavily unionized public sector enterprises directly affect the budget deficit and at the same time drive up cost of intermediate products to the private sector and put upward pressure on private sector wages, as well. And, high fees in regulated professions (e.g., lawyers, engineers, architects, pharmacists, notary publics, certified accountants) drive up production costs in the non-traded and, worst, in the traded goods sectors, jeopardizing the competitiveness of the economy and therefore reducing exports.

First, in Tables 2a and 2b we examine the importance for the behavior of WPR and TSL of the demographic factors and the state of the business cycle (i.e, the two groups of variables that to not directly relate to IOS theory). That is, they report the estimates of the following equations:

$$Z_{it} = \alpha + X_{it}'b + u_{it}; \quad i = 1,...N; \quad t = 1,...,T \tag{2}$$

where, i denotes the country and t the time index, a is a constant, Z_{it} is either WPR or TSL, and X_{it} is a vector of demographic variables as well as the state of the business cycle. Estimates are based on pooled OLS with robust standard errors.

Table 2a. WPR vs Demographic Factors and the State of the Business Cycle				
Variable	**Definition**	**Coefficient**	*t-statistic*	**Probability**
Constant		2.971321	24.63760	0.0000
POPT25	Population Age 25+ with tertiary education	0.000177	0.149244	0.8814
DEP_RATIO	Dependency ratio	-0.013838	-8.552417	0.0000
URBAN_POP	Urban Population	-0.014127	-17.34860	0.0000
YGAP	Output gap	-0.137671	-0.247987	0.8042
Adjusted R-squared	0.191372			
No. of obs.	797			

Table 2b. TSL vs Demographic Factors and the State of the Business Cycle				
Variable	**Definition**	**Coefficient**	*t-statistic*	**Probability**
Constant		-0.276354	-3.932854	0.0001
POPT25	Population Age 25+ with tertiary education	0.013780	8.745445	0.0000
DEP_RATIO	Dependency ratio	0.005761	4.696193	0.0000
URBAN_POP	Urban Population	0.008376	12.11898	0.0000
YGAP	Output gap	-0.220484	-0.386020	0.6996
Adjusted R-squared	0.182806			
No. of obs.	770			

The next question posed, then, is whether the unexplained part of these regressions still differs among Greece, SP, and the remaining OECD countries (i.e. the ROECD group). To see this, we estimate regressions that combine both the demographic and state of the business cycle variables as well as dummies for Greece and the SP group:

$$Z_{it} = \alpha_0 + DUM'\alpha_1 + X_{it}'b + u_{it}; \quad i = 1,...N; \quad t = 1,...,T \tag{3}$$

Again, estimates are based on pooled OLS with robust standard errors.

Tables 3a and 3b reveal that, despite taking into account for the variables that do not directly relate to IOS theory, the dummies remain positive and significant in the case of WPR and negative and significant in the case of TSL, with the effect associated with Greece being much stronger (around double). Moreover, the comparison of the respective adjusted R-squared in Tables 2 and 3, leaves no doubt that, when it comes to WPR and TSL, Greece and the SP group are indeed special cases.

Table 3a. WPR vs Demographic Factors and the State of the Business Cycle Variables with country dummies				
Variable	**Definition**	**Coefficient**	*t-statistic*	**Probability**
Constant		2.212455	16.80728	0.0000
POPT25	Population Age 25+ with tertiary education	0.00193	1.739468	0.0823
DEP_RATIO	Dependency ratio	-0.00991	-5.90045	0.0000
URBAN_POP	Urban Population	-0.00815	-10.0033	0.0000
YGAP	Output gap	-0.09179	-0.24855	0.8038
DUMMY GR	Greece=1	0.821895	27.14865	0.0000
DUMMY SP	Spain-Portugal=1	0.477169	19.49924	0.0000
Adjusted R-squared	0.568369			
No. of obs.	797			

| Table 3b. TSL vs Demographic Factors and the State of the Business Cycle Variables with country dummies.				
Variable	**Definition**	**Coefficient**	*t-statistic*	**Probability**
Constant		0.185664	2.518292	0.012
POPT25	Population Age 25+ with tertiary education	0.012496	9.985624	0.0000
DEP_RATIO	Dependency ratio	0.003027	2.441981	0.0148
URBAN_POP	Urban Population	0.005068	8.001078	0.0000
YGAP	Output gap	-0.20367	-0.47347	0.636
DUMMY GR	Greece=1	-0.58002	-39.3594	0.0000
DUMMY SP	Spain-Portugal=1	-0.31156	-15.0143	0.0000
Adjusted R-squared	0.374305			
No. of obs.	770			

These results prompt us to investigate whether the behavior of WPR and TSL in Greece can be accounted for by the other four groups of variables that directly relate to IOS and whether the way they are related is different among the other country groups.

In Figures 4a-4e we present scatterplots relating each one of the variables in the last four groups that directly relate to IOS theory, with WPR and TSL. This exercise serves as a way to elicit stylized facts on the difference between Greece and ROECD countries vis-à-vis these variables. Clearly, in all cases Greece behaves as an outlier, in the sense that it lies in an extreme position of the scatter plots.[17] More importantly, this difference is in accordance with the IOS theory. For example, Greece is characterized by particularly high UD_RATIO, ETCR, PSL, public and current account deficits, as well as low VEF. Interestingly, COORD and CENT seem to have a nonlinear relationship with both WPR and TSL. As far as the wage premium is concerned, it is the Anglo Saxon on the one hand and the Nordic countries on the other, that constitute the two extremes. In Anglo-Saxon countries where wage bargaining is thought, in general, to be competitive and labor unions are thought to play a relatively small role in wage setting, the levels of CENT and COORD are very low. On the other hand, the Nordic countries have very strong unions in both public and private sectors, and the levels of CENT and COORD are very high.[18] Here the unions co-operate to internalize the cost to the economy associated with a high wage premium in one industry or sector. Greece along with the other southern European countries which are characterized by high public sector wage premia, lie in the middle, with close to sample average levels for both COORD and CENT. Finally, contrary to what one should have expected following our IOS hypothesis that Greece behaves as an IOS country, tax revenues as a share of GDP in Greece are exceptionally low. This may be explained however by tax evasion and tax avoidance, especially by groups considered as insiders, such as professional associations.[19] This is also clearly reflected in the exceptionally low value of VEF. Also, low tax revenues as a share of GDP, in Greece, may also reflect a long established preference of debt over tax financing of government spending. Finally, it could also reflect an ineffective tax collection mechanism, materialized in the low value of VEF.

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[17] The respective regressions with country dummies for Greece and the Spain-Portugal group confirming that these countries, especially Greece, are outliers, are available upon request.

[18] See Visser (2013), European Commission (2013, 2014) and Kollintzas et al. (2016), for related country clusterings.

[19] There is plenty of evidence on the exceptionally high levels of tax evasion in Greece. See, e.g., Buehn and Schneider (2012). Also, Artavanis et al. (2012) reveal the important role in this respect played by members of professional associations.

Figure 4a. Public finances.
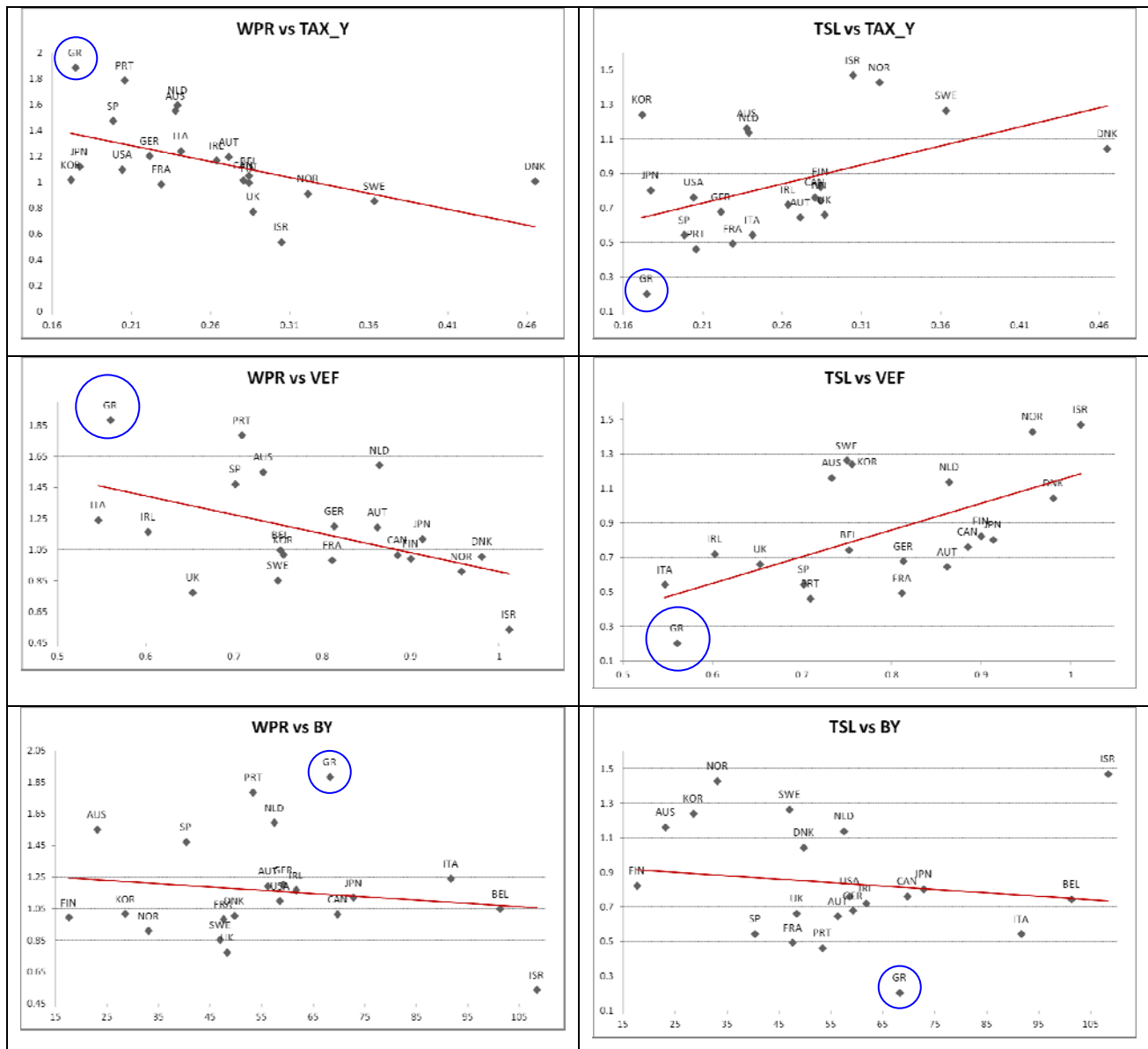
Note: (i) Median values (maximum time span 1970-2010), (ii) The red line is the linear regression line.
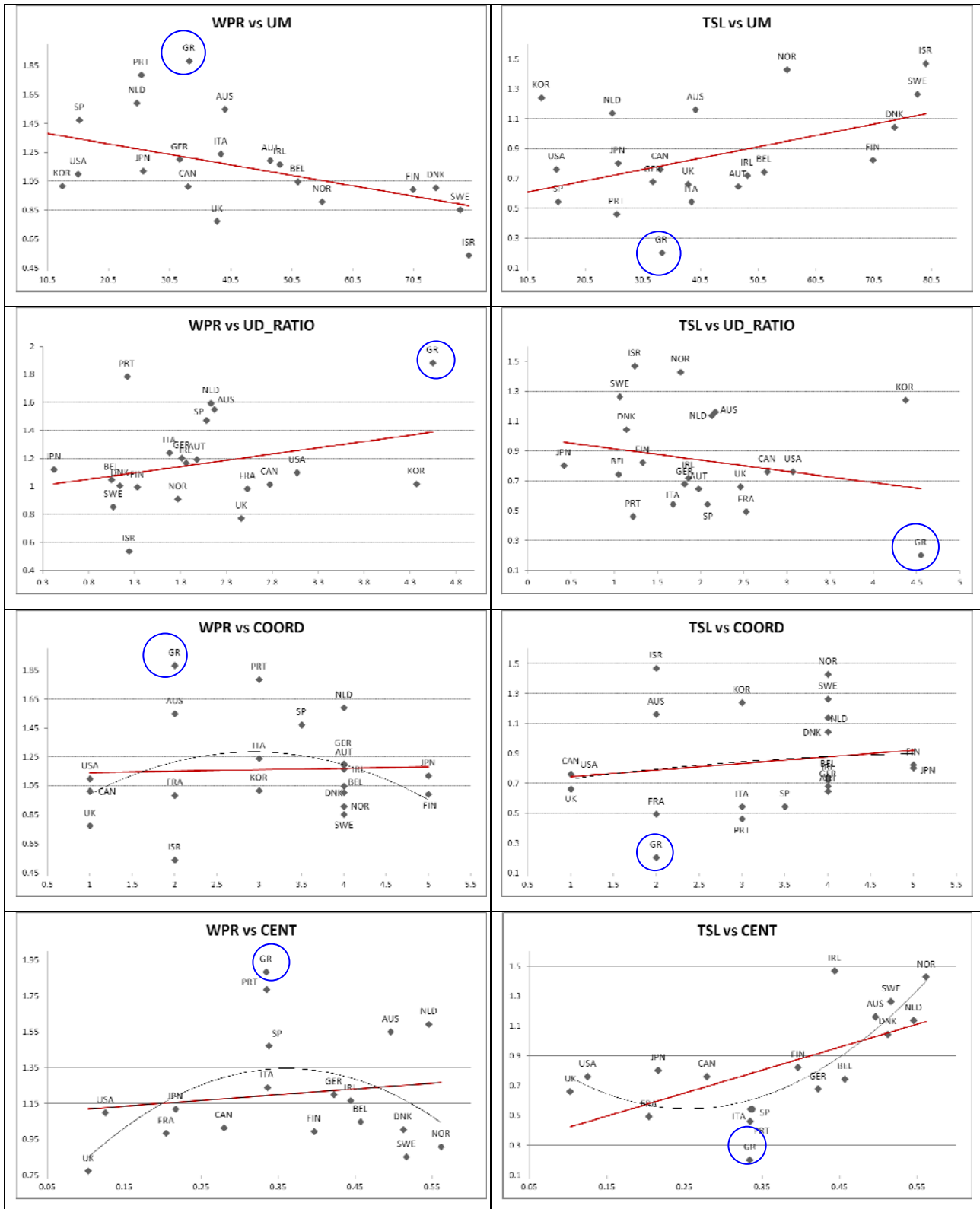
Figure 4b. Twin Deficits
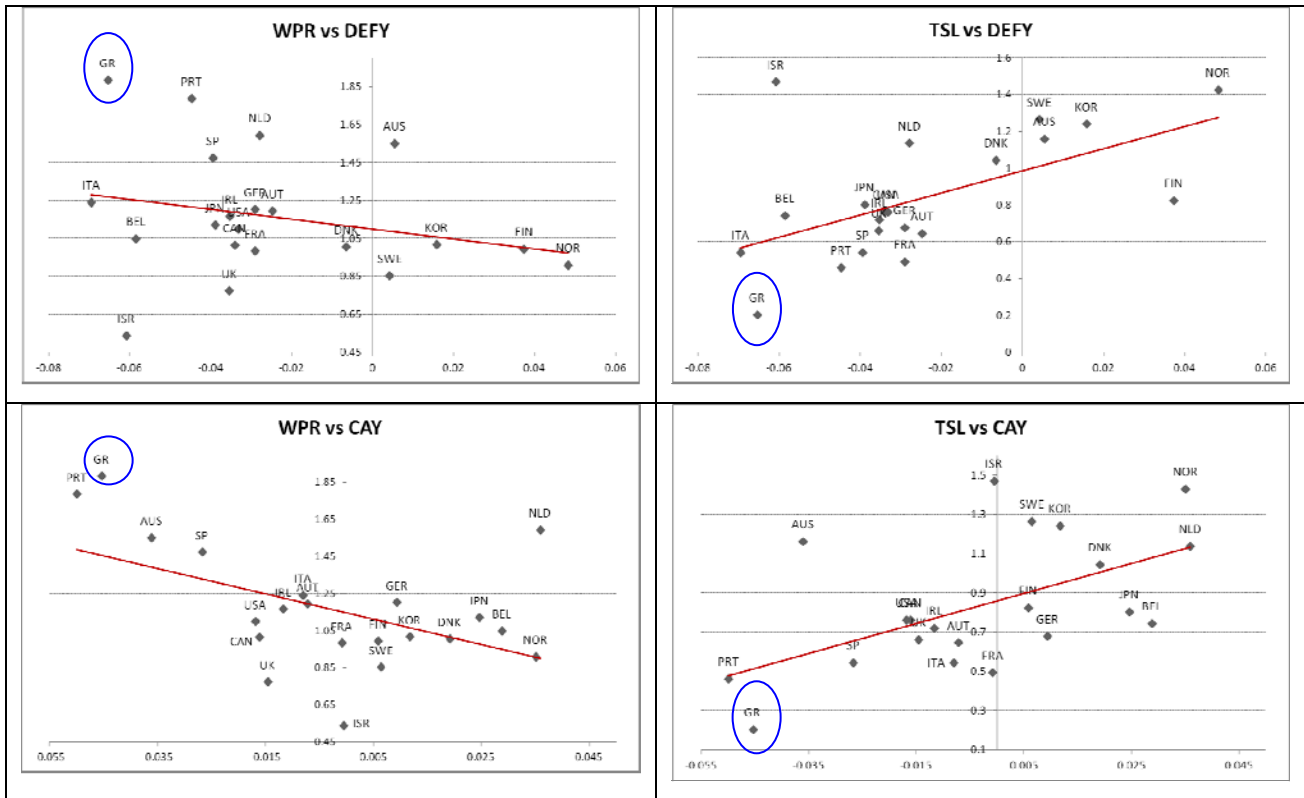
Note: (i) Median values (maximum time span 1970-2010), (ii) The red line is the linear regression line.

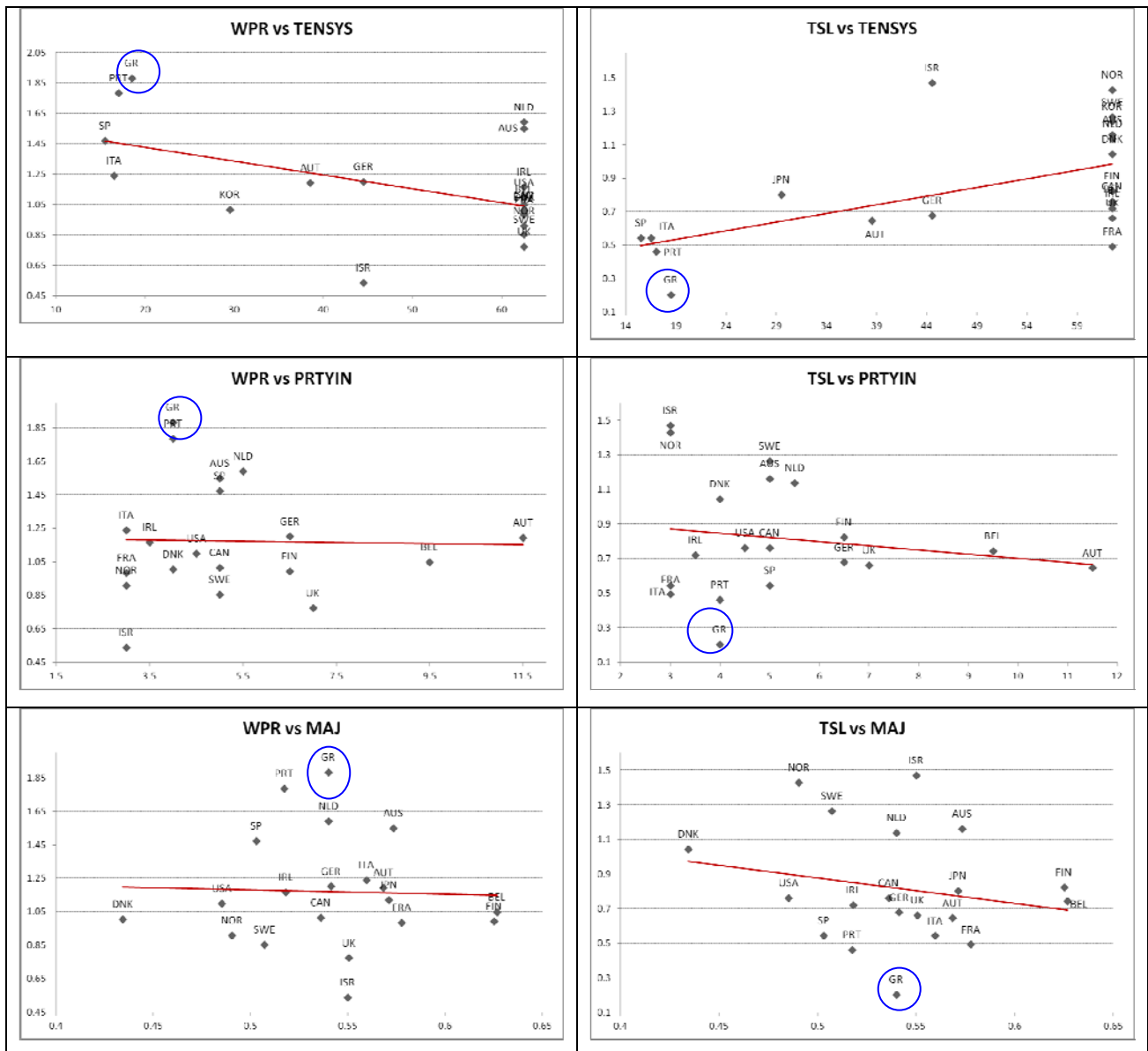**Figure 4c. Competition conditions**
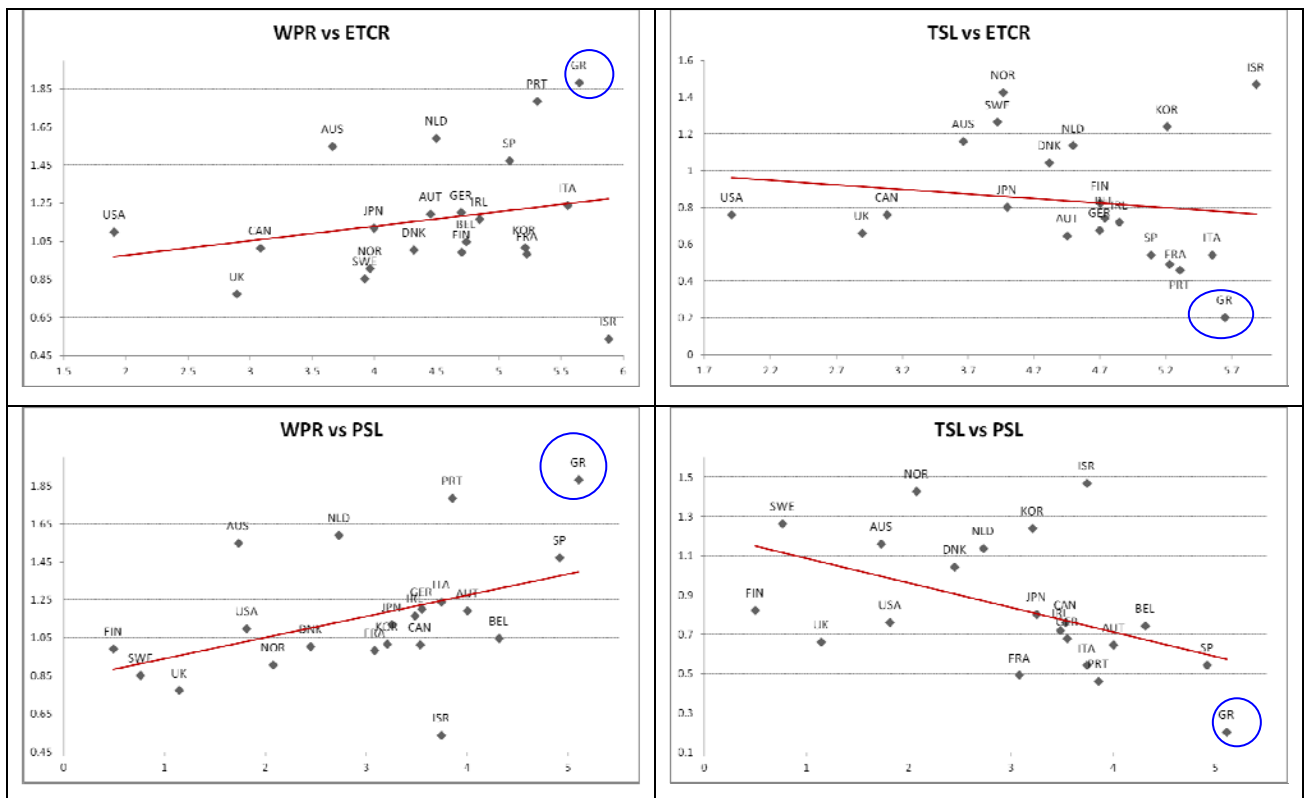
Note: (i) Median values (maximum time span 1970-2010), (ii) The red line is the linear regression line.

Figure 4d. Labor Institutions

Note: (i) Median values (maximum time span 1970-2010), (ii) The red line is the linear regression line, (iii) The black curved line is the second order regression line.

Figure 4e. Political institutions

Note: (i) Median values (maximum time span 1970-2010), (ii) The red line is the linear regression line.

Now, in the sense of proceeding towards a more thorough specification of the econometric test of the theory, we also run panel regressions incorporating the complete set of explanatory variables. The idea here is to examine whether the overall dependence of WPR and TSL on the set of these variables is different in Greece, as well as the Spain-Portugal group, than in the other OECD countries. And, whether the overall dependence of the explanatory variables on WPR and TSL in the case of Greece is consistent with the hypothesis of Greece being an insider – outsider society. Note that, the results from such an exercise are hard to interpret due to the obvious problem with multicollinearity, especially for the subset of explanatory variables that have a direct relationship to the IOS explanation, which as shown above seem to move in the "same" direction (i.e., the direction implied by the IOS hypothesis).

In any case, we start by introducing two country dummies, one for Greece and one for the Spain-Portugal group, and estimate the following equation using Panel Least Squares:

$$Z_{it} = \alpha + X_{it}'b_1 + Y_{it}'b_2 + DUM'X_{it}'\gamma_1 + DUM'Y_{it}'\gamma_2 + u_{it}; \quad i = 1,...N; \quad t = 1,...,T \tag{4}$$

where, i denotes the country and t the time index, a is a constant, Z_{it} is either WPR or TSL, X_{it} is a vector of exogenous variables not directly related to IOS theory (i.e., demographic factors and the state of the business cycle) and Y_{it}^j is a vector of exogenous variables directly related to IOS theory (labor institutions, competition/regulation conditions, political insitutions, public finances and external imbalances) and $DUM' = [DUMMY\_GR, DUMMY\_SP]$ is a pair of dummy variables equal to one for Greece and the SP group (Spain and Portugal), respectively. The results of this exercise reveal the existence of autocorrelation problems.[20] The use of "Panel Fully Modified Least Squares" to address this problem is not possible in the above equation due to the presence of the country dummies. An informative comparison, however is possible by discarding the country dummies and running the following regression for two groups:

$$Z_{it} = \alpha + X_{it}'b_1 + Y_{it}'b_2 + u_{it}; \quad i = 1,...N; \quad t = 1,...,T \tag{4'}$$

The first group consists of Greece along with Spain and Portugal who share to a large extent similarly strong IOS characteristics (GPS), and the second of the remaining OECD countries (ROECD).[21] The results are presented in Tables 4a and 4b for WPR and TSL, respectively.

Clearly, credence to the IOS theory would be established if in the GPS group, the coefficients of the IOS related variables identified above, are significant, have the "correct" sign , and are quantitatively bigger (i.e. in absolute value) and more significant than the corresponding ones in the

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[20] The results from regressions using pooled OLS with dummies for Greece and the Spain-Portugal group, are available upon request.
[21] Running such a regression is not possible for Greece alone due to insufficient number of observations.

ROECD group. Indeed, when it comes to WPR (See Table 4a), the groups of variables that are related to IOS such as labor institutions and competition conditions and public finances, are significant and, with the exception of ETCR, have the "correct" sign for the GPS group. For all variables whose corresponding parameters are significant in both groups, the parameter values are quantitatively bigger (in absolute terms) in the GPS group, while sign reversals between the two groups occur in the cases of COORD and VEF. This is taken to suggest that the IOS related variables are doing better when it comes to the group of countries thought to have stronger IOS characteristics. With the exception of COORD and VEF and TAX_Y, similar arguments hold for the case of TSL (See Table 4b). Note that VEF and TAX_Y are all taxation related variables: There seems to be more than our IOS theory behind the way these variables are related to each other.

Table 4a. A Test of the IOS Theory - Dependent Variable: WPR					
Variable	**Definition**	**ROECD**	**GPS**	**ROECD**	**GPS**
POPT25	Population Age 25+ with tertiary education	0.013752*** *21.68738*	0.056935*** *19.33179*	0.016376*** *19.49832*	0.072230*** *16.95067*
DEP_RATIO	Dependency ratio	-0.007610*** *-18.71470*	0.015084*** *5.556921*	-0.007160*** *-17.08557*	0.030255*** *10.26010*
URBAN_POP	Urban Population	-0.002111*** *-4.954121*	0.043615*** *9.283251*	-0.001064** *-2.155844*	0.068865*** *9.549796*
YGAP	Output gap	-0.372530*** *-9.622241*	1.215862*** *8.592253*	-0.439692*** *-10.13525*	0.211226 *1.513867*
TENSYS	Years of Democracy	-0.013166*** *-27.33816*	-0.048215*** *-12.54250*	-0.014542*** *-28.40986*	-0.046499*** *-9.354322*
PRTYIN	Years a party is in office	-0.001374*** *-10.59422*	0.006619*** *7.293152*	-0.001297*** *-8.701355*	0.007466*** *6.463171*
MAJ	Fraction of seats held by government	0.170186*** *15.97982*	0.061034 *0.799573*	0.175584*** *14.33033*	-0.007409 *-0.081154*
UM	Union Membership	-0.005021*** *-18.22230*	-0.010502*** *-6.046546*	-0.005557*** *-18.68675*	-0.006180*** *-2.640103*
UD_RATIO	Public to Private sector union density ratio	0.003153 *1.643036*	2.481486*** *10.15728*	-0.000402 *-0.182166*	1.016409*** *4.738432*
COORD	Wage Setting Coordination index	0.009548*** *7.948113*	-0.069391*** *-11.63344*	0.009482*** *6.851676*	-0.061503*** *-8.593499*
ETCR	Regulation index in Energy, Transportation and Communication	-0.078886*** *-25.50326*	-0.075693*** *-6.346026*	-0.077832*** *-25.96991*	-0.020440*** *-1.638897*
VEF	VAT Efficiency index	0.131382*** *11.38263*	-0.130535*** *-2.280017*	0.089619*** *7.371067*	-0.558684*** *-8.110368*
BY	Debt to GDP ratio	0.000224*** *3.519767*	0.005003*** *9.960387*		
TAX_Y	Tax Revenues to GDP ratio			0.556429*** *8.381534*	2.574937*** *5.903848*
Adjusted R²		0.892180	0.964101	0.892241	0.961601
N. of obs.		395	71	401	71

Notes. (i) ***, **, and * denote significance at the 1%, 5% and 10% level, respectively. (ii) t-statistics in italics.

Variable	Definition	ROECD	GPS	ROECD	GPS
Table 4b. A Test of the IOS Theory - Dependent Variable: TSL					
POPT25	Population Age 25+ with tertiary education	-0.007635*** *-8.738876*	0.012050*** *9.825228*	-0.000894 *-0.784281*	0.013495*** *9.546269*
DEP_RATIO	Dependency ratio	-0.002177*** *-3.775028*	-0.006533*** *-4.762078*	-0.003302*** *-5.794885*	-0.006046*** *-4.688952*
URBAN_POP	Urban Population	0.021846*** *37.18969*	-0.003944* *-1.754419*	0.021463*** *32.32905*	-0.001165 *-0.452738*
YGAP	Output gap	-0.330004*** *-6.176525*	-0.515270*** *-8.926122*	-0.266744*** *-4.568967*	-0.535301*** *-11.16596*
TENSYS	Years of Democracy	-0.004111*** *-6.193623*	0.009931*** *6.052335*	-0.009989*** *-14.48103*	0.007973*** *4.764618*
PRTYIN	Years a party is in office	-0.001890*** *-10.54719*	0.000403 *1.105937*	-0.001415*** *-7.041950*	0.000599 *1.587920*
MAJ	Fraction of seats held by government	0.001660 *0.112679*	-0.052019 *-1.226267*	0.012377 *0.747268*	-0.036235 *-0.871550*
UM	Union Membership	-0.007102*** *-18.12682*	-0.009379*** *-12.64936*	-0.006815*** *-16.80220*	-0.008235*** *-9.794655*
UD_RATIO	Public to Private sector union density ratio	-0.023443*** *-8.851157*	-0.283258*** *-2.792456*	-0.023127*** *-7.761181*	-0.212901*** *-2.854252*
COORD	Wage Setting Coordination index	0.013865 *8.238375*	-0.025195*** *-10.41000*	0.013614*** *7.182157*	-0.025736*** *-10.77292*
ETCR	Regulation index in Energy, Transportation and Communication	-0.015952*** *-3.724772*	0.072124*** *15.34342*	-0.034958*** *-8.670203*	0.071361*** *17.42026*
VEF	VAT Efficiency index	-0.175460*** *-10.46235*	-0.079611*** *-3.394369*	-0.114566*** *-6.660233*	-0.081259*** *-3.560441*
B_Y	Debt to GDP ratio	-0.000776*** *-8.705856*	-0.000148 *-0.748292*		
TAX_Y	Tax Revenues to GDP ratio			0.694478*** *7.507842*	0.262306* *1.828174*
Adjusted R^2		0.942483	0.929550	0.944211	0.929720
N. of obs.		390	69	396	69

Notes. (i) ***, **, and * denote significance at the 1%, 5% and 10% level, respectively. (ii) t-statistics in italics.

4. THE TFP AND GROWTH IMPLICATIONS OF WPR AND TSL

In this section, we investigate the relationship between long term growth and WPR and TSL. As explained above, the major implication of the insiders – outsiders society is that it adversely affects TFP, output, and output growth. Both WPR and TSL reflect the extent to which an economy has been imbued by the labor misallocation and tax distortions associated with the workings of IOS.[22] These are stemming from the fact that, it is to the interest of all public sector labor unions and professional associations to cooperate so as to influence government and its budget. Therefore, to the extent a country shares the characteristics of IOS, we should expect WPR to relate negatively and TSL to relate positively, with TFP, output and output growth.[23]

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[22] The results of this section complement the findings of other strands of the literarure on the role of institutions for business cycles (see e.g., Gnocchi, et al (2016)) and TFP behavior (see e.g. Angelopoulos, et al (2009) and Angelopoulos, et al (2011)).

[23] This is essentially the mechanism suggested by Kollintzas et al. (2016), where WPR is a focal variable. They show that TFP declines with the wage premium, but increases with the size of the public sector, as the "variety" effect dominates over the "labor misallocation" effect. However, the overall effects on steady state capital, output and growth

4.1 TFP

The IOS implications for TFP are illustrated in Table 5, whereby, we compare the behavior of Greece to the other countries in the sample. In particular, we would be interested to ascertain whether Greece is different and if any observed differences are consistent with our IOS theory. This table summarizes the following regressions for Greece and the two country groups SP and ROECD:[24]

$$TFP_t^{GR} = a + b_1 Z_t^{GR} + \varepsilon_t^{GR} \tag{5}$$

$$TFP_{it}^{group} = a + b_1 Z_{it}^{group} + \varepsilon_{it}^{group} \tag{6}$$

where: *TFP* is total factor productivity, *Z* is either WPR or TSL and group=SP, ROECD. Trend as an explanatory variable is included as needed. Estimates are based on pooled OLS with robust standard errors. Table 5 summarizes the effects of WPR and TSL on TFP. The regressions in detail are in Tables A3-A8 in the Appendix. Observe the negative and significant correlation for WPR and positive and significant for TSL in Greece. The SP group shares the same qualitative, but quantitatively smaller characteristics with Greece. And, contrary to Greece and the SP group, we observe a positive and significant correlation for WPR and a negative and significant for TSL. These results are in line with theory, if we take Greece, and to a lesser extent Spain and Portugal, to feature strong IOS characteristics, as opposed to the other OECD countries.

Table 5. TFP vs WPR and TSL			
	GREECE	**SP**	**ROECD**
WPR	-0.258381*** *-4.849058*	-0.047639** *-2.161475*	0.090452*** *8.010170*
Adjusted R squared	0.892758	0.752159	0.915153
TSL	0.516661*** *6.382703*	0.094088** *2.177210*	-0.039871 *-3.729730*
Adjusted R squared	0.824245	0.923985	0.907548

Notes: (i) ***, **, and * denote significance at the 1%, 5% and 10% level, respectively. (ii) t-statistics in italics.

towards the steady state, depend on the after-tax labor productivity. For it is assumed that the underlying infrastructure, associated with the publicly provided intermediate goods, is financed by a distortionary income tax. Then, it is shown that the effect of an increase in the number of publicly provided intermediate goods on steady state output and growth towards this steady state is negative (positive), depending on the existing number of publicly provided intermediate goods. If this number is higher or lower than a certain threshold, the combination of the "labor misallocation" and the tax distortion effects dominates over (is dominated by) the "variety" effect. All this being quite plausible, as the "variety" effect ("labor misallocation" and tax distortion effects) decreases (both increase) with the existing number of publicly provided intermediate goods.

[24] ROECD includes AUS, AUT, BEL, CAN, DNK, FIN, FRA, GER, IRL, ITA, JPN, NLD, NOR, SWE, UK, US. Data for TFP are not available for KOR and ISR.

Hence, we take this evidence to suggest that, contrary to what happened in other OECD countries, the observed increases (decreases) of WPR (TSL) in Greece and especially the very high increases from 1980 to 2010 exercised a negative impact on TFP and, therefore, long term growth (see the graphs of WPR and TSL for Greece in Figures A2 and A3, respectively, in the Appendix).

4.2. Barro Regressions

One way to think of the IOS implications for growth is within a neoclassical growth model with endogenous Total Factor Productivity. The latter incorporates the resource allocation distortions associated with the market power enjoyed by each individual group of insiders, as well as the public finance distortions associated with government decisions influenced by all groups of insiders, e.g., distorting taxes and tax breaks, the creation and maintenance of public sector infrastructures for the benefit of insiders. In the previous subsection we established the important negative effects of both WPR and TSL on TFP for countries where IOS structure is thought to be relevant. Hence, it seems appropriate to investigate the growth dynamics of IOS and by running standard Barro regressions augmented by the inclusion, one at a time, of WPR and TSL. Presumably, countries with strong IOS characteristics will be associated with lower TFP, lower steady state output, and slower convergence.[25]

More specifically, in order to examine the role of WPR and TSL for output growth, we run Barro regressions of the form:

$$\gamma_{it} = a + X'_{it}b + cZ_{it} + \varepsilon_{it} \tag{7}$$

where: γ_{it} is the five year average growth rate of real per capita GDP over the period 1970-2010; X'_{it} is a vector of exogenous variables including the log and squared log of real per capita GDP at the start of each five year period (LNRGDP0 and LNRGDP0^2, respectively), a measure of school attainment at the start of each five year period (LNSCH), population growth (POPG) and five year period averages of the total investment to GDP ratio (IY), government non-wage consumption as share of GDP (CGNWY) and exports as share of GDP (XY); Z_{it} is either WPR or TSL.

Ideally we would prefer to compare the results from the above regression among, on the one hand, Greece or the Greece, Spain, Portugal group and the remaining group of countries respectively, on the other hand. However, such a Barro regression is not possible for Greece or even the three countries Greece, Spain and Portugal, due to insufficient number of observations. For that matter, an informative comparison is possible by running the Barro regression for two groups: The

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[25] Kollintzas et al. (2016) establish the channel among TFP and WPR, show the existence of a steady state and convergence therein, as well as, the adverse effect of IOS both for long run and transition.

all encompassing twenty one OECD countries group (OECD21) as opposed to the ROECD group where Greece, Spain and Portugal are excluded.[26] Clearly, credence to the IOS theory would be established if in the ROECD group, the coefficients of WPR and TSL are quantitatively smaller and less significant than the corresponding ones in the all encompassing group.

Table 6a. Barro Regression including WPR						
	OECD21			ROECD		
Variable	Coefficient	*Std. Error*	Probability	Coefficient	*Std. Error*	Probability
Constant	0.183655	0.073067	0.0132	0.178464	0.075061	0.0192
LNRGDP0	-0.024161	0.009390	0.0112	-0.020463	0.009742	0.0380
LNRGDP0^2	0.001028	0.000366	0.0058	0.000898	0.000384	0.0213
LNSCH	-0.004393	0.008355	0.6000	-0.014039	0.008115	0.0865
POPG	0.182955	0.124038	0.1426	0.345050	0.147653	0.0213
CGNWY	-0.207624	0.059525	0.0007	-0.212384	0.064097	0.0012
IY	0.019696	0.044627	0.6597	0.001202	0.049856	0.9808
XY	0.021071	0.010467	0.0462	0.019419	0.010478	0.0665
WPR	-0.010768	0.003287	0.0013	-0.005286	0.003222	0.1038
Adjusted R-squared	0.255474			0.315726		
N. of obs.	140			119		

Table 6b. Barro Regression including TSL						
	OECD21			ROECD		
Variable	Coefficient	*Std. Error*	Probability	Coefficient	*Std. Error*	Probability
Constant	0.292172	0.103209	0.0054	0.291167	0.103595	0.0059
LNRGDP0	-0.039826	0.013108	0.0029	-0.035637	0.013751	0.0109
LNRGDP0^2	0.001612	0.000499	0.0016	0.001463	0.000519	0.0057
LNSCH	-0.012931	0.009827	0.1906	-0.020727	0.009323	0.0283
POPG	0.053776	0.121449	0.6587	0.172883	0.100475	0.0882
CGNWY	-0.247260	0.070307	0.0006	-0.277089	0.065104	0.0000
IY	-0.033750	0.053609	0.5301	-0.048960	0.049251	0.3224
XY	0.015889	0.012339	0.2002	0.015728	0.012605	0.2148
TSL	**0.019319**	0.008500	**0.0247**	**0.015058**	0.008291	**0.0721**
Adjusted R-squared	0.293549			0.357271		
N. of obs.	136			117		

Tables 6a and 6b summarize the results for each one of the two variables WPR and TSL and the two sample groups. Estimates are based on pooled OLS with robust standard errors over the time period 1975-2010 (5 year averages). These regressions reveal a negative (positive) and significant relationship among WPR (TSL) and output growth in the OECD21 group. In the

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[26] OECD 21 includes AUS, AUT, BEL, CAN, DNK, FIN, FRA, GER, GR, IRL, ISR, ITA, JPN, KOR, NLD, NOR, PRT, SP, SWE, UK, US.

ROECD group, the respective relationships become quantitatively smaller and clearly less significant.[27] We take this to suggest that Greece, in particular, and possibly Spain and Portugal, have lower growth due to the IOS structure of their respective economies. One should also observe that the 1% confidence interval of the coefficient of WPR for the OECD21 group does not include the corresponding estimate for the ROECD group. This makes clear that the inclusion of Greece, Spain and Portugal makes a statistical importance difference. A similar argument holds for TSL.

5. WPR, TSL AND THE SHOCK PROPAGATION MECHANISM

In this section, our main interest is to (i) trace out the response of key macroeconomic variables to shocks in the two variables that capture the notion of the insiders - outsiders society WPR and TSL, and (ii) to study whether the dynamics of key macroeconomic variables are different across countries with different insiders-outsiders characteristics. This is done via a VAR model analysis whereby we investigate whether the shock propagation mechanism is different between Greece, the SP group and the group of the remaining OECD economies (ROECD). We use annual data that cover a maximum time span from 1970 to 2010. We first focus our analysis on Greece. We then estimate a panel - VAR model for the SP and ROECD groups, as well.

In the case of Greece the VAR specification is:

$$Y_t = A(L)Y_t + v_t, \quad t = 1, 2, ..., T \tag{8}$$

while the panel-VAR model is specified as:

$$Y_{it} = B(L)Y_{it} + v_{it}, \quad i = 1, ... N; \quad t = 1, ..., T \tag{9}$$

where, L denotes the lag operator, $A(L)$ and $B(L)$ are autoregressive lag polynomials; Y is the five variable vector $[TFP, Z, RGDP, DEFY, CAY]$, where Z is either WPR or TSL, $RGDP$ is the log of real per capita GDP, $DEFY$ is the government budget deficit (Total Government Spending – Total Tax Revenues) as a share of GDP and CAY is the current account deficit to GDP as a share of GDP. We think of $RGDP$, $DEFY$ and CAY as three variables that summarize the state of the macroeconomy.

Different identification assumptions may imply different qualitative and/or quantitative dynamic responses to shocks. It is important to stress here that what we are interested in is to establish that given the identification choice, the propagation mechanism triggered by an innovation in either WPR or TSL is different in Greece relative to the other country groups and this difference conforms to our IOS theory. Thus, for identification we follow Love and Zicchino (2006), who also

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[27] These results are robust to changes in the length of the sample and inclusion of explanatory variables. Results are available upon request.

use annual data and moreover conduct an experiment comparing country groups with different characteristics. The identification scheme is based on a Choleski orthogonalization of the shocks. This recursive identification approach assumes that, variables that appear earlier in the ordering, affect the subsequent variables contemporaneously and with a lag, while variables that come later, affect the previous ones only with a lag. Hence, variables that appear earlier in the VAR are "more exogenous" than the ones that come later. Thus, according to our specification, an innovation in Z (that is, either WPR or TSL) has a contemporaneous effect on all variables in the VAR with the exception of the preceding TFP. That is, after TFP, Z is considered as the second "most exogenous" variable in the system, an assumption that is consistent with our analysis. This assumption is consistent with our theory's predictions that it takes some time for the IOS to establish and its effects on the economy's productivity to be set in action. We also allow the government budget deficit-to-GDP ratio to be contemporaneously affected by real per capita GDP, since components of government spending and revenues, such as government transfers and income taxes, are likely to depend on the current level of economic activity (see also Blanchard and Perotti (2002) and Kim and Roubini (2008)). Finally, as in Kim and Roubini (2008), the current account-to-GDP ratio is simultaneously affected by all other variables. Each VAR system is estimated by OLS.[28]

4.1. TFP

To fix ideas, we start with the dynamic responses from a positive TFP shock, depicted in Figures 5a-5c, in order to investigate whether the propagation mechanism arising from a TFP shock differs among groups of countries with different IOS characteristics. Red dashed lines denote the one-standard deviation confidence intervals based on 1000 Monte Carlo simulations.

First of all, the effect of a positive TFP shock on RGDP, DEF/Y and CA/Y is qualitatively and quantitatively similar irrespective of the VAR vector considered (i.e., either including WPR or TSL or TSELF, respectively). In what concerns RGDP, we observe a positive response throughout and in all country groups, as expected. For that matter, this lowers the public deficit, both directly and indirectly through the automatic stabilizers effect of increased tax revenues. However, the effect is considerably short lived in Greece since, after two periods the deficit increases. This diverging behavior of Greece relative to ROECD and SP stems from the behavior of WPR.

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[28] Data for Greece cover the period 1970-2010, while data for the panel-VARs cover a maximum time span over 1970-2010 per country. All country variables have been detrended with a linear and quadratic trend. The VAR for Greece and the respective panel-VARs for the two groups are estimated using one lag. ROECD group includes AUS, AUT, BEL, CAN, DNK, FIN, FRA, GER, ITA, JPN, NLD, NOR, SWE, UK, US and IRL. Data for TFP are not available for KOR and ISR.

As can be seen in the second column of Figure 5a, the effect of a positive TFP shock on WPR is actually very different among Greece and the ROECD and SP groups. In Greece, WPR falls in the very short run but eventually increases substantially. On the other hand, in the case of the ROECD group, WPR falls throughout, indicating that the positive TFP shock has a stronger positive effect on the wages in the private sector. The opposite seems to hold in Greece, where apart from the first two periods it is the public sector wages that increase more. The increase in WPR observed in Greece mitigates the increase in output and at the same time increases government spending and thus the deficit. Recall that, according to the theory discussed in the introduction, an increase in the private sector wages raises public sector wages by more, creating additional frictions that mitigate the increase in output brought about by the positive TFP shock. This distortion will be bigger to the degree that higher wages in the public sector imply distortionary tax increases. This relationship between the wage premium and output will be more apparent in the next experiment where we consider the effects of a shock on WPR.

Figure 5a: Dynamic Responses to shock in TFP (vector includes WPR)
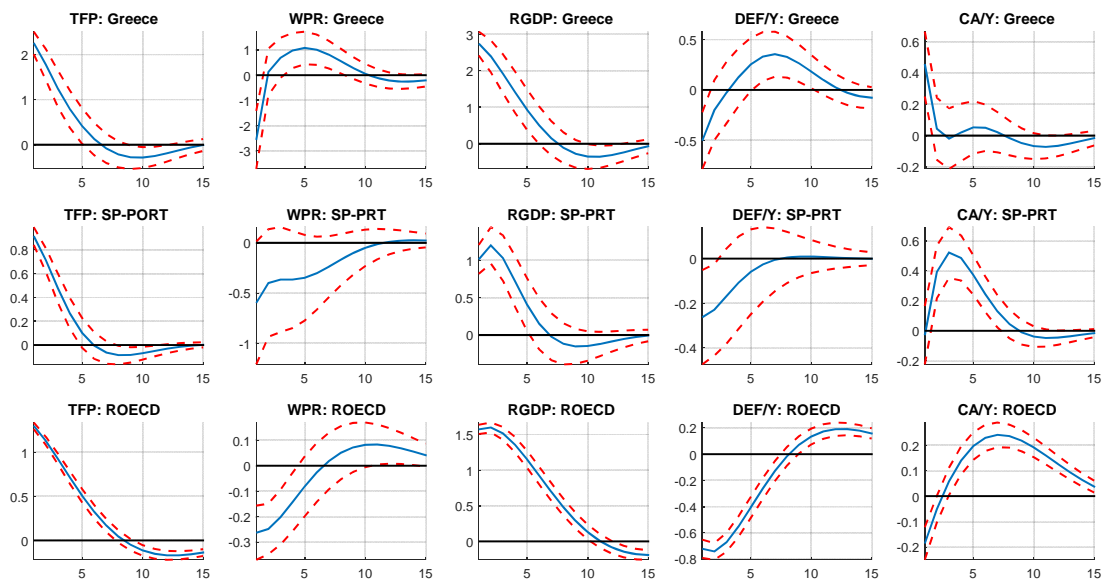
When it comes to the dynamic response of the current account deficit to GDP ratio, as can be seen from the fourth column in Figure 5a, this differs among the three country groups. A positive TFP shock has a short lived deterioration in the current account deficit in Greece and no effect thereafter. This deterioration comes as a result of an increase in imports due to the increase in RGDP. Thereafter the increase in imports is counterbalanced by the effects of increased productivity on foreign investment and exports. On the other hand, the current account deficit in the case of the ROECD group improves in the short run, reflecting the positive productivity effect on

investment and exports, but eventually deteriorates once the increased imports effect dominates. This effect is the one that dominates the SP group as well.

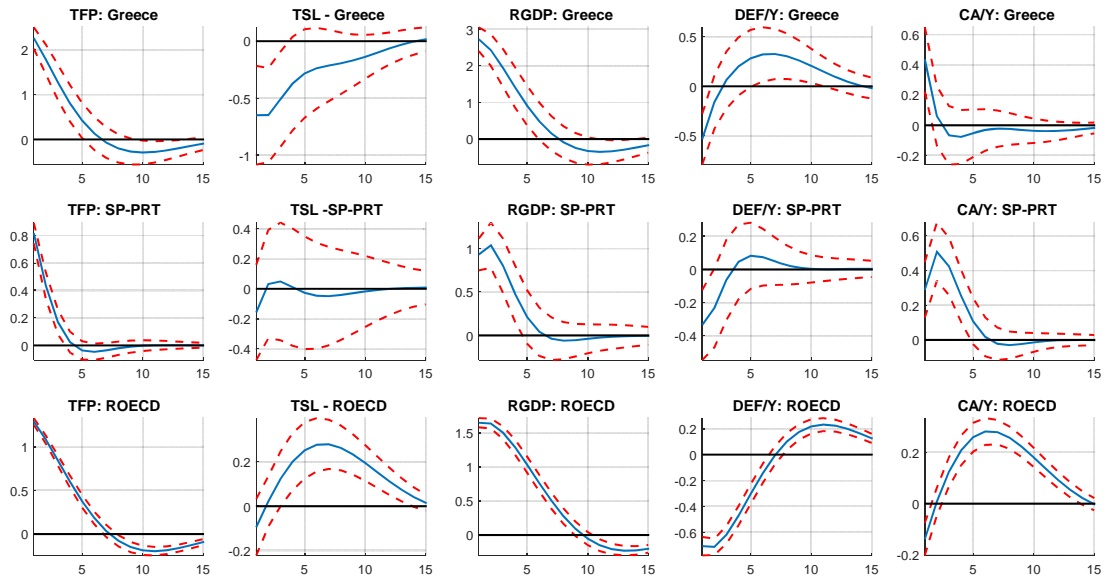**Figure 5b: Dynamic Responses to shock in TFP** (vector includes TSL)
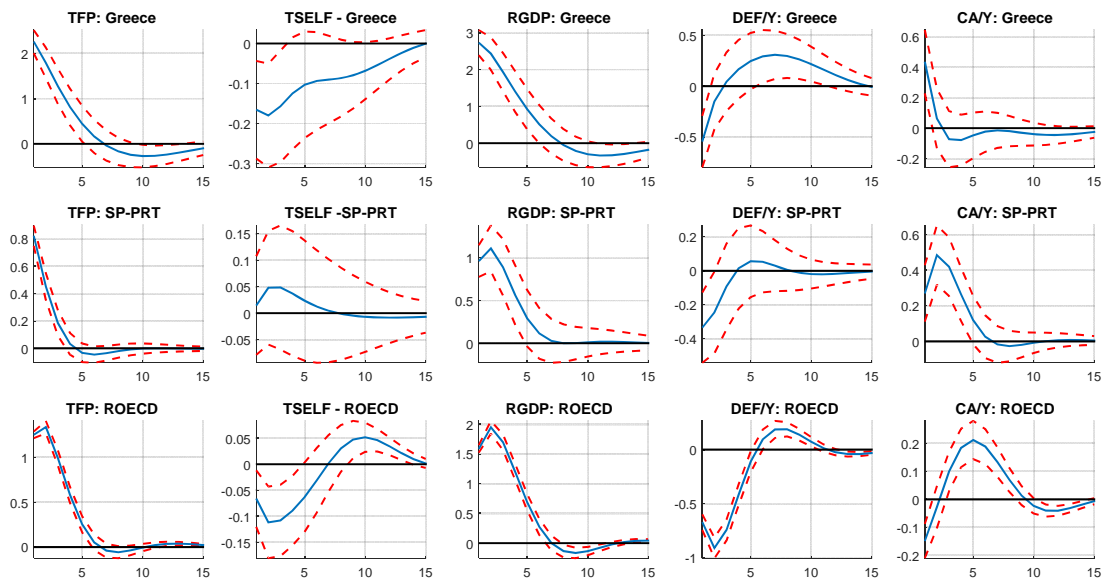

**Figure 5c: Dynamic Responses to shock in TFP** (vector includes TSELF)

A final note on the negative dynamic response of TLS in Greece, implying that, it is the self employed that benefit (in terms of taxation) more from the positive technology shock. In order to decipher the effects on TSL it is helpful to consider first the effects of the productivity shock on the effective tax rate on the income of the self employed alone (TSELF). As can be seen in Figure 5c, this is also negative, in Greece. An increase in TFP leads to higher wages and thus, through the automatic stabilizers, one would expect higher effective tax rates. However, TSELF falls. This reflects the self employed higher opportunities for tax evasion and tax avoidance, which, as

emphasized in the introduction, is a feature of the insiders – outsiders society. The negative effect on TSL implies that either the tax on labor income increases or fall by less relative to TSELF. When it comes to the ROECD group, TSELF also falls but the overall effect on TSL is positive, implying that increased productivity makes taxes on labor income to fall by more relative to TSELF. In other words, both self employed and employees benefit from the increase in TFP. This different behavior among the two country groups is a further indication that the IOS mechanism is at work. Note that the effect on the SP group on both TSELF and TLS is negative but insignificant. It seems that, in all cases, the behavior of the SP group lies somewhere in between Greece and the ROECD group.

4.2. WPR and TSL

Figures 6-7 display the impulse responses (for the first fifteen years) to orthogonal shocks, as well as the one-standard deviation confidence intervals based on 1000 Monte Carlo simulations. Each figure depicts the responses of the endogenous variables to a one standard deviation shock in a variable thought to capture aspects of IOS, i.e., WPR, and TSL, respectively. The first raw, corresponds to Greece, the second to the SP group (Spain and Portugal) and the third to the ROECD group.

Figure 6: Dynamic responses to a shock in the wage premium WPR
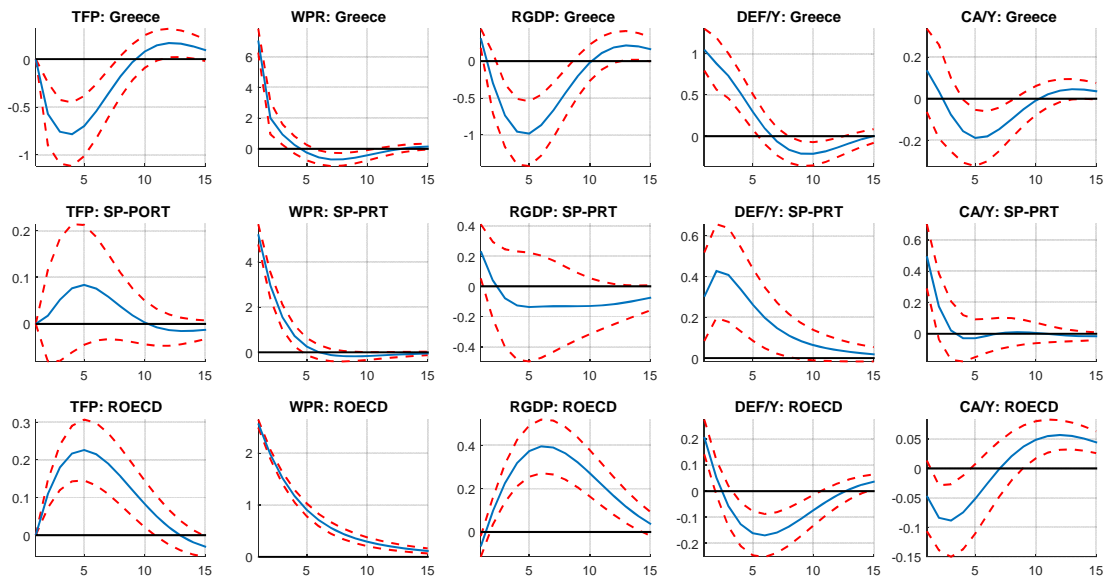
Looking at the effects of a shock in WPR, the most striking feature that emerges from the inspection of Figure 6 is the completely different, both qualitatively and quantitatively, behavior of Greece relative to ROECD. In particular, for Greece, the increase in WPR, lowers TFP, reduces output and increases both the public and current account deficits (although, the effect on the current account is insignificant); while it works in exactly the opposite direction for ROECD. The SP group lies,

again, in between Greece and ROECD, with insignificant responses of output and TFP, but significant and positive for the public and current account deficits. More specifically, the magnitude of the increase in the wage premium in Greece, is more than three times bigger relative to the ROECD group, and fifty percent bigger relative to the SP group, respectively. This shock, apart from an increase on impact, leads to a significant and long lasting decrease in Greek RGDP. The increase in the first period may reflect an initially positive demand effect which, however, is quickly counterbalanced by the adverse effects of the IOS propagation mechanism. The latter are reflected in the impulse response of TFP, which reveals a strong negative relationship between WPR and TFP. Concerning the response of DEF/Y, a positive shock in the wage premium gives rise to a big and long lasting increase in the government budget deficit. On the other hand, the wage premium shock increases the current account deficit but, as already mentioned, the effect is insignificant. These findings are in line with our theory whereby the wage premium affects negatively TFP and therefore output. That is, as our theory predicts, first, a high public sector wage premium is an indication of labor misallocation and tax distortions. And, second, if these frictions are sufficiently strong, both TFP and output decline. On the other hand, in the ROECD group, a shock in WPR is accompanied by a positive effect on TFP and output, a small and quickly vanishing increase in the public deficit and a small but significant decrease in the current account deficit. It seems that the IOS mechanism is not at work here.

When it comes to the "twin deficits", the behavior of the public and the current account deficits are in accordance to the IOS explanation. This is clearly the case for Spain and Portugal. In what concerns Greece, an increase in WPR stimulates both public and current account deficits. However, the effect on the current account deficit is insignificant. One explanation could be that the increase in the current account deficit brought about by the increase in the government deficit and possibly the fall in exports brought about by the decrease in TFP, are counterbalanced by the decrease in the demand for imports stemming from the fall in output. This explanation is also consistent with the fact that in the case of Spain and Portugal no significant fall in output is observed.

Next we consider the effects from a shock that increases TSL. These are depicted in Figure 7. Such a shock shares two features: The first implies a weakening in the IOS characteristics, if present. The second has to do with the distortions implied by taxation.[29] Again, as in the case of WPR, the most striking feature is that Greece is in a league of it's own: As a result of a positive

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[29] TSL increases when the effective tax rate on the income of the self employed (TSELF), increases by more (or falls by less) relative to the effective tax rate on dependent employment income. Although an increase in TSL implies a weakening in the IOS characteristics the interpretation of the dynamics is tricky since it is difficult to trace out whither the results stem from: TSL consists of a ratio of distorting taxes, and it is difficult to disentangle which of the two is more distortionary.

shock in TLS, TFP and RGDP increase, the public deficit falls and the current account deficit increases. On the other hand, the only significant effect in the ROECD group, is that on the public deficit which rises, while the effects for the SP group are all insignificant. The response of the macroeconomic variables in Greece implies that, it is the positive effect on the workings of the economy brought about by the weakening of the IOS characteristics that dominates. Again, these findings are in line with our theory, whereby the inverse of TSL may interpreted as a tax break premium enjoyed by the self employed over dependent employment. Therefore, an increase in TSL, i.e. a fall in this tax break premium, will be associated with an increase in TFP and output, as observed.[30]

Figure 7: Dynamic responses to a shock in TSL
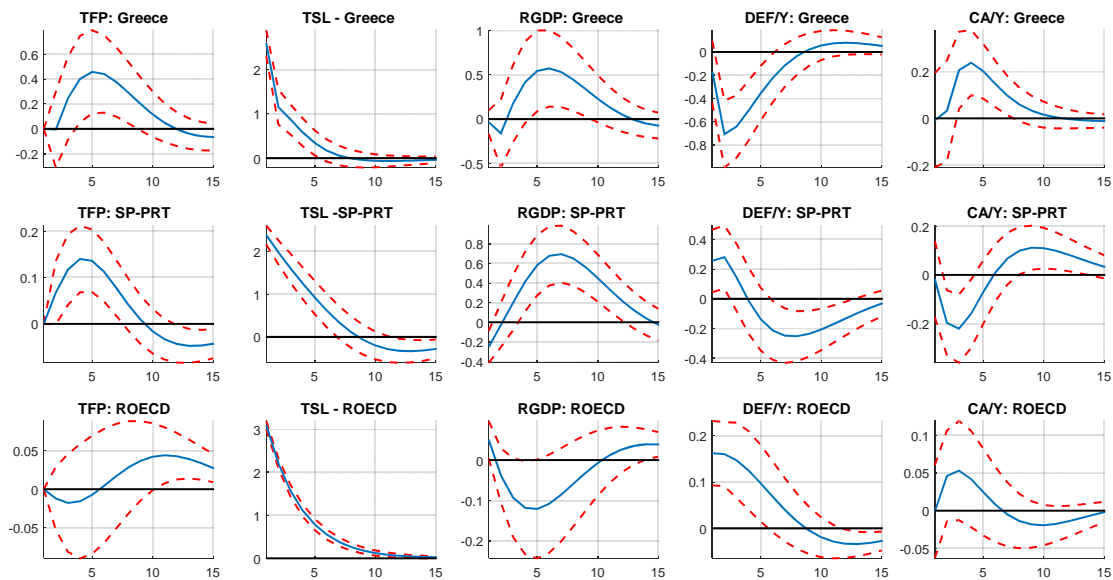
To sum up, our results provide strong enough evidence in support of our IOS hypothesis. In particular, in what concerns the impact of WPR and TSL, Greece, and to some extent Spain and Portugal, behave in the way predicted by IOS theory: Positive (negative) innovations in WPR (TSL) cause TFP and output to fall and both public and current account deficits to deteriorate. No such behavior emerges for the remaining OECD countries.

4.2. A corroborating counterfactual

What if the shock propagation mechanism of WPR and TSL in Greece was qualitatively and quantitatively similar to that of the ROECD groups? The answer is given in Figures 8 and 9 where the second line reports the impulse response functions for the VAR for Greece wherein the

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[30] Essentially the same picture emerges looking at the respective impulse responses for TSELF (see Figure A4 in the Appendix).

parameter values related to WPR and TSL are substituded by their respective counterparts of the ROECD group VAR. The first line is the same as the first lines in Figures 6 and 7. Clearly, a shock in WPR has an insignificant case on TFP in the counterfactual experiment contrary to the prolonged negative effect actually observed for Greece. This difference in the behavior of TFP among the actual and the counterfactual IRFs lies behind the corresponding differences in the responses of output and the two deficits. This is in line of course with our view that Greece unlike the ROECD group of countries behaves as an Insider-Outsider Society. A similar picture emerges by comparing the actual and counterfactual responses of a shock in TSL.

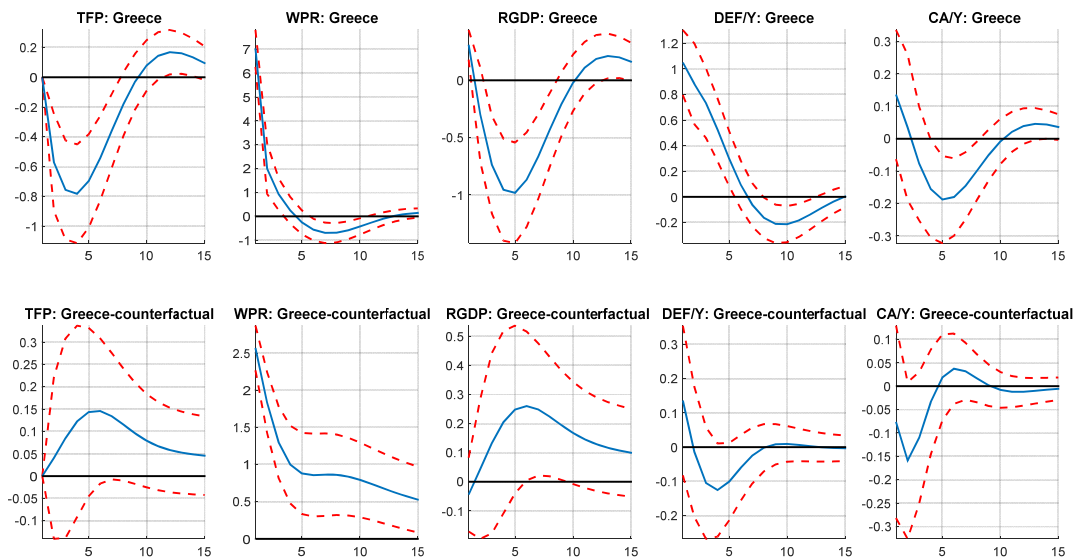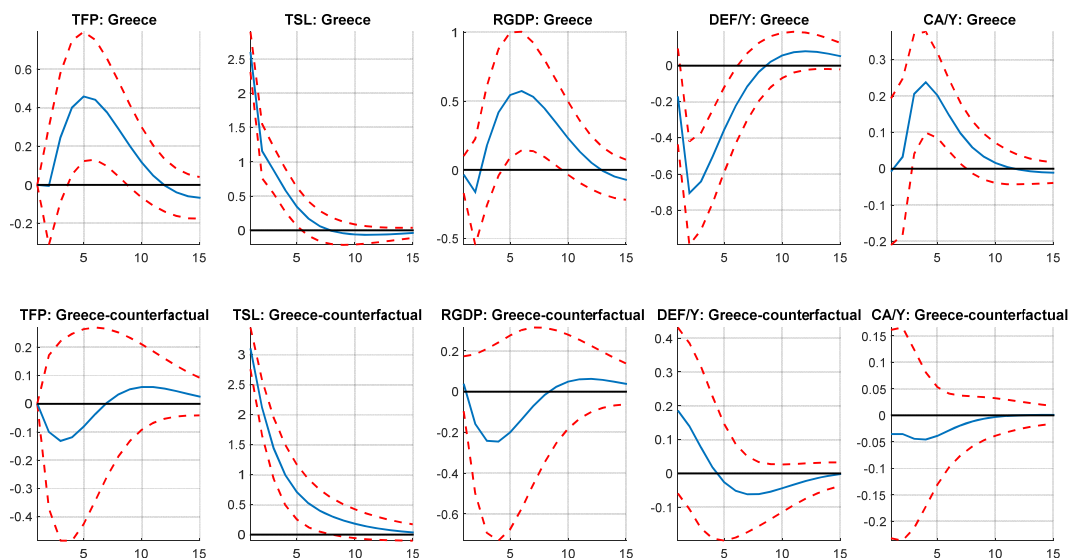**Figure 8: Actual vs Counterfactual responses to a shock in WPR**

Figure 9: Actual vs Counterfactual responses to a shock in TSL

6. CONCLUDING REMARKS

In this paper we identified certain stylized facts of Greek public finances and connected them to the divergence in the GDP per capita path of Greece relative to the OECD average, as well as the economic crisis plaguing Greece, over the last eight years. These stylized facts are indicative of an "insiders – outsiders society," whereby the politicoeconomic system is characterized by groups of elites with each one of these elites enjoying market power, ignoring the effects of their actions on the rest of society. But, at the same time, all these groups cooperate in influencing government, so as to promote their interests. Greece has the highest ratio of the average wage in the public relative to the private sector and the lowest effective tax rate on the income of the self employed over labor income, among the group of OECD countries for which the pertinent time series data, are available. It was shown that: (a) Unlike the other OECD countries, the behavior of these variables in Greece, and to a lesser extent in Spain and Portugal, can be accounted for by "insiders- outsiders society" characteristics associated with, wage setting institutions, competition conditions, tax collection efficiency and the twin deficits. (b) The behavior of these variables affects long term growth and the business cycle in Greece in a manner that is similar to Spain and Portugal and quite different than the other OECD countries. Moreover, these differences and similarities are consistent with the "insiders – outsiders society" explanation.

Taking stock of all these results, we conclude that, indeed, Greece conforms to the IOS structure. And, we take all these results as providing strong evidence that the country's recent dismal growth performance and difficulty in tackling the ongoing and persistent crisis may be due to its politicoeconomic system IOS. If this explanation, then, is correct, the way to deal with the problems that brought Greece to its present crisis is to dismantle the insiders – outsiders society. This, however, requires a thorough look into the organization of Greek society and the workings of the political and economic system. First, rents to groups of insiders must be identified and second, appropriate policies for their dismantling must be implemented. Only, a powerful commitment technology mechanism such as an appropriately designed program that takes fully into account the idiosyncrasies of Greek society can achieve this. Only such an approach can gain the necessary social support and create well grounded expectations for getting out of the crisis.

Finally, the results of this paper could be of interest to the European integration question, as countries that have gone beyond a certain point toward the establishment of an insiders-outsiders society (like Greece and possibly other South European countries) will have a difficulty following the others in TFP and output growth, as already suggested by several policy influential economists (see, e.g., Blanchard (2004), Alesina and Giavazzi (2008)).

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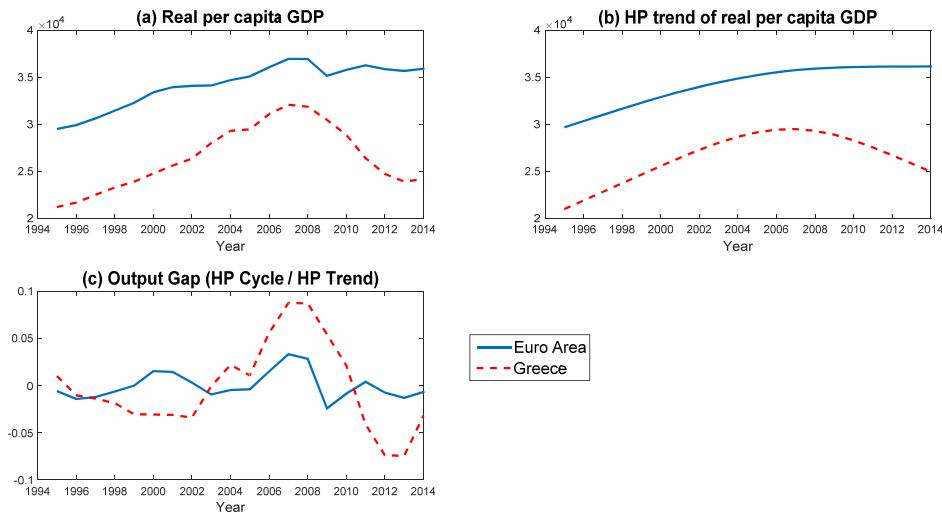
APPENDIX

I. NOTES ON FIGURES

Figure 1: (i) Annual data over the period 1970-2014, (ii) Per capita GDP is in constant 2010 prices, constant PPPs and detrended with the HP filter with a smoothing parameter of 100, (iii) Output gap is defined as the ratio of the HP filter cyclical component over the corresponding HP trend.

Figure 2: Median values over the period 1970-2010 for AUS, AUT, BEL, CAN, FIN, FRA, GR, ITA, JPN, NOR, NLD, SP, SWE, UK, US, 1971-2010 for DNK, IRL, 1975-2010 for KOR, 1977-2010 for PRT, 1991-2010 for GER and 1999-2010 for ISR.

Figure 3: Median values over the period 1970-2010 for AUS, AUT, BEL, CAN, FIN, FRA, GR, IRL, ITA, JPN, NLD, SP, SWE, UK, US, 1981-2010 for DNK, 1975-2010 for KOR and NOR, 1989-2010 for PRT, 1991-2010 for GER and 2000-2010 for ISR.

II. ADDITIONAL FIGURES

Figure A1

Notes: (i) Annual data over the period 1995-2014, (ii) Per capita GDP is in constant 2010 prices, constant PPPs and has been detrended with the H-P filter with a smoothing parameter of 100, (iii) Output gap is defined as the ratio of the HP filter cyclical component of real per capita output to the HP trend.
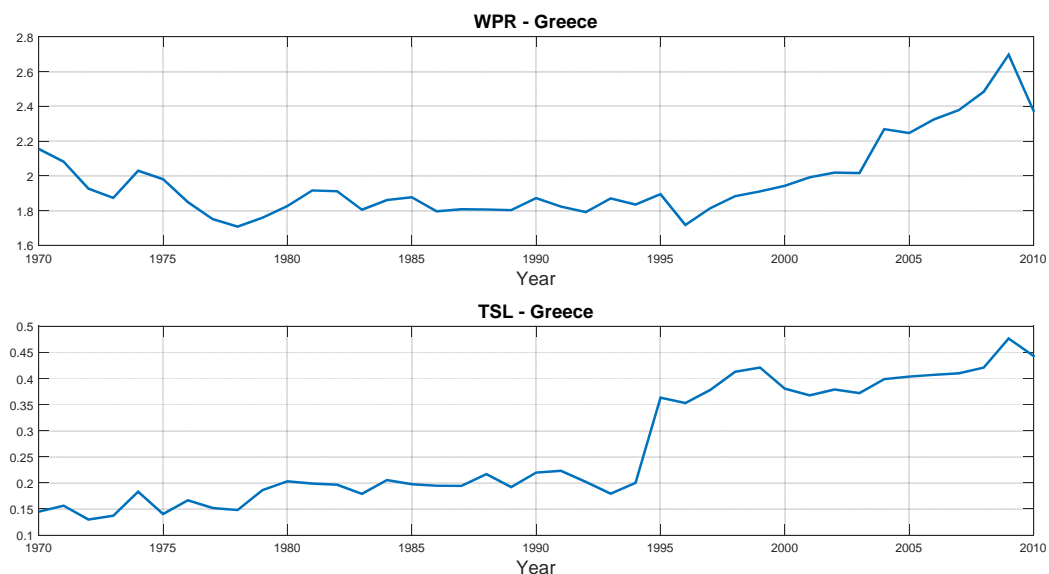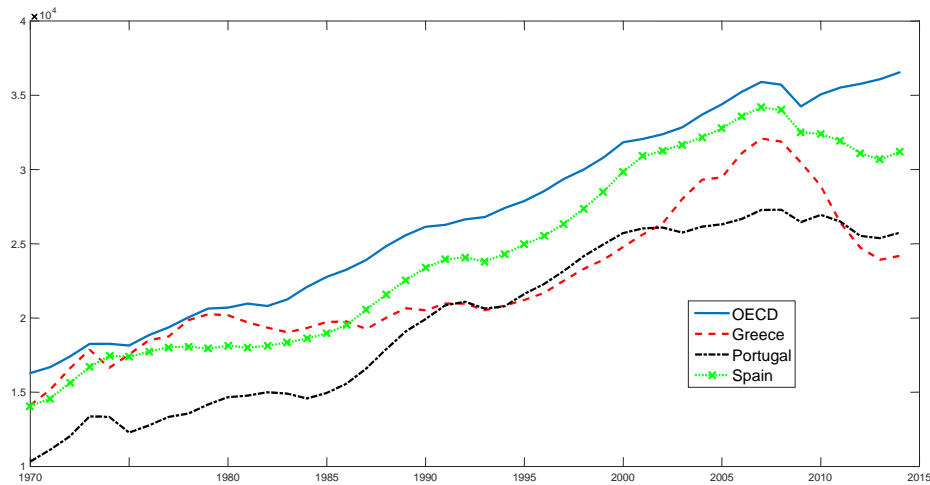
Figure A2. WPR and TSL in Greece

Figure A3. Real Per Capita GDP in PPP values in Spain and Portugal vs Greece and OECD

Notes: (i) Annual data over the period 1970-2014, (ii) Per capita GDP is in constant 2010 prices, constant PPPs.

Figure A4: Dynamic responses to a shock in TSELF (quadratic detrending)
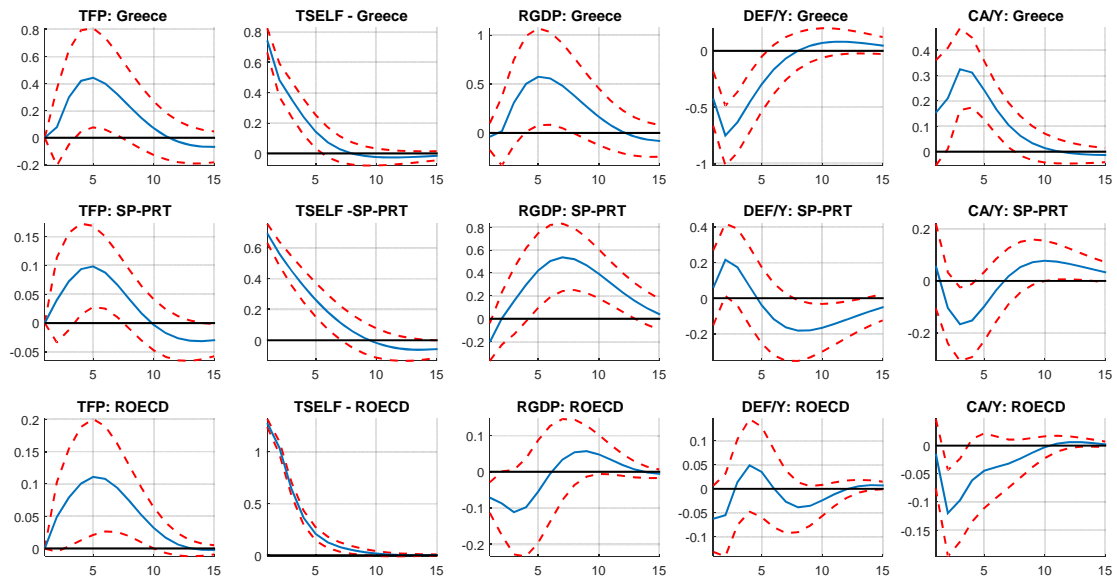
III. ADDITIONAL TABLES

Table A1a: Second Moment Properties of the HP Output Gap			
	Standard Deviation	**Relative Volatility**	**Autocorrelation**
OECD	0.015	1	0.55
GREECE	0.039	2.6	0.69

Table A1b: Co-movement of the HP Output Gap between Greece and OECD				
$t-2$	$t-1$	t	$t+1$	$t+2$
-0.21	0.27	0.55	**0.50**	0.40

Notes: (i) Annual data over the period 1970-2014, (ii) Per capita GDP is in constant 2010 prices, constant PPPs and detrended with the HP filter with a smoothing parameter of 100, (iii) Output gap is defined as the ratio of the HP filter cyclical component over the corresponding HP trend.

A2. A Comparison of wages: The Greek Power Company (ΔEH)			
	ΔEH	**Public Sector**	**Private Sector**	**EON**
2008	68176	38562	23336	54844
2009	74155	42094	23526	60718

Source: Greek Budget / ΔEH and EON annual financial statements.

Table A3. How TFP is affected by WPR - Greece			
Variable	**Coefficient**	*t-statistic*	**Probability**
Constant	1.325345	12.15748	0.0000
WPR	-0.258381	-4.849058	0.0000
time	0.007133	2.077388	0.0454
time^2	-0.001022	-5.026768	0.0000
time^3	2.92E-05	7.716427	0.0000
Adjusted R-squared	0.892758		
N. of obs.	39		

Notes: Estimates are based on OLS.

Table A4. How TFP is affected by TSL - Greece			
Variable	**Coefficient**	*t-statistic*	**Probability**
Constant	0.739130	32.99943	0.0000
TSL	0.516661	6.382703	0.0000
Adjusted R-squared	0.511184		
N. of obs.	39		

Notes: Estimates are based on OLS.

Table A5. How TFP is affected by WPR – SP			
Variable	**Coefficient**	*t-statistic*	**Probability**
Constant	0.879453	16.59311	0.0000
WPR	-0.047639	-2.161475	0.0341
time	-0.005117	-1.557608	0.1238
time^2	0.000885	5.704337	0.0000
time^3	-1.61E-05	-7.038776	0.0000
Adjusted R-squared	0.752159		
N. of obs.	75		

Notes: Estimates are based on pooled OLS with robust standard errors.

Table A6a. How TFP is affected by TSL - SP			
Variable	**Coefficient**	*t-statistic*	**Probability**
Constant	0.763660	41.91098	0.0000
TSL	0.419845	11.61221	0.0000
Adjusted R-squared	0.737985		
N. of obs.	63		

Notes: Estimates are based on pooled OLS with robust standard errors.

Table A6b. How TFP is affected by TSL - SP			
Variable	**Coefficient**	*t-statistic*	**Probability**
Constant	0.747308	53.20008	0.0000
TSL	0.094088	2.177210	0.0335
time	0.013123	4.550123	0.0000
time^2	-0.000275	-2.095569	0.0405
time^3	1.98E-06	0.973103	0.3345
Adjusted R-squared	0.923985		
N. of obs.	63		

Notes: Estimates are based on pooled OLS with robust standard errors.

Table A7. How TFP is affected by WPR – ROECD			
Variable	**Coefficient**	*t-statistic*	**Probability**
Constant	0.565918	42.50796	0.0000
WPR	0.090452	8.010170	0.0000
time	0.002100	1.091721	0.2754
time^2	0.000487	4.211516	0.0000
time^3	-8.29E-06	-4.102892	0.0000
Adjusted R-squared	0.752159		
N. of obs.	633		

Notes: Estimates are based on pooled OLS with robust standard errors and country fixed effects.

Table A8a. How TFP is affected by TSL - ROECD			
Variable	**Coefficient**	*t-statistic*	**Probability**
Constant	0.580026	12.45116	0.0000
TSL	0.310096	6.643240	0.0000
Adjusted R-squared	0.227886		
N. of obs.	619		

Notes: Estimates are based on pooled OLS with robust standard errors and country fixed effects.

Table A8b. How TFP is affected by TSL - ROECD			
Variable	**Coefficient**	*t-statistic*	**Probability**
Constant	0.700452	50.34096	0.0000
TSL	-0.039871	-3.729730	0.0002
time	0.001316	0.643384	0.5202
time^2	0.000531	4.497061	0.0000
time^3	-8.81E-06	-4.373991	0.0000
Adjusted R-squared	0.907548		
N. of obs.	619		

Notes: Estimates are based on pooled OLS with robust standard errors and country fixed effects.

IV. DATA

We consider the following countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Netherlands, Norway, Portugal, Spain, Sweden, UK, USA. Data are yearly and cover a maximum time span from 1970 to 2010. Our main data source for the macroeconomic variables is the OECD Economic Outlook no. 90. Missing values for some specific time periods/variables have been completed from the OECD Economic Outlook no. 88, 86, 85 and AMECO. Other data sources are the OECD employment and labor market statistics, World Development Indicators (WDI), OECD General Government Accounts, and OECD Revenue Statistics. The political institutions variables are taken from Visser, (2011) - ICTWSS: Database, Beck et al. (2001) – The Database of Political Institutions (DPI-2012). Data for education attainment are taken from Barro and Lee (2010).

Table A.9: List of macroeconomic and other variables

Variable	Description	Source	Time span
NGDP	Nominal gross domestic product	*OECD Economic Outlook & AMECO*	1969-2010
RGDP	Real gross domestic product	*OECD Economic Outlook & AMECO*	1969-2010
PC	Private final consumption expenditure	*OECD Economic Outlook*	1970-2010
GDPPPP	GDP per head, constant prices, constant PPPs	*OECD.Stat*	1970-2014
WSSS	Total compensation of employees	*OECD Economic Outlook*	1970-2010
GFCF	Gross fixed capital formation	*OECD Economic Outlook*	1970-2010
X	Exports of goods and services	*OECD Economic Outlook*	1970-2010
YPGT	Total disbursements of general government (Total government expenditures)	*OECD Economic Outlook and Eurostat*	1970-2010
CGNW	Government final non-wage consumption expenditure	*OECD Economic Outlook*	1970-2010
CGW	Government final wage consumption expenditure	*OECD Economic Outlook & AMECO*	1970-2010
CG	Government final consumption expenditure	*OECD Economic Outlook*	1970-2010
DEF	Government net lending (total government deficit)	*OECD Economic Outlook*	1970-2010
TIND	Taxes on production and imports	*OECD Economic Outlook*	1970-2010
TY	Total direct taxes	*OECD Economic Outlook*	1970-2010
CA	Balance of current transactions with the rest of the world (Current account balance)	*AMECO*	1970-2010
TE	Total employment	*OECD Economic Outlook*	1970-2010
EE	Dependent employment - Total economy (Total employees)	*OECD Economic Outlook*	1970-2010
EEP	Dependent employment in the private sector (Private sector employees)	*OECD Economic Outlook*	1970-2010
GE	General government employment	*OECD Economic Outlook*	1970-2010
SE	Total self-employed persons	*OECD Economic Outlook*	1970-2010
POP	Working age population 15-64	*OECD Economic Outlook*	1969-2010
YGAP	Output gap (gap between actual GDP and Hodrick-Prescott filter divided by H-P filter)	*AMECO*	1970-2010
UM	The ratio of employees that are trade union members divided by the total number of employees	*i) OECD employment & labor market statistics ii) ICTWSS database*	1970-2010
POPT25	Education attainment – Share in population over 25 with Tertiary education	*Barro and Lee (2010)*	1970-2010, five year intervals (linear interpolation used to fill in missing years)
PRTYIN	How many years has the party has been in office	*DPI2012*	1975-2010
MAJ	Margin of majority (fraction of seats held by the government)	*DPI2012*	1975-2010
TENSYS	How long has the country been autocratic or democratic, respectively.	*DPI2012*	1975-2010

DEP_RATIO	Dependency ratio (people younger than 15 and older than 64 as share of working age population)	WDI	1970-2010
URBAN_POP	Urban population as share of total population	WDI	1970-2010
COORD	Index of coordination of wage-setting	ICTWSS database	1970-2010
CENT	Index of centralization of wage bargaining	ICTWSS database	1970-2010
UD_public	Union density of public sector workers	ICTWSS database	1970-2010
UD_private	Union density of private sector workers	ICTWSS database	1970-2010
ETCR	Regulation index in energy, transport and communication	OECD.Stat	1970-2010
PSL	Regulation index in professional services (legal)	OECD.Stat	1970-2010
VAT	Standard VAT rate	Consumption Tax Trends 2014, OECD Publishing	1970-2010

Table A.10: Own calculations

Variable	Description	Calculation	Time span
RGDPP	Real per capita GDP	RGDP/POP	1970-2010
RGDPG	Growth rate of real per capita GDP	LN(RGDPP(t))/ LN(RGDPP(t-1))	1970-2010
COMPP	Total compensation of employees in the private sector	WSSS-GW	1970-2010
WP	Compensation rate in the private sector	COMPP/PE	1970-2010
WG	Compensation rate in the public sector	GW/GE	1970-2010
WPR	Wage premium	WG/WP	1970-2010
TAX_Y	Total tax revenues-to-GDP ratio	(TIND+TY)/NGDP	1970-2010
CGNWY	Government final non-wage consumption expenditure-to-GDP ratio	CGNW/NGDP	1970-2010
TL	Effective tax rate on labor income	See Kollintzas et al. 2012	1970-2010
TSE	Effective tax rate on self-employment income	See Kollintzas et al. 2012	1970-2010
VATR	VAT revenues	Tax revenue statistics, OECD	
TVAT	VAT effective tax rate	VATR/(PC-VATR)	1970-2010
TSL	Ratio of the effective tax rate on self-employment income divided by the effective tax rate on labor income	TSE/TL	1970-2010
CAY	Current account balance-to-GDP ratio	CA/NGDP	1970-2010
DEFY	Government net lending-to-GDP ratio	DEF/Y	1970-2010
UD_RATIO	Union density of public sector workers to the union density of private sector workers	UD_public/UD_private	1970-2010
VEF	Ratio of the VAT effective tax rate to the standard VAT rate	TVAT/VAT	
STE	Self-employment over total employment	SE/TE	1970-2010

1. For Australia, government final wage consumption is computed as $CGW = WSSS - WSSE * EEP$, where $WSSS$ is total compensation of employees, $WSSE$ is the compensation rate in the private sector and EEP is dependent employment in the private sector. Then, government final wage consumption expenditure is computed as $CGNW = CG - CGW$, where CG is total government consumption. Data for $WSSE$ are from OECD Economic Outlook no. 90.

2. For Germany and Korea, total dependent employment, EE, and dependent employment in the private sector, EEP, are respectively computed from the following relationships: $WSST = WSSS / EE$ and $WSSE = (WSSS - GCW) / EEP$, where $WSST$ is the compensation rate of the total economy, $WSSE$ is the compensation rate in the private sector, $WSSS$ is total compensation of employees, and GCW is

government final wage consumption expenditure. For Israel, EE is computed as $EE = ET - ES$, where ET is total employment and ES is total self-employment. Then, EEP is computed as $EEP = EE - GE$, where GE is general government employment.

3. For Australia, Austria, Germany, Greece and Korea, general government employment is computed as $GE = EE - EEP$, where EE is total dependent employment and EEP is dependent employment in the private sector.

Table A.11: Data used for the Barro type growth regressions:

Variable	Description	Calculation	Time span
RGDPG0	Real per capita GDP growth rate at the start of each period		1970-2010
IY	Gross fixed capital formation-to-GDP ratio	*GFCF/NGDP*	1970-2010 In five year averages
XY	Exports of goods and services-to-GDP ratio	*X/NGDP*	1970-2010 In five year averages
SCH	Average year of total schooling (age group over 25) at the start of each period	*Source: Barro and Lee (2010)*	1970-2010
POPG	Population growth	*LN(POP(t))/ LN(POP(t-1))*	1970-2010 In five year averages
CGNWY	Government final non-wage consumption expenditure-to-GDP ratio	*CGNW/NGDP*	1970-2010 In five year averages