Fiscal Multipliers in the Euro Area: Evidence from Southern European Regions

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Abstract

An original panel dataset of exogenous fiscal shocks for some Mediterranean countries is used along with the so-called "narrative" approach introduced by Romer and Romer (2010) to estimate the tax multiplier. Exogenous shocks comprise only tax changes motivated by the willingness to improve long term growth, reduce government debt as well as achieving redistributive goals. Endogenous shocks are excluded from the data since they are likely to be correlated with output. The aggregate tax multiplier on output is much smaller than the one found in Romer and Romer (2010): -1, instead of -3 at a three years perspective. When considering the effect of tax changes on unemployment, a multiplier of +2.8 is found on a two years horizon; a similar coefficient, with a negative sign, is found relating government tax liabilities with private investment, on the same temporal horizon. Splitting the sample between pre and post-crisis period, a multiplier non significantly different than zero is obtained for the first partition, while significant and equal to -0.75 for the second subsample.

Key words: exogenous fiscal shocks, GDP growth, unemployment, private investment, tax multipliers, policy lags.

JEL codes: E02, E21, E24, E62, H21, H30.

1 Introduction

The empirical literature on fiscal multipliers is wide and heterogeneous. One of the main caveats is related to the fact that the transmission mechanism of fiscal policy, contrarily to that of monetary policy, has not entirely been uncovered yet. This fact might contribute to explain why empirical works are so different each from one another. Moreover the topic is politically sensitive. Broadly speaking, three are the

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[1]Such paper constitutes a revised version of the author's final thesis aimed at obtaining the studying title of dottore magistrale within the course in *Discipline economiche e sociali* at Universitá Bocconi in Milan. Supervision was provided by Francesco Giavazzi. Advisor was Luca Sala. Discussants were Alberto Alesina, Carlo Ambrogio Favero and Tommaso Nannicini. Matteo Salto, at the European Commission, thankfully provided us with the European Union wide set of data used in the analysis throughout the paper. All errors and imprecisions remain ours.

main techniques employed by researchers to estimate the so called *fiscal multipliers*, aimed at understanding the effects on output arising from a marginal variation in the level of taxes (or government spending). In the literature the following are observed: (*i*) *vector-autoregressive* techniques, relying on a Choleski decomposition; (*ii*) *anticipated shifts in government spending or revenues* and (*iii*) *narrative measures*, also recognized as action-based approach[2]. The related literature will be considered briefly, since the aim of the paper is indeed to consistently estimate the effects of tax changes for some Mediterranean European countries (France, Greece, Italy, Portugal, and Spain) through the analysis of a dataset obtained by applying the "narrative" technique.

The article is structured as follows: in section 2 the related literature is discussed; section 3 contains the core of the narrative analysis[3]; in section 4 summary statistics of the data-set are described and compared with all legislated tax changes; section 5 presents the econometric results; section 6 discusses, and section 7 draws conclusions. A visual representations of all exogenous shocks for each country is provided, in the appendix.

2   Literature on tax multipliers

The seminal paper introducing VAR methods in fiscal policy is Blanchard and Perotti (2002). It employed a mix between structural vector - autoregression and event study analysis, based on the institutional information about the magnitude of spending and tax changes, as well as their timing[4]. With a postwar quarterly sample, Blanchard and Perotti (2002) estimated the effects of fiscal policy on the US economy, finding counterintuitive evidence that a positive government spending or tax shock has a negative effect on private investment (as a component of GDP), contrarily than for consumption. Nevertheless a positive *spending* shock is found to have a positive effect on output growth, while a positive *tax* shock is found to have a negative effect on the same variable.

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[2]De Vriers et al. 2011.

[3]Namely for two of the five countries considered, budget laws are analyzed speculating on which measures could be deemed as exogenous and which endogenous with respect to GDP growth. The distinction made in Romer and Romer (2010) is adopted: exogenous with respect to output growth are those reforms based on the willingness to reduce government debt and to improve long run growth; endogenous are all other measures which have a short term objective of counter-balancing the business cycle.

[4]Imposing the identifying assumption that changes in government purchases and taxes are pre-determined within a quarter.

Overall, the multipliers are typically close to one, and have been obtained both in a *static* and in a *dynamic* setup. The persistence of the shock is dependent on whether it has been determined under a *deterministic* or a *stochastic* trend (higher in the former case). Another relevant issue raised in Blanchard and Perotti 2002 is the anticipation of the shifts, since most of the tax changes are known to economic actors just a few quarters prior to implementation. It should also be reminded that Blanchard and Perotti (2002) did not consider the inter-temporal government resource constraint nor did they include inflation.

Barro and Redlick (2011) explored fiscal policy within a neoclassical framework. Here the authors focused on the military spending as an instrument driving the multipliers in the US after 1945. In particular they argued that every study estimating a multiplier higher than two is biased since it is affected by reverse causality, specifically directed from GDP to non defense purchases. An interesting point of the paper is that it constructed a series of average marginal income tax shocks and social security payrolls for almost the whole last century (1913-2006) for US. The results are consistent with the fact that an increase in government defense purchases raises GDP growth, but decreases private consumption, investment (purchases of consumer's durables) and net exports, given a predominance of the substitution effect on the wealth effect.

Again, a result based on the effects of military buildups on output, comes from Ramey (2011). Ramey analyzed the consequences of government purchases on private investment as well as employment, finding that private spending falls in sudden response of a positive spending shock. Ramey also inquired whether raising government spending decreases unemployment, and her finding is positive, even though the largest part of the effect is driven by public employment. This is why she concluded that government spending has no significant impact in stimulating private activity, statement which has a non-Keynesian flavour.

Nakamura and Steinssón (2012) found evidence supporting the idea that a spending multiplier higher than one is typical of the US economy, instead. In fact, they exploited variations in military buildups across different regions of United States to prove that their new "open economy relative multiplier" is largely affected by demand shocks. And a 1% increase in regional military purchases has the effect of increasing national output growth by 1.5%.

Researches of the IMF have also been attracted by fiscal consolidation episodes within industrialized countries. A fiscal consolidation episode is characterized by decreasing government spending - aimed at stimulating private demand - and raising marginal taxes - in order to adjust the government debt-stabilizing public finances. Hence, Guajardo, Leigh, and Pescatori (2011) suggested that the standard method

adopted to measure the effects of fiscal consolidation (variations in cyclically adjusted balance) is not truly suitable, since it does indicate evidence in favour of the expansionary austerity hypothesis, which is implausible (according to them). A new measure should instead replace changes in cyclically adjusted balance, in favour of only exogenous variations, found through an *action based* or *narrative* approach.

The reason why the statistical measure of variations in cyclically adjusted balance could be a biased estimate of the effects of fiscal consolidation, is its likely correlation with factors affecting output. In this sense, ΔCAB might embrace components which are endogenous towards gross domestic product's growth. The direction of the bias would be upward, according to Guajardo, Leigh, and Pescatori (2011), as exemplified by the case of Ireland in 2009. An empirical testing of the two measures' consistency performed by the same authors, clearly shows a superiority of the action based approach.

In the same direction, De Vries, Guajardo, Leigh and Pescatori (2011) compiled a new action-based dataset with variables related to fiscal consolidation for 17 OECD countries, according to the criteria that only exogenous fiscal shocks should be included in a relevant series. *Exogenous*, in this context, represents an attribute of the only shocks which are not correlated with output growth (e.g. a tax increase aimed at reducing government debt) and are allowed to be properly considered shocks, in an analogous fashion as intented in Romer and Romer (2010).

Such a new dataset has been employed by Alesina, Favero and Giavazzi (2012) to estimate the multipliers related to both tax based and spending based fiscal consolidation episodes. In particular, the authors analyzed the effects on output of these *"multi-period policy mixes"*, composed of increases in revenues as well as cuts in government spending. Indeed, according to them, it is hardly likely that single measures are, for instance, adopted in isolation, thus there should be room for different "styles" in fiscal consolidation across countries. They found, with both anticipated and unanticipated shocks, that fiscal consolidations based on *spending cuts* are less recessionary than those based on *tax hikes*, the reason not being the role of accompanying policies, rather the business confidence and private investment reactions.

Another relevant article on the issue is Ilzetzki, Mendoza, and Végh (2011), which suggests that the size of the expenditure multiplier might easily vary across countries, according to their degree of development, to whether they adopt a peg exchange rate, the extent to which they are prone to protectionism, and the size of indebtedness of their government. Their main finding is that the magnitude of the multipliers is higher for countries that are industrialized, that have a fixed exchange rate, a closed economy, and a low public sector debt.

Finally, perhaps the most crucial article with respect to our analysis, is the work by Romer and Romer (2010) for the US, followed by that of Cloyne (2011) for the UK. These two studies have both relied on a new measure of fiscal shocks which, as already mentioned, is based on the so called "narrative approach". Its core is the study of the narrative records, namely institutional documents such as the Budget Reports, Economic Speeches of the President, and well as Congressional Reports, employed to understand whether a specific tax reform was adopted for reasons connected with the business fluctuations, such as the willingness to counteract negative demand shocks, or in response to more structural reasons. The two main justifications for qualifying a change as "exogenous", are the intentions to improve long run growth or to reduce government debt. Only these two kinds of declared reasons can significantly underlie a fiscal shock enabling the researcher to consistently estimate the effects of tax changes on output growth (without being correlated with standard errors in the regression). Based on this analysis, Romer and Romer (2010) estimated the effect of tax changes on GDP growth obtaining a much larger tax multiplier compared to the conventional ones, amounting to -3 after twelve quarters. A similar finding characterized the study of Cloyne (2010), with an estimate of -2.5 over the same time span.

While for countries such as the United States and the United Kingdom analyzed by the two previously cited contributions, there exists a well established tradition of keeping track of public administrative actions, the same does not hold for most of the continental and Southern European countries.

A relevant initial difficulty was faced, due to the high fractionalization of the legislated tax changes typical of our countries' sample. For such Mediterranean nations, indeed, there exists a wide number of provisions in the financial laws, relative to welfare oriented tasks, whose classification as exogenous or endogenous is often controversial. In the anglo-saxon countries (mainly US and UK) such a problem is present at a lower extent, making their narrative fiscal analysis more easily applicable.

3   Narrative Analysis

The present section represents the core of the process for obtaining "narrative measures" as introduced by Romer and Romer (2010). The starting point is the set of discretionary tax measures legislated by five EU countries' parliaments, namely France, Greece, Italy, Portugal, and Spain. These data, provided by each member state's Finance Ministry to the European Commission, contain the projected impact of tax changes on government revenues (they are *ex-ante* estimates). This information is used, together with official documents, in order to assess the reasons under-

lying each tax change. For all these five European countries, governments present the project for the prospective year's "financial law" to the respective parliaments, generally in September, so that the latter may vote a final version by the end of December. That law establishes some budgetary provisions whose nature is binding for all the public administrations. Hence indications on both the maximum size of the disposable expenses for each ministry and administrative unit, or the issuing of new rules for the collection of taxes (new tributes, or adjustments to old ones) are expressed.

For Italy, the content of these financial laws is explored, while for France, the speeches of the Budget Ministers towards the two Chambers are analyzed. With regards to the other three countries, the analysis is based on the discretionary tax measures' description, which are pretty accurate, of the motivations underlying fiscal variations on each EC file. If, during year t, the parliament of country i issues a tax cut, motivated by the willingness to restore consumers' demand at the pre-slack period, that measure should be deemed "endogenous", because correlated with the contingent economic conditions. In such a case, that specific measure is not be included in our set of data.

Four categories could be distinguished in order to frame the legislated tax changes: two are "endogenous", and two "exogenous" with regards to output growth. Firstly, we identify those variations that are clearly preceded by a discussion to counterbalance a specific episode, such as a negative shock to the economy. These are likely to bring output to normal levels. A second category, is composed by those measures which are intended to balance the expansionary effects of government expenses (i.e. health or educational programs, in most cases).

Turning to the exogenous measures, a typical one, as Romer and Romer (2010) point out, "might be a tax cut motivated by a belief that lower marginal tax rates will raise output in the long run". In other cases, the willingness to raise taxes is meant to "deal with inherited budget deficit" or respond to ideological reasons. For example, policymakers might introduce a deduction allowing families to reduce fiscal pressure: in that case a redistributive goal is motivating a tax change. Considering debt reductions, European countries forming the Euro Area have been subject to the provisions contained earlier in the Maastricht Treaty, and later in the Stability and Growth Pact. They were required to keep $\frac{debt}{GDP} \leq 60\%$, $\frac{deficit}{GDP} \leq 3\%$, and to further control the fluctuations of exchange rates, inflation as well as long term interest rates. The measures connected with these reasons can largely be considered "exogenous".

3.1 Italy

The date indicated in each law is referred to the provisions established for the prospective year. Hence each law dated year t is obviously containing the tax measures applying in year $t + 1$. The analysis spans within the decade 2001 - 2012.

3.1.1 Law no. 388, 23rd of December 2000[5]

The main measures approved for the forthcoming year were: **i.** a reshaping in the design of income brackets (18, 24, 32, 39, 45 percent), as well as the institution of some new detractions and deductions, both aimed at reducing the tax pressure on families (these measures are likely to be "exogenous"). **ii.** With regards to Imposta sul Reddito delle Persone Giuridiche (IRPEG)[6], its rate marginally decreased from 37 to 36%. In addition, a more rapid payback period was allowed for long term investments, in order to promote firms' higher capitalization. The balance sheet loss of one fiscal period could be deduced from the subsequent 5 years' profits (the three measures just described might be deemed "exogenous"). **iii.** The tax credit for subjects receiving a dividend's share decreased from 58.73 to 56.25% (we deem all these as "endogenous", since they are plausibly connected with asset prices fluctuations). **iv.** Capital gains arising from sales of participation in firms listed on the stock exchange were subject to taxation for solely 80.56% of their value ("endogenous", for the same reason as the previous measure). **v.** Individual entrepreneurs' income is calculated as part of Imposta sul Reddito delle Persone Fisiche (IRPEF)[7]. The same holds for the so called "società di persone"[8] ("exogenous"). **vi.** A withholding tax amounting to 20% of their income is retained for subjects practicing a liberal art or profession within the first two years of activity (it is "exogenous", not being linked to any short term objective). **vii.** Tax base for Imposta Regionale sulle Attività Produttive (IRAP)[9] does not include scholarships granted by regions ("exogenous" because inspired to equality principles). **viii.** Lump-sum taxes on biodiesel were reduced, as well as on oil, GPL, and methane ("endogenous" since mainly connected to oil price fluctuations). **ix.** Measures established by the European Commission are imposing balance sheet rules for universities and research institutions (here the clas-

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[5]http://www.camera.it/parlam/leggi/00388l.htm

[6]E.g.: the corporate income tax.

[7]Equivalent to the household income tax.

[8]In the Italian legal system, personal companies' members are fully liable from the company's debts. The contrary holds for the so-called capital companies, where unlimited liability holds.

[9]Complementary to the corporate income tax, but characterized by a lower rate and a higher base.

sification is a bit controversial, but here it is considered "exogenous", being part of a European structural integration framework). **x.** Lastly, an increase in Imposta sul Valore Aggiunto (IVA)[10] on motorbikes and scooters sales is set, as well as auction sales, and a re-design in tariffs, public prices, and local taxes, "endogenous".

3.1.2   Law no. 448, 28th of December 2001[11]

i. IRPEF discipline changed; deductions for advertising costs - 20% - were conceded to pharmaceutical firms launching new medicines (ideological reasons, "exogenous"). **ii.** Enterprise fixed assets' revaluation heightened the base for the regional productivity tax. Land-offices' annuity was revisited through some new parameters (both related to long-run reasons: "exogenous"). **iii.** For real estate sales subject to IVA, 30% of the tribute itself should be due as tax substitute, "endogenous". **iv.** With regards to lands available for construction, revaluations were subject to a tax substitute amounting to 4% of the higher value, "endogenous". **v.** Municipal tax on real estate's revaluation was suppressed, Imposta Comunale sugli Immobili (ICI, "endogenous" change). **vi.** A detraction is allowed for reconstruction works of historical buildings equal to 36% of the property, to be spread over a 10 years' span. The same holds for artistic restoring as well as conservative interventions. Moreover some measures on environmental protection of forests and wilds were adopted, "exogenous". **vii.** Lump-sum tax rates on petrol's products were decreased, "endogenous".

3.1.3   Law no. 289, 27th of December 2002[12]

i. Personal tax pressure was reduced through a Euro 3,000 deduction, for guaranteeing a progressive fiscal system. Euro 1,500 are deductible as well, in case the total earning was generated by more than one income source. A new income brackets' design was established (23, 29, 31, 39, 45 percent). These household income taxes' are deemed "exogenous" since they appear to be linked to a set of redistributive reasons. **ii.** A "no-tax area" is fixed below the 7,500 threshold (for both earnings or pensions). Detractions were conceded only within the upper bound of 52,000 income. Property rights' owners were allowed a detraction spreadable on a three to five years' span. It should be reminded that monetary transition from Lira to the European Currency Unit took place this year. Purchasing costs for real estate destined to the medical profession's exercise were not deductible (these measures are to be consid-

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[10]Analogous to value added tax.
[11]http://www.camera.it/parlam/leggi/01448l.htm
[12]http://www.camera.it/parlam/leggi/02289l.htm

ered "exogenous"). **iii.** IRES[13] rate was decreased from 35 to 34%, "endogenous".
iv. IRAP was to be redefined after reaching an agreement on the issue of fiscal
federalism (articles 118 - 119, Title V of the Constitution). This issue was especially
delicate, since it deals with interregional tax income distribution, relatedly with the
North-South inequality as well as some secessionist instances ("exogenous", because
related to ideological reasons). **v.** Corporate tax credit was reduced, from 53.85
to 51.51%, "exogenous". **vi.** Increased deductions for IRAP, in particular about
transport costs, insurance for injured at workplace, trainees' costs, etc. were set,
"endogenous". **vii.** Registrar's duties were slightly raised. Methodologies adopted
for quantifying the income are based on the value added data. A new norm set-
ting parameters for fiscal litigations was proposed, "endogenus". **viii.** An offshore
disclosure facility was issued with a rate equal to 4% of the value of the financial
activities held abroad by a resident subject (controversial classification, since even if
implemented with the aim of bringing back some hidden capitals, it might just have
some short run effects, nonetheless we deem it "exogenous").

3.1.4 Law no. 350, 24th of December 2003[14]

i. Personal withholding tax was decreased from 19 to 12%, and that of 15 was
reduced to 9%, and payable within three years, staring from 2004, without inter-
ests, "endogenous". **ii.** Agricultural activities were made freer from taxes over the
value added (-50%), "exogenous". **iii.** Cultural institutes were favored with a tax
credit amounting to 100,000, in order to promote the creation of their headquarters,
"exogenous". **iv.** Lump-sum taxes on alcoholic goods were diminished to 1.59 per
hectoliter, while for intermediate products it was adjusted till 57.15 per hectoliter;
lastly for ethyl alcohol the lump sum tax rate equalled 730,87 per hectoliter, "en-
dogenous". **v.** Reduced IVA rate (4%) was set for medicines aimed at first aid cures
(debatable categorization, perhaps endogenous to favor pharmaceutical industries,
or exogenous for being inspired to first aid help humanitarian needs).

3.1.5 Law no. 311, 30th of December 2004[15]

i. The DPEF [16] established a variation in the public revenues destination different
than the 2% of those fixed for the previous year. This was true with the excep-

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[13]Reformed corporate income tax, in place of IRPEG.
[14]http://www.camera.it/parlam/leggi/03350l.htm
[15]http://www.parlamento.it/parlam/leggi/04311l.htm
[16]Documento di Programmazione Economica e Finanziaria.

tion of interests on government bonds [17], social transfers connected with subjective rights as well as from communitarian funds, "exogenous". **ii.** Spending ceilings were introduced for mountainous communities as well as for provinces and regions, as regulated by the Ministry of Finances, "endogenous". A special fund amounting to 7,500 millions could be employed. Another special fund was established by the Ministry of Forestry and Agriculture in order to promote investments in related infrastructures. An empowerment program for the seaside highways was launched with transportation easing objective, presumably to improve long run growth. New family deductions were adopted: 3,200 for the non legally separated spouse; 2,900 per child; 3,450 for children younger than three years; 3,200 for each child with a missing parent; 3,700 for disabled persons. Also, an updated income tax brackets' design was drawn in order to reduce the income inequalities across households. Proposal for fiscal planning was launched towards professionals and corporate income perceivers. **iii.** As last an impulse to tax elusion/evasion was prompted (certainly "exogenous" because inspired to beliefs about fairness).

3.1.6 Law no. 266, 23rd of December 2005[18]

The higher amounts coming from the liquidation of estates that were part of the State's property were to be destined to the reduction of public debt (not classifiable since it is not a fiscal revenue). **i.** Lump-sum taxes were resized to 256.70 per 1,000 liters on stabilized emulsions, "endogenous". **ii.** 5 per 1,000 on IRPEF was devoted to some third sector's activities such as volunteering organizations, scientific or medical research, municipal social activities, "exogenous". Moreover some agreement of cooperation were established with some research centers located in North America. **iii.** A new corporate tax was settled: IRES, in place of IRPEG (structural measure, thus "exogenous"). A fiscal, financial, administrative disburdenment was grantable for investments in research and development. **iv.** Individuals perceiving an autonomous work earning as well as those obtaining dividend yields from business activities were subject to an additional personal income tax equal to 25%, "exogenous". **v.** Enterprise fixed assets' revaluations were disburdened by a tax substitute of 12% and 6% respectively on depreciable and non-depreciable activities, "endogenous". **vi.** Internal liberalization of electric energy market was issued according to a European directive, "exogenous". **vii.** Lotteries' tax rate increased to $8\% \leq \tau_g \leq 12\%$, "endogenous".

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[17]Buoni sulle Obbligazioni del Tesoro.
[18]http://www.parlamento.it/parlam/leggi/05266l.htm

3.1.7   Law no. 296, 27th of December 2006[19]

Firstly targeted objectives were to reduce the fiscal pressure as well as fight tax evasion, in order to pursue social equality and development. **i.** Deductions were suppressed, and new income tax brackets were fixed (23, 27, 38, 41, 43 percent). Detractions were set for familial expenses such as for a non legally separated spouse, for each son, particularly if subject to a handicap, or is younger than 3 (aiming at guaranteeing the fiscal system is still progressive: "exogenous"). **ii.** A regional tax on automobile - oil consumption was defined, amounting to Euro.00266/.00288/.00307 per liter for 2007/'08/'09 (connected with oil price fluctuations: "endogenous"). **iii.** Health expenses were deductible when proved by fiscal receipts. Higher public incomes for the prospective year were added to the Political Economy Structural Interventions ("exogenous" since it is inspired by welfare oriented reasons).

3.1.8   Law no. 244, 24th of December 2007[20]

i. Detractions were conceded upon real estate tax. Moreover, households opting for setting solar energy systems might obtain a 4% discount spreadable over a three years period. Detractions were also set for the renters of students older than 20 and younger than 30. These three measures are to be deemed "exogenous", since they deal with reasons such as the promotion of renewable energy, the easing for the tax on house of residence, as well as some students' allowances. **ii.** Fiscal lightening on housing constructions were postponed until years 2008 and 2009. Land's rent with value lower than 500 was exempted by any kind of taxation ("exogenous", for the same reasons as the previous changes). **iii.** A household with at least four children may benefit from a detraction amounting to 1,200, "exogenous". **iv.** Personal companies could detract the negative profits from the taxable income during the five subsequent years, "endogenous". **v.** Negative interests payment was deductible from gross earnings within the 30% bound - starting from the third tax period after 2007 ("endogenous", since it is likely to be a countercyclical measure). **vi.** Subjects incurring in a financial leasing had the right to implement an accelerated depreciation, and each endowment is deductible from the tax base, "endogenous". **vii.** Brand expenses were also deductible (we deem this as "endogenous"). **viii.** 84% of the capital gains obtained from participations in listed companies is exempted. The others were taxed at the rate of 27.5%. For groups of companies, an obligation of global profits imposition holds, if produced by controlled foreign companies, "exogenous". **ix.** In case of factories' sales, a tax withholding amounting to 12, 14, or 16% was issued, according

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[19]http://www.parlamento.it/parlam/leggi/06296l.htm
[20]http://www.parlamento.it/parlam/leggi/07244l.pdf

to whether the value of the assets was lower than 5m, between 5 and 10m, or higher than 10m euros, "endogenous". **x.** A higher detraction for travel agents was set, with the aim of preventing their Internet-caused decline; more broadly, IRAP's tax base was reduced on the labour costs ("exogenous", since related to the fundamentals of that regional tribute). **xi.** A blacklist on worldwide tax havens was published by the Ministry of Finances, in order to discriminate among account holders is such states[21] (linked to ideological reasons, hence "exogenous"). **xii.** Teachers of all levels of public schools are granted with a 500 detraction for expenses due to self-education courses, "exogenous" as well.

3.1.9   Law no. 203, 22nd of December 2008[22]

i. Additional regional tax rate equals 1.9%, not holding over common investment funds, nor GEIE [23], nor pension funds, "endogenous". **ii.** The 500 detraction for teachers of public schools for expenses of self-updating and education was postponed (naturally "exogenous", despite the beginning of the crisis might make it "endogenous"; still educational measures are likely to be related to long term growth objectives). **iii.** Also, a detraction was established for local public transport expenses, "endogenous". **iv.** A favorable treatment was reserved for agricultural properties, as well as for lump-sum taxes on oil within local mountainous municipalities ("endogenous" because related to the agricultural items' price fluctuations). **v.** A tax credit for automobiles' purchases was issued during 2009, if the weight of the car is lower tan 7.5 tons, and was committed by entrepreneurial organizations ("endogenous", with the aim of sustaining private demand).

3.1.10   Law no. 191, 23rd of December 2009[24]

Higher public finance availabilities were employed to stimulate the decreased demand, as a consequence of the financial crisis. Highly targeted subjects were: (a) families with children; (b) labour income workers; (c) retired workers; (d) all the employed. **i.** Contributions to pensions by agricultural workers were determined on their average salary within the different categories belonging to collective agreements, "endogenous". **ii.** As an exceptional measure, IRAP's rate was raised by

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[21]Except for those professionals who were domiciled within an EU country.

[22]http://www.camera.it/parlam/leggi/08203l.htm

[23]Gruppi Europei di Interesse Economico are a juridical institution identifying groups of firms with European geographical relevance.

[24]http://www.parlamento.it/parlam/leggi/09191l.pdf

0.15%, and IRPEF's by 0.30% ("endogenous", since motivated by the economy's contingent conditions).

3.1.11   Law no. 220, 13th of December 2010[25]

Labeled as "Stability Law", it was formed by a single article with various provisions. Briefly, it established **i.** a fiscal reform based on easing; an exemptions regime; social security strengthening amounting to 1.5 million ("endogenous", because all related to short term objectives); **ii.** an "eco-bonus"; university funds' institution; nuclear energy promotion ("exogenous"). **iii.** For financial leasing contracted during a real estate's purchase, it was newly stated that both the debtor and the leasing firm are obliged to pay the purchasing registry tribute ("exogenous", motivated by long run reasons). **iv.** In order to stimulate academic research, a tax credit was accorded to firms which opted for externalizing their own R&D department in favor of public universities ("exogenous", ideologically motivated). **v.** Tax facilities were conceded to employees with income lower than 40,000, "exogenous". All forms of unemployment benefits were kept intact through a state guarantee.

3.1.12   Law no. 183, 12th of November 2011[26]

i. One of the main objectives was to reduce the imbalance among debt-financed firms and equity-sustained ones. A deduction was indeed conceded to the latter. This measure is to be considered "exogenous". **ii.** Some tax easing was accorded to labour cost as well as to young and female workers (ideological, hence "exogenous"). **iii.** Expenses aimed at a energy-reducing house improvements can be detracted from gross income (to be deemed "exogenous"). **iv.** A new municipal tribute was instituted, namely Imposta Municipale sugli Immobili (IMU[27]), holding until 2015, whose tax base was the property's value, according to the housing registry office. Its standard rate was 0.76%, which can be augmented or decreased by the majors within a +/-0.3% band (motivated by need to reduce previously accumulated deficit, "exogenous"). **v.** Another local tribute was instituted, on urban waste collection,

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[25]http://www.agenziaentrate.gov.it/wps/file/Nsilib/Nsi/Documentazione/Archivio/ Normativa+fiscale+principale/Legge+di+stabilita+2011/Legge+di+stabilita+2011/ legge+stabilita+2011.pdf

[26]The present financial law (aimed at "stability and growth") has been written by a new technical government headed by Mario Monti. http://www.agenziaentrate.gov.it/wps/file/Nsilib/ Nsi/Documentazione/Archivio/Normativa+fiscale+principale/Legge+di+stabilita+2012/ Legge+di+stabilita+2012/legge_stabilita_2012.pdf

[27]Definable as a real estate's municipal tax.

"exogenous". **vi.** Lump sum tax rates on oil were fixed in 0.7042/liter for petrol, in Euros 0.26777/liter for gas of liquified petrol, in $0.00331/m^3$ for trucks' natural gas, "endogenous". **xii.** Moreover luxury cars, yachts, aircrafts and helicopters were heavily taxed ("exogenous" aimed at keeping a steeply progressive tax system). **xiii.** IVA's rate was augmented till 21% of value added, "exogenous".

3.2 France

Speeches introducing organic financial laws are studied. Organic laws are subject to slight variations, at the end of the year, through a final transitory law, which takes into account the most recent cyclical developments. Here, extracts extracts from the parliamentary speeches are presented.

3.2.1 Discours sur le projét de loi des finances pour le 2001[28]

The government's project foresaw a manoeuvre with value equal to BnF186 (28.4bn). A plan for fiscal reduction was launched which should operate on VAT, household income taxation as well as on corporate one ("exogenous", being a multi year plan). Moreover, a priority was set on the battle for job vacancies creation. Growth forecast for 2001 is higher than 3.2%. Deficit is amounting to 1.2% of GDP. Some F50bn reductions are established as supplementaries, such as a -1% of value added tax and the suppression of the regional component of the housing tax, "endogenous". This three year tax reduction plan establishes a total reduction of F100bn equivalent to Bn15.2[29]. Finally, the Kyoto Treaty on pollutant emissions imposed a reduction of energetic expenses in France.

3.2.2 Discours sur le projét de loi de finances pour le 2002[30]

The budget hypothesized that growth for 2002 will set around around 2.3%. The three main issues for the Euro area countries, this year would be stability if economic structures, making labour markets more dynamic, and keeping proper budgetary policies. Price stability should be carefully ensured, in France inflation grew only 0.1% during the last five moths. Household consumption augmented by 1.7%

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[28]http://www.alain-lambert.org/wp-content/uploads/senat/pdf/
12-12-00-discours-plf-01-vote-final.pdf

[29]Franc to Euro exchange rate for that year was 6.559:1.

[30]http://www.performance-publique.budget.gouv.fr/sites/performance_publique/
files/farandole/ressources/archives/2002/PLF/fp0112131.htm

2001:3. Risks mining the desirable growth consolidation were of financial, or psychological nature, or connected to oil price fluctuations. Government's plan for ensuring sustainable growth was achieved through employment's preservation, business investment's stimulus, reinforcement of public intervention in favour of small and medium enterprises.

> *"Les mesures fiscales portent principalement la marque de consolidation de la croissance [...].* **i.** *Amortissement special pour les entreprises jusqu'au 2002 (30 mois) sur l'investissement dans les bien d'équipement sont assurés.* **ii.** *1.22Md d'euro d'argent en mois ne viendront collecté par la TVA.* **iii.** *Les entreprises d'assurance beneficieront des dispositions fiscales ameliorées (aprés l'11 de Septembre). Il faudra aussi garantir la neutralité du passage á l'euro."*
> Madame Parly, Sécretaire d'État au Budget

No new specific measure was taken for this year, except for those already issued in the three years plan legislated in 2001.

3.2.3   Discours sur le projét de loi des finances pour le 2003[31]

The law project for 2003 was based on transparency, respect of duties in favour of employees, growth, and fiscal federalism. An increase in tax revenues amounting to 700m, due to a new forecast, was estimated for the year 2003. As a consequence, the government proposes to cut taxes for the correspondent amount. Concretely, the main planned measures were concerned **i.** with labour income imposition of a 1bn decrease; **ii.** and professional income tax was lightened of a 2.7bn reduction. In total, a rounded amount of 3.8bn in public taxes is withdrawn. The aim of such measures is not only related with reducing tax wedge, but also with favouring enterprises to improve general employment, and thus restoring the country's competitiveness (both "exogenous", because structural).

3.2.4   Discours sur le projét de loi des finances pour le 2004[32]

The aim of this year's financial law was to simplify imposition, through the **i.** reformation of the distributive fiscal regime ("exogenous", related to ideological reasons); **ii.** the reduction in dividends' taxation ("endogenous", because connected to current

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[31]http://discours.vie-publique.fr/notices/033000066.html
[32]https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000612133&
dateTexte=&categorieLien=id

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economic developments); **iii.** and the creation of a shareholders' tax credit, "endogenous". In addition to that, **iv.** real estate's up-valuations regime was simplified; the same is true for land's agricultural exploitation, as well as for formalities related to tiny hereditary successions. Other relevant measures are going to be briefly summarized: **v.** a Popular Pensions' Saving plan is formulated ("exogenous", structural); **vi.** employees' taxation is lightened; a tax credit is granted for domestic expenses within the principal residence; anticipated patrimony transmission is issued for young generations (welfare oriented, "exogenous"); **vii.** tax credits are conceded to those enterprises which favour a proper conciliation between work and leisure times (ideologically motivated, "exogenous"). **vii.** Excise on oil is adjusted, "endogenous". In total, the fiscal mitigation amounts to 2.5bn, which reach the peak of 3.3bn if additional fiscal benefits arising from other legislative sources are considered. State's budget choices were inspired this year by the idea expressed by Mr. Alain Lambert: *"Doter la France d'un État efficace et performante. Un bon budget n'est pas un budget qui augmente!"*. A final task faced by the financial law of 2003 for 2004 was the reform of tariffs, public prices, university fees, "endogenous".

3.2.5 Loi des finances pour le 2005[33]

The finance minister Hervé Gaymard, member of a right-wing government, during a speech in front of the National Assembly (lower chamber), declared that private consumption in France in 2004 was the second highest in Europe, with a consumption growth forecast of about 2%. Industrial investments for the same year is +5%. The main financial risks were connected to dollar devaluations towards euro, and to the oil price fluctuations. He stated that *"La croissance n'est pas seulement exogene, il faut la chercher"*. A higher ground for minimum wage is established. **i.** Measures in favour of donations are set (is ideologically motivated, thus "endogenous"). **ii.** Both professional and corporate income tax were decreased (short run measure: "endogenous"). **iii.** Furthermore, social security system was reformed for the benefit of youngest, eldest and less qualified subjects on the job market (+2bn), "exogenous". In conclusion, the main political economic objectives were **a.** reconciling growth sustainability and public finance consolidation; **b.** making employment more flexible; **c.** prioritizing, within competition policy, research and development's promotion.

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[33]https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000789373&dateTexte=&categorieLien=id

3.2.6 Loi des finances pour le 2006[34]

This year's financial law did not contain any ambitious social reform - related provision. Supervision for "excessive deficit procedure" started for France by initiative of the EC. **i.** A slight reduction in personal income tax was introduced, as well as **ii.** on enterprises' profit (the formed might be deemed "exogenous", contrarily to the latter, which appears more like to operate in the short term).

3.2.7 "Loi des finances pour le 2007"[35]

According to the contents of such a law, government expenditures were to be decreased; total taxes' reductions amounted to 6bn. **i.** A higher revenue of 0.8bn is originated by targeted measures. The deficit has been reduced by about 5bn in 2007, complying with the Stability and Growth Pact's prescriptions. Government debt was instead setting on 63.6% of GDP. Broadly speaking, the general orientation was to further lessen the annual deficit, within the prospective four years. The government effort to finance sectors such as public security, justice, technological development, university education was also to be deemed relevant.

3.2.8 Loi des finances pour le 2008[36]

Eric Woerth, Ministry of Budget and State's Reform, stated that the objectives for the forthcoming year were: reinforcing growth, to be achieved through public finance adjustment, lowering fiscal pressure and monitoring public expenses. Concretely, these goals are pursued through **i.** reducing professionals income tax, as well as **ii.** reducing imposition on dividend yields and capital gains.

3.2.9 Loi des finances pour le 2009[37]

An ambitious aim was set for 2009: bringing public finances towards a balanced path by 2012, reachable with a 0.5% yearly decrease of deficit to GDP. In order to attain such an objective, government expenses had to be kept under control; **i.** as for social security contributions, health insurance must be readdressed by 4 to 5bn

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[34]http://www.assemblee-nationale.fr/12/pdf/projets/pl2540.pdf

[35]https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000615000&
dateTexte=&categorieLien=id

[36]https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000017853368&
dateTexte=&categorieLien=id

[37]https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000019995721&
dateTexte=&categorieLien=id

by 2011, "exogenous"; structural reforms with a positive impact on growth ought to be promoted. **ii.** Old age pensions were indexed to inflation, to counterbalance the negative effects of 2008, due to inflation, "endogenous". A constitutional reform opened a window on the possibility to insert in the fundamental chart a provision about public finance's equilibrium.

3.2.10   Loi des finances pour le 2010[38]

The crisis' challenge had been successfully tackled in 2009. Consumption was properly sustained, investment too, thanks to subsidies conceded to small and medium enterprises, banking bailouts were properly faced, according to E.Woerth, Budget Minister. Nevertheless the deficit is still high, equivalent to 8.2 points of GDP. **i.** Income tax on enterprises decreased by a very significant amount, 10bn. **ii.** 4.1bn of tax credits would be employed as a recovery measure. The general government orientation was directed towards a reduction of the fiscal pressure, being France yet the fifth country in the global ranking for higher taxes. Hence, as far as stimulus to economy was concerned, **iii.** professional income tax as well as corporate one would both be decreased.

3.2.11   Loi des finances pour le 2011[39]

Household revenues tax was increased as well as social security contributions. An austerity plan was set in order to contrast the sovereign debt crisis, affecting countries of the Euro area. **i.** A first measure was an increase in indirect tax on tobacco products. **ii.** Professional income tax was raised marginally, and **iii.** corporate income tax rules were modified towards a harmonization with the German system. **iv.** Social "forfait" rate was increased from 6% to 8%. Finally, **v.** real estate surplus' higher imposition would account for most of the fiscal revenues for this year.

3.2.12   Loi des finances pour le 2012[40]

> *"The French budget has been in deficit since 1975 and it should slowly*
> *be reduced till zero as long as 2016 approaches. Budgetary discipline is*

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[38]https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000021557902

[39]https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000023314376&categorieLien=id

[40]https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000025044460&categorieLien=id

not a matter of technicalities neither of political nature, it is just a matter
of moral and national responsibility. "
  Budget Ministry V. Precresse

In order to achieve that objective, government expenses should be lightened. For the first time since 1945, expenditures will be reduced in 2012, and some public administration employees are going to be fired. Turning to the prospective fiscal changes, **i.** a 3% special contribution on high income earners (250,000-500,000), 4% if above that bound ("exogenous", being equality oriented). **ii.** Fiscal niches are reduced (having a plausible effect in the long run, thus "exogenous"); **iii.** a special excise tax on soft drinks is set, "endogenous"; **iv.** tax on energetic improvements (solar panels and thermal isolation) is going to be decreased to zero by 2015, "exogenous". As a rectification, **v.** extraordinary working hours' exemption is going to stopped, "endogenous"; and **vi.** the products subject to the lowest VAT are to be taxed heavier from 5.5% to 7% - except for food items and books ("endogenous", being motivated by the need to counterbalance the current crisis). **vii.** A tax on wealth is established, "exogenous".

3.3   Spain, Portugal, and Greece

In the case of these three Mediterranean countries included in our study, instead of analyzing the content of the financial laws or their presentation speeches, a deeper piece of information contained on the EC's files with discretionary tax measures of member states was exploited. In these files, indeed, descriptions of the fiscal changes were presented in a more accurate manner. Hence, it was possible distinguishing thanks to that information source, between measures adopted with the intention to respond to the business cycle and others taken for long run reasons.

4   Data

Raw data on discretionary tax measures were collected during a traineeship at the European Commission, DG - Ecfin, in the Unit C1 of Fiscal Policy and Surveillance in spring 2012. As already mentioned, the data on discretionary measures have been skimmed according to the Romer and Romer (2010)'s criterion: classifying each tax shock on the basis of the underlying motivation, in order to construct a "narrative" dataset of fiscal shocks.

The series of all legislated tax changes is not particularly long in time (2001-2013, for Greece only since 2005 onwards), contrarily to that of Romer and Romer (2010)

for the US and Cloyne's (2011) for the UK. Hence, our data are not time-series, rather a panel for five European countries: Italy, France, Spain, Portugal and Greece, whose choice was motivated by the fact that they are those which suffered the most from the intensity of the financial crisis of 2008-2011 (except France, perhaps).

The process which leads to the creation of an exogenous dataset of tax shocks, began by applying a sort of "narrative analysis" to the raw data. Financial laws for Italy and France are analyzed so to attempt a detection between two main categories of tax policy changes on the basis of their underlying motivation. The quantification and attribution of their foreseen impact on GDP growth, reduction in government debt as well as on their ability to counteract the cycle (recession) has been done in a "heuristic way". For Greece, Portugal and Spain, such a disentanglement exercise was performed through the imputation voices of the difference in government revenues for, e.g., an inncrease of two percent in the excise tax on tobacco or on petroleum sales or on a given type of value added tax present on the Microsoft Excel files compiled by the finance ministries personnel. In this manner, a relative weight to each shock has been assigned, allowing to include portions of them and exclude the remaining partof the projected government revenues.

The choice regarding independent variables has been to obtain the most disaggregated possible level of analysis, elaborating variables for personal income tax, corporate income tax, value added tax, social security contributions, instead of, say, simply direct taxes on the one side and indirect taxes on the other. Other variables comprised in the data-set are gross domestic product at current prices, private consumption at currents prices, gross fixed capital formation for the private sector, labeled as private investment, total unemployment for all sectors (excluded public sector), and government debt to GDP ratio, extracted from the Ameco database (EUROSTAT).

In order to obtain a measure of real output growth, such a transformation was performed: $\Delta Y_t = \left(\frac{Y_t - Y_{t-1}}{Y_{t-1}} \right)$. An analogous operation has been carried out for the other four independent variables, which will be used to elaborate some extensions of the baseline results. Their inclusion will permit one to obtain an estimate of the effects of tax reforms not solely on real GDP growth, but also on private consumption, private investment, unemployment, government debt to GDP's growth.

Fiscal shocks are originally expressed in billions of euros, but for the purpose of the analysis, they have been divided for real GDP. Moreover, purporting the need to have an idea of a global effect of tax changes, and not just of any single component, we aggregated the three main categories - `pit`, `cit`, `vat` [41]. In so doing, we added

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[41]Meaning, clearly, personal income tax, corporate income tax, and value added tax

them together, premultiplied by their relative weight, i.e.: $\texttt{pertax} = \sum_i \alpha_i (T^s_{it})/Y_t$, where $\alpha_i = \frac{\bar{T}_i}{\sum \bar{T}_i}$.

The data are described at a yearly frequency. The fact that they are not quarterly should not undermine the analysis, since this is not a VAR model, requiring as an orthogonality condition the data to be frequent. Rather, with a simple OLS and a fixed effects regression, it is only necessary for the independent variable to be uncorrelated with the error term. Purpose which should have been achieved through the narrative analysis.

4.1   Properties of Exogenous Tax Changes

Before running any kind of regressions, it is deemed relevant to briefly describe the data. Firstly, they are in real values, billions of euros, even if in the following regressions, they will be expressed in ratio with GDP. The means of corporate income taxes over the five countries in our time sample is -.279, with a standard deviation of 2.023. With regards to personal income taxation, the mean is negative, -.554, and a standard deviation amounting to 2.168. Value added tax, as well as social security contributions are lower, their mean respectively reaching the values of -.060 and .135, while the standard deviations are 1.308 and 1.373.

The situation in France is quite varied, since a noticeable fluctuation has been registered in the past thirteen years, with `cit` being the most drawn downward (2009). Nonetheless, `cit` was robustly diminished, particularly in 2001 and 2007, to be augmented again in 2012 (after the victory of Mr. Hollande at the Elysee). Finally, it should be remarked that `ssc` has been levied significantly across the whole decade, with increases in 2004, 2006, 2012, and reductions in 2001, 2008.

This description is based on the graphs in appendix. Regarding Greece, the most evident measure is the huge increase in indirect taxes - mainly `vat` - due to the financial "bail-out" which took place in 2010. Afterwards, a financial support promoted by EC and IMF deepened the need to increase taxes, such that some journalists talked about *"austerity trap"*. An insignificant reduction in `cit` in 2011 was not enough to cause growth.

Italian tax shocks are fluctuating across the decade, marked by an enterprise income tax reform, promoted by Romano Prodi's government, during years 2006 and 2007. `vat` was reduced along those year, and re-raised in 2009. `pit` was the highest varying tax, reaching the minimum in 2001, within our time sample.

Portugal's principal characteristics are an increase in `vat` in 2003, as well as a relevant lowering of tax burden on enterprises, taking place in 2010. The tax pressure on households has been strengthened since the beginning of the US subprime crises

till nowadays, with a peak reached the last year.

The main facts about Spain are abundant tax cuts. `pit` was significantly decreased in 2003 and 2008, to be raised afterward in 2010. Conversely, `vat` was reduced in 2009. Anyway, the recently approved fiscal reform is more spending than revenue-based.

4.2 Comparison with (all) Discretionary Tax Measures

Considering all discretionary tax measures involved having some broader measure of fiscal variations. Turning towards summary statistics of these measures, we could indicate that personal income tax shocks means amounts to -1.207 with a standard deviation of 4.283. Corporate income tax's fiscal shocks mean is -.356 (2.930). Value added tax's average is .0045 (1.162) and social security contributions' one is .497 (3.974). The disaggregated effects for each single country are: for Greece, means(`pit`) = .413; means(`cit`) = .261; means(`vat`) = .664; for Spain, means(`pit`) = -1.167; means(`cit`) = -.817; means(`vat`) = -.262; for France, means(`pit`) = -1.120; means(`cit`) = -.859; means(`vat`) = -.315; for Italy, means(`pit`) = -1.749; means(`cit`) = .600; means(`vat`) = .077; for Portugal, means(`pit`) = .070; means(`cit`) = -.141; means(`vat`) = .052.

5 Estimating the tax multiplier

5.1 Setting up

Armed with the new tax panel dataset for Southern European countries, the fiscal multiplier through a simple linear regression accounting for space and time fixed effects was estimated. Before setting up the model, the issue of endogeneity in fiscal policy must be clarified, along with the framework proposed by Romer and Romer (2010). Consider a simple equation describing how real output growth is affected by tax reforms:

$$\Delta Y_{it} = \alpha_i + \beta \Delta T_{it} + \epsilon_{it} \tag{1}$$

where ΔY_{it} is real GDP growth for state i in year t, ΔT_{it} represents all discretionary tax measures.

Various components are naturally likely to affect growth other than tax changes. It is possible to imagine them ranging from monetary policy shocks to government spending ones, from natural catastrophes to expectations about future prospects. Hence, we might think of ϵ_{it} as a mosaic made up of a variety of factors:

$$\epsilon_{it} = \sum_{j=1}^{L} \epsilon_{it}^{j}. \tag{2}$$

Moreover, the ϵ_{it}^{j} are likely to be correlated with each others. A relation connecting the forces lying behind tax changes is considered:

$$\Delta T_{it} = \sum_{j=1}^{L} g_{it}^{j} \epsilon_{it}^{j} + \sum_{k=1}^{M} \phi_{it}^{k}, \tag{3}$$

where ϵ_{it} are those previously identified, and the ϕ_{it} are ulterior components of tax policy. Equation (3) catches the fundamental fact that tax changes are not univocally determined by a unique set of reasons, but by a variety of them. Government may respond to factors likely to significantly affect output growth (i.e. the ϵ_{it}), such as a forthcoming recession, and lower taxes to balance it. Alternatively it could tighten the fiscal pressure for financing the higher expenses required by a war. Nonetheless, policymakers could just wish to reduce taxes with the idea that it will favour long-run growth: this is described by the ϕ_{it} in equation (3). Furthermore the idea of two kinds of reasons motivating tax changes (just one being exogenous towards output growth) is formalized by assuming the absence of correlation between the ϵ_{it} and the ϕ_{it}.

Tax changes are discrete phenomena, responding to some particular event, and such fact is captured by the interaction of the ϵ_{it} with the g_{it}. The responses are typical for every period, but not necessarily subsequently ϵ_{it} are affected among themselves (i.e. they are non stationary).

5.2 Combining taxes and output

Now, putting together the equations for taxes and for output, the following is obtained:

$$\Delta Y_{it} = \alpha_i + \beta \Big[\sum_{j=1}^{L} g_{it}^{j} \epsilon_{it}^{j} + \sum_{k=1}^{M} \phi_{it}^{k} \Big] + \epsilon_{it} \tag{4}$$

Writing in this way the equation for output demonstrates why a regression with output growth as a dependent variable and all legislated tax changes as a regressor, conducts to a biased estimate of the "tax multiplier": some changes are correlated with this regression's error term. Such a correlation may be even stronger if the

measure of tax changes is assumed to be the conventional one, e.g. cyclically adjusted revenues.

The effort to construct a series of fiscal shocks for some EU countries was specifically aimed at finding some proper ϕ_{it} to be filled in equation (4). We have been able to employ narrative records to identify all significant legislated tax changes. Because it is likely that there exists one single motivation behind each tax change, we are able to identify each g_{it}, ϵ_{it} and ϕ_{it} in the post Berlin Wall fall era.

Equation (4) can be reformulated in a way that places tax changes affected by output shocks into the error term:

$$\Delta Y_{it} = \alpha_i + \beta \sum_{k=1}^{M} \phi_{it}^k + v_{it}, \tag{5}$$

where $v_{it} = \sum_{j=1}^{L}(1+\beta g_{it}^j)\epsilon_{it}^j$. If the ϕ_{it} have been correctly identified, the measure of tax changes should be uncorrelated with the error term. A regression of output growth on ϕ_{it} should yield an unbiased estimate of the effects of fiscal policy changes on output. The ϕ_{it} in each year is our new measure of fiscal shocks.

5.3   Empirical strategy

In principle, a simple OLS could be run, in order to estimate the effect of tax changes on output. Nonetheless, a fixed-effects estimator is subsequently used, in order to consistently account for space unobserved heterogeneity, even if this heterogeneity was correlated with one of the regressors. Formally, the result can be achieved through four possible methodologies, namely first differences, deviations from the means, orthogonal deviations, and dummy-variable estimator. The last one would be adopted since it avoids any fancy transformation, to get rid of the unobserved source of heterogeneity.

The dummy-variable estimator indeed, is not based on the GLS, which to be estimated needs to be transformed into a "feasible GLS". Here, simply applying OLS, thanks to a matrix of dummies for individual i, it is possible to estimate the unobserved parameter accounting for the additional variability in the dependent variable. Finally we should remind that STATA has a proper command for computing the β of fixed-effects regression, which greatly simplifies our task.

Exploiting the temporal variability across individuals, it is possible to come-up with a simple estimator of the effects of tax changes on output, in a dynamic setting, exploiting time lags within different periods.

5.4 Baseline results

Real output growth is regressed on our new measure of tax changes, at times $t-3$, $t-2$, $t-1$, for personal, corporate income, and value added taxes. We firstly run an OLS, a fixed effect estimation afterwards. It is surprising to observe some so highly positive coefficients for corporate income taxes with both the econometric specifications, one period aback.

While the β for personal income tax and value added tax are quite negative (-2.94 and -4.00 for OLS, -0.993 and -1.90 for fixed effects), but their t-statistics are too low to be deemed significant, with corporate income tax, the coefficients significantly jump till 6.51 and 7.45 respectively. The result of these regressions with disaggregated tax shocks might be seen as worrying, since they could bring to a loss of significance to the validity of our analysis. How possible is that a marginal increase in taxes on enterprises will lead to an increase in output? Economic theory of optimal taxation foresees that if tax rates are higher, it will be more costly for firms to produce an additional unit of output. Hence, they will be discouraged to increase their productivity, by raising salaries, encouraging consumption, and causing growth. An interpretation could be that the aggregate supply elasticity to corporate taxes is harshly low.

In order to find an estimate of the global effect of tax changes on output growth, a lagged aggregate measure of tax changes is used a s a regressor, which we called `pertax`[42]. An OLS regression, a robust regression, and a fixed effect estimation is then performed. The results obtained for the first one, are a point estimate of .21 for a period ahead, with a $t-statistic = 0.49$, hence insignificantly different than zero. Two periods ahead, the multiplier is -.89, significant at the 10% level, with a $t-statistic = -1.91$. Three periods ahead, the coefficient of the simple linear regression is not significant.

Afterward, a robust regression is performed in order to account for outliers, thanks to the command `rreg` [43]. In this case, the estimates of β are 0.17, non significantly different than zero after one period; -.83, significant two periods ahead; -1.96, non significant again, after three periods.

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[42]Obtained as a weighted average of the three main tax components in our dataset: personal, corporate income, and value added tax.

[43]As Hamilton (2012) explains, recalled in Blanchard and Leigh (2013), the STATA command is `rreg`, works by applying a simple OLS. Then, observations whose Cook's distance is higher than 1 are deleted. In the end, through an iterative process, the program comes up with a down sized measure of influential outliers.

Table 1: Baseline regressions with lagged disaggregated tax shocks

Indep. Vars.	GdpGrowth$_{OLS}$	GdpGrowth$_{FE}$
Marg. ↗ PIT_{t-1} rate	-2.935	-0.993
	(3.243)	(3.150)
Marg. ↗ CIT_{t-1} rate	6.512*	7.446**
	(3.341)	(3.069)
Marg. ↗ VAT_{t-1} rate	-4.006	-1.895
	(2.417)	(2.340)
Marg. ↗ PIT_{t-2} rate	-0.820	1.091
	(3.683)	(3.360)
Marg. ↗ CIT_{t-2} rate	-0.532	-2.189
	(4.172)	(3.749)
Marg. ↗ VAT_{t-2} rate	-0.210	0.829
	(2.584)	(2.318)
Marg. ↗ PIT_{t-3} rate	-5.731	-3.568
	(3.470)	(3.370)
Marg. ↗ CIT_{t-3} rate	2.870	2.220
	(4.132)	(3.815)
Marg. ↗ VAT_{t-3} rate	0.464	3.502
	(2.366)	(2.394)
Constant	0.0200***	0.0176***
	(0.00600)	(0.00543)
Observations	48	48
R-squared	0.248	0.745
Number of states		5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 2: Baseline regressions with lagged aggregated tax shocks

Indep. Vars.	GdpGrowth[45]	GdpGrowth[46]	GdpGrowth[47]
Marg. Tax $\nearrow_{t-1}$	0.214	0.174	0.135
	(0.438)	(0.461)	(0.385)
Marg. Tax $\nearrow_{t-2}$	-0.892*	-0.827*	-1.015**
	(0.468)	(0.486)	(0.402)
Marg Tax $\nearrow_{t-3}$	-0.200	-1.964	0.151
	(0.556)	(1.494)	(0.492)
Constant	0.0196***	0.0208***	0.0194***
	(0.00512)	(0.00533)	(0.00432)
Observations	48	47	48
R-squared	0.085	0.107	0.205
Number of states			5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Finally, the same variables are regressed with a different model, namely a fixed effect estimator, accounting for time and space heterogeneities[44]. The results are slightly similar to those obtained with the OLS, even if a bit more amplified. In fact, if after one period the coefficient is non significantly amounting to .14, after two is equal -1.02 with a $t - statistic = -2.52$. After three periods, the coefficient's estimate is insignificant.

5.5 Extensions

Extensions are explored along two dimensions. On the one side, the dependent variable of real output growth is substituted with other macroeconomic variables, specifically the relative variations in households consumption, in private investment, in total unemployment, and in government debt to GDP. On the other side, keeping the independent variable unchanged, a partition in the temporal dimension of the sample is introduced within the baseline regression (panel with fixed effects), measuring the effect of tax changes on output growth before and during a period of economic crisis.

In the next table, outcomes of regressing lagged composite tax shocks on private

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[44]The STATA command is, in this case, `xtreg, fe`.

consumption and investment, unemployment, and debt to GDP are presented with a fixed effects model. Firstly, the causal effect of variations in the level of taxes on private consumption is studied. The coefficients found are at first sight negative, but at a deeper view they are non significantly different than zero for all the three lags.

With regards to the GDP component of private investment, it is worthy to remark that it is largely sensitive to the magnitude of tax changes. A tax shock occurring in year t has a non significant effect on private sector investment in year $t+1$, despite the coefficient's sign is consistent with our hypothesis [48]. Moving forwards to analyze the consequence of a 1% tax increase in year t on private investment in year $t+2$, it can be found that it is large in magnitude and highly significant, amounting to -2.32. Finally, checking the response of a shock occurred three years aback, the effect on private investment is again non-significant.

A positive relation linking a marginal tax hike in year t and the unemployment's level variation in year $t+1$ is observable, i.e. a one 1% increase in taxes today would produce a 2.81% raise in unemployed persons tomorrow. This coefficient is the only having statistical significance, indeed, the β linking tax shocks of years t with unemployment at times $t+2$ and $t+3$, are not significantly different than zero. The principal reason why they are not, might simply be the paucity of observations in our data-set. If this was the case, they could still have an economic significance: the effects of a tax increase on unemployment after two periods is still high (2.40). After three years the coefficient entirely loses its economic and statistical significance.

In order to correctly interpret the coefficients linking the revenue shocks with government debt to GDP, it should be made a distinction between short and long run effects of tax hikes. If the aim of an "exogenous" tax increase is to reduce government debt, it is also true that such effect will be verified over the long run. In the short run instead, an increase in debt to GDP will take place, due to the reduction in GDP growth. This behaviour is observed in the table, where two years after the occurrence of the tax shocks, the debt to GDP rise is multiplied by a factor of 6.92.

Moreover, the baseline fixed effects equation has been re-estimated on two partitions of the sample. One preceding the economic crisis, before 2008, and the other during the recessionary period, after 2008. Interestingly, the related finding is that the multiplier of the first partition is higher - in absolute value - than the one of the crisis period. This evidence is opposite to the one suggested by Blanchard and Leigh (2013), according to whom fiscal multipliers are higher in times of crises than

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[48]Fiscal consolidations operated through tax hikes are more recessionary than those based on spending cuts, is found by Alesina and Ardagna (2011).

Table 3: Fixed effects regressions with new dependent variables

Indep. vars.	ΔPriv. cons.	ΔPriv. Inv.	ΔUnempl.	ΔDebtT oGdp
Marg. Tax $\nearrow_{t-1}$	0.217	-0.804	2.810*	1.315
	(0.437)	(0.912)	(1.639)	(3.962)
Marg. Tax $\nearrow_{t-2}$	-0.309	-2.405***	2.402	6.920*
	(0.417)	(0.871)	(1.566)	(3.785)
Marg. tax $\nearrow_{t-3}$	0.221	1.083	-0.00399	-1.634
	(0.552)	(1.151)	(2.069)	(5.001)
Constant	0.0155***	-0.0125	0.0682***	-0.0134
	(0.00524)	(0.0109)	(0.0196)	(0.0475)
Observations	41	41	41	41
R-squared	0.026	0.224	0.139	0.098
Number of states	5	5	5	5

Δ for each column stands for growth in the variable under consideration.

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

in normal ones. Perhaps this divergence is explainable by differences in data, indeed Blanchard and Leigh (2013) employ IMF - World Economic Outlook data. Also, their analysis is not meant to investigate the causal impact of tax changes on output, rather to show how multipliers' underestimation was connected to growth forecast's overestimation. Nevertheless, as our t-statistic suggests, the only coefficient which has an economic and statistical significance is the one relative to the downturn period, rather than the one typical of the pre-crisis period.

6   Discussion

The results are consistent with the predictions. Exogenous fiscal shocks lead to an unbiased estimate of the tax multiplier, differently than the traditional approach of changes in cyclically adjusted revenues. The latter approach embraces all legislated tax changes compared with GDP at its potential, ignoring the existing correlation between short run fiscal measures and error terms in the regressions.

Our estimate of the tax multiplier on output is lighter in magnitude than the one obtained in Romer and Romer (2010): -1 after two years, rather than -3 after

Table 4: Fixed effects regressions with partitioned sample, pre and post 2008.

Indep. Vars.	GDP growth[49]	GDP growth[50]
Marg. Tax $\nearrow_{t-1}$	-0.125	0.308
	(0.767)	(0.360)
Marg. Tax $\nearrow_{t-2}$	-0.961	-0.753*
	(0.888)	(0.368)
Marg. Tax $\nearrow_{t-3}$	-0.661	0.409
	(1.064)	(0.466)
Constant	0.0480***	0.000621
	(0.00252)	(0.00490)
Observations	18	30
R-squared	0.140	0.206
Number of states	4	5

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

three years from the occurrence of the shock. Cloyne (2011)'s estimate is larger in absolute value than ours as well, the marginal effect of tax increases being estimated in -2.5 on a twelve quarters horizon. The discrepancy might be explained by the different natures on the datasets, theirs being a time series, ours being a panel, over a shorter time span. In addition to that, it should be noted that Cloyne employed a vector autoregressive technique, whereas Romer and Romer used both a single equation model controlling for lagged growth, and a three variable VAR including other macroeconomic variables.

Investigating the effects of tax increases at time t on private investment, we find a strong, significant, and negative effect, amounting to -2.4, at $t+2$. This is consistent with one of Blanchard and Perotti (2002)'s result, confirmed in Romer and Romer (2010). Private investment suffers from tax increases more heavily than household consumption, as the coefficients for the latter prove to be negative but insignificant over a three years horizon.

Considering the results obtained by isolating the two subsamples, before and after the beginning of the crisis, the interpretation is not straightforward. Whether Blanchard and Leigh (2013) find higher growth forecast errors in times of financial crisis, with a larger underestimation of the multipliers, in this study there seems to be a higher multiplier before 2008 than after. However, between the two estimates, the only one which shows statistical significance is that typical of the crisis period.

Estimating the tax multiplier on unemployment, it is found that a marginal

increase in fiscal pressure (1% of GDP) has a strong and positive effect on unemployment, raising the share of jobless population by 2.8% in the first year after the tax change is issued. This finding is complementary to the one in Ramey (2012), in which she shows that increases in government spending lower unemployment.

7   Conclusions

This paper illustrated the construction of an exogenous panel of fiscal shocks for five countries of Southern Europe - France, Greece, Italy, Portugal, and Spain - for the last twelve years. Raw data have been obtained from EC discretionary tax measures files as well as Ameco database, which have been filtered through the study of institutional tracks (financial laws and budget speeches). The aim was to discern between those legislated variations motivated by exogenous or endogenous reasons with respect to the business cycle. An overall estimate of the tax multiplier on output has been performed, firstly considering disaggregated measures of the tax changes, next a total one.

Summing up, a negative tax shock has recessionary macroeconomic effects on our countries' sample, lowering *output growth* by a factor of one on impact, also strongly discouraging *private investment* over a two years horizon, increasing *unemployment* and raising *government debt*. Since the negative output effects appear to be stronger in times of crisis, it is recommendable to implement a tax based adjustment in normal times, rather than during an economic crisis.

No concern is expressed on whether the effects on output are due to supply side stimulus or to demand incentive (higher disposable income). Even if the non-persistence of the shocks suggests the predominance of demand side effects, one should be cautious in declaring this conclusion. The data do not shed light on the government spending multiplier, rather considers isolated discrete shocks on the revenue side. Further research is needed in order to assess the relative impact on output of spending and tax-based adjustments, relying on a narrative approach.

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A   Appendix
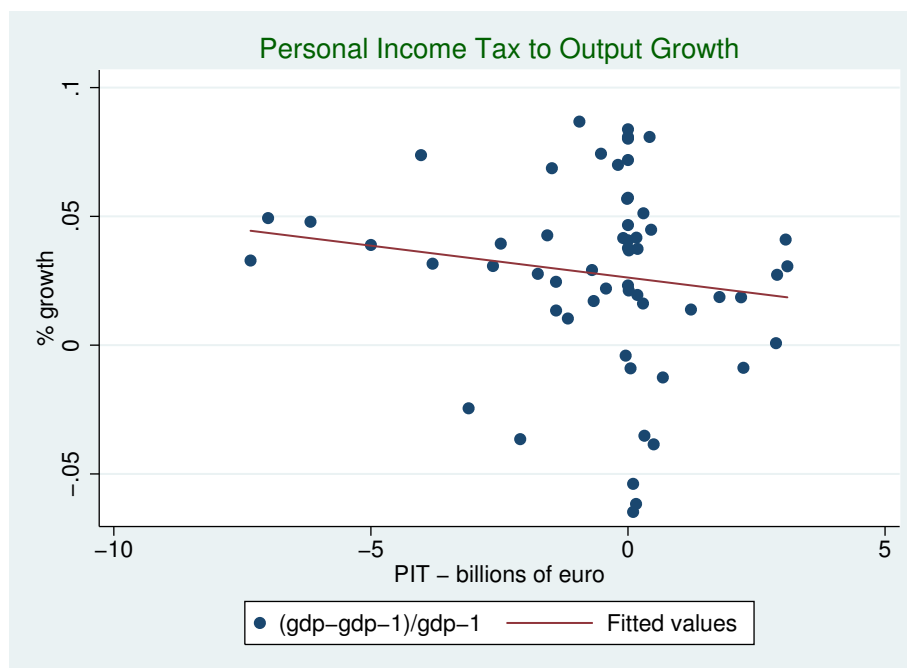
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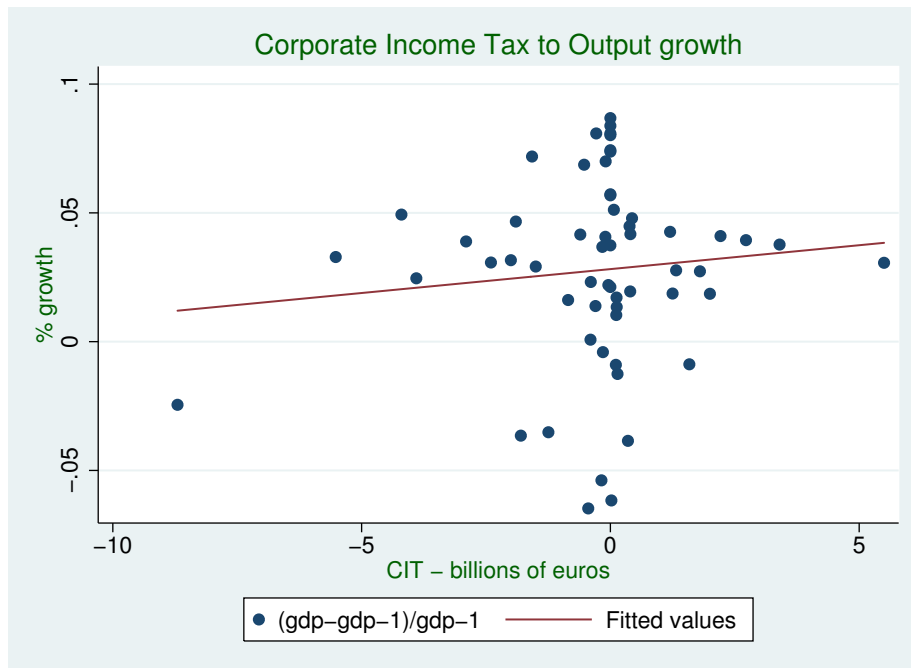
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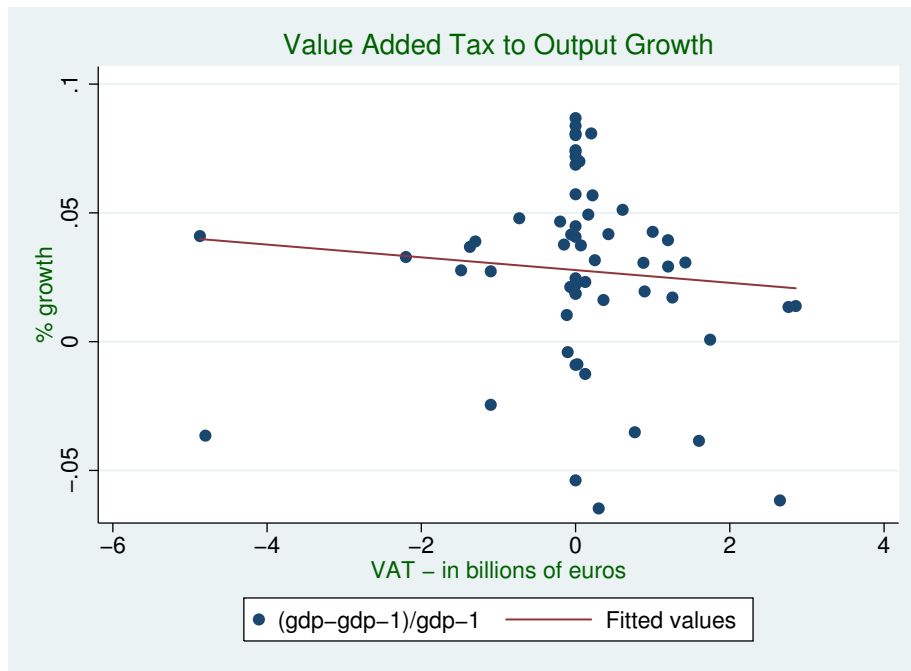
Figure 3: Correlation between value added tax shocks in absolute value and output (GDP) growth for the pooled sample.
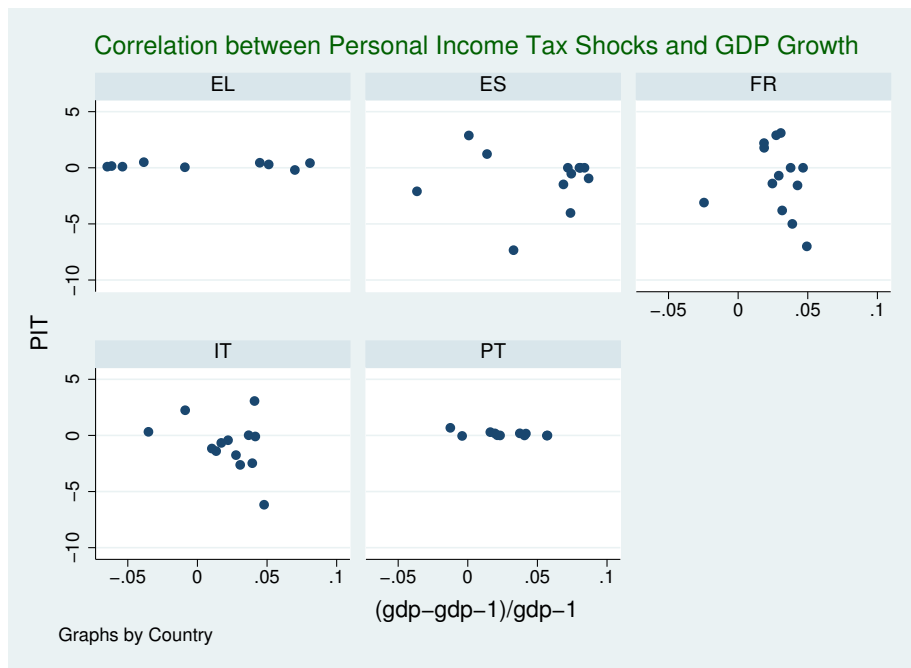
Figure 4: By country.
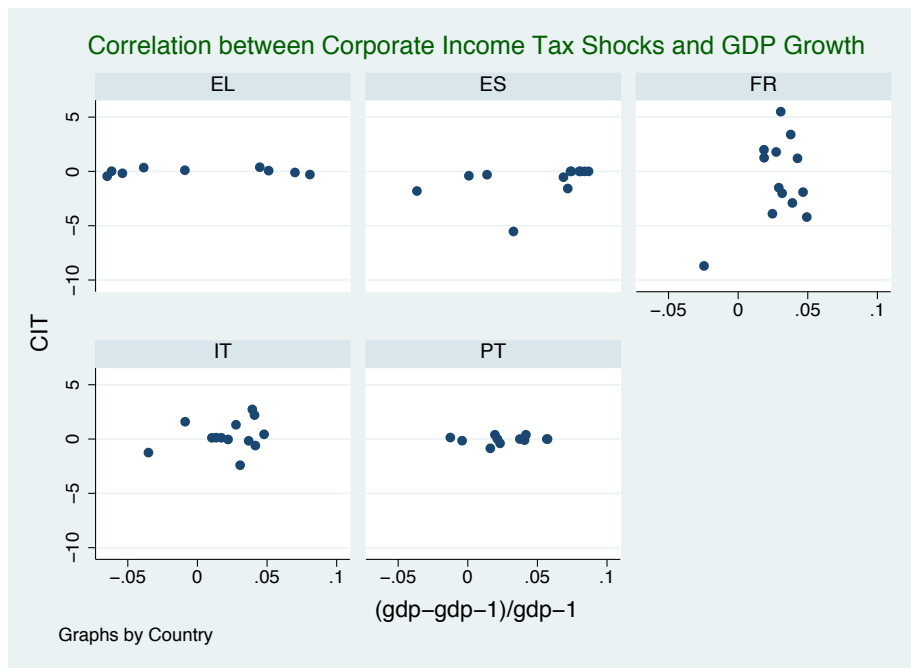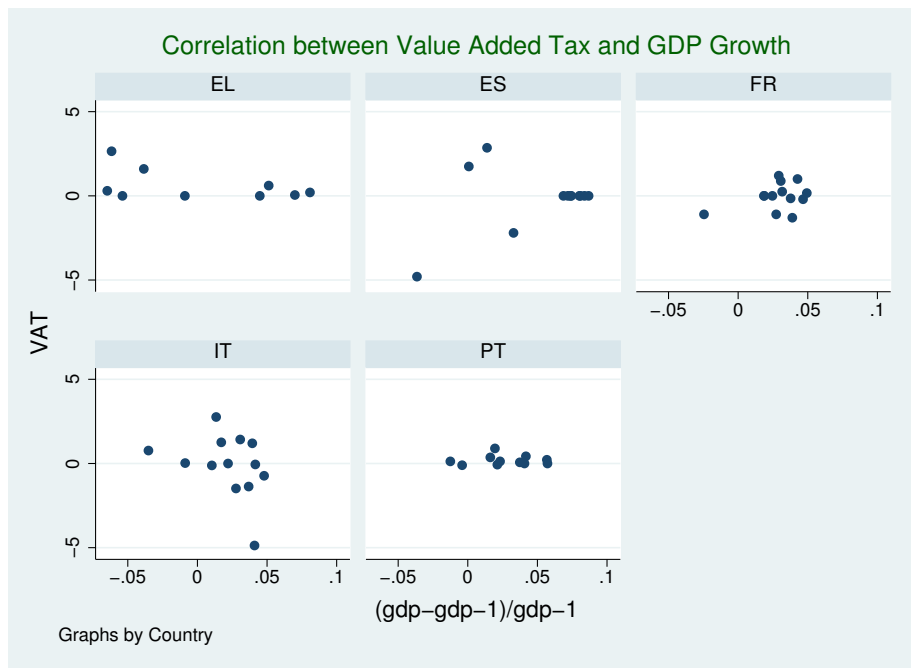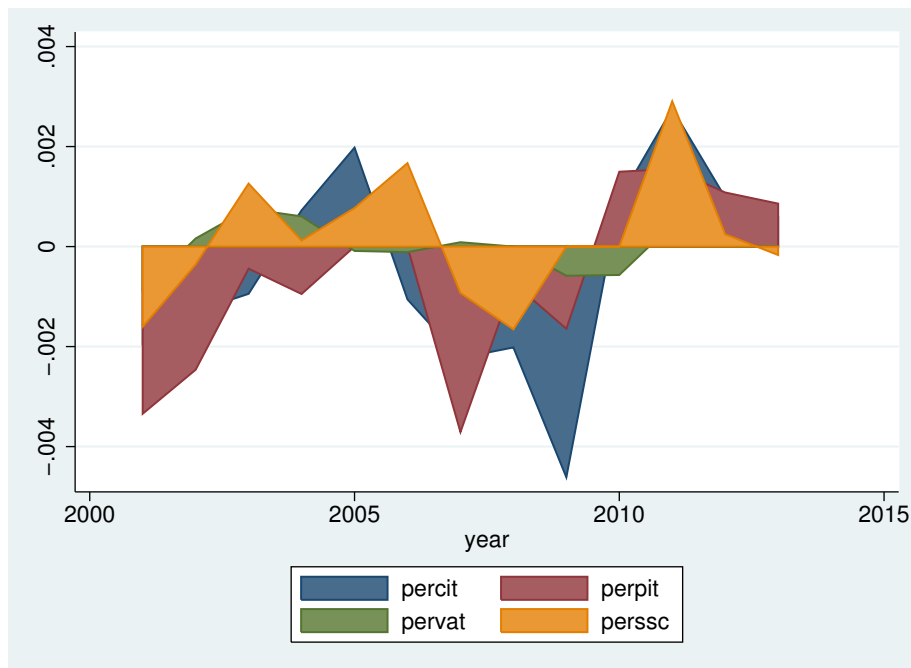
Figure 5: By country.

39

Figure 6: By country.

Figure 7: France's all exogenous Tax Shocks in percentage of its level of GDP.
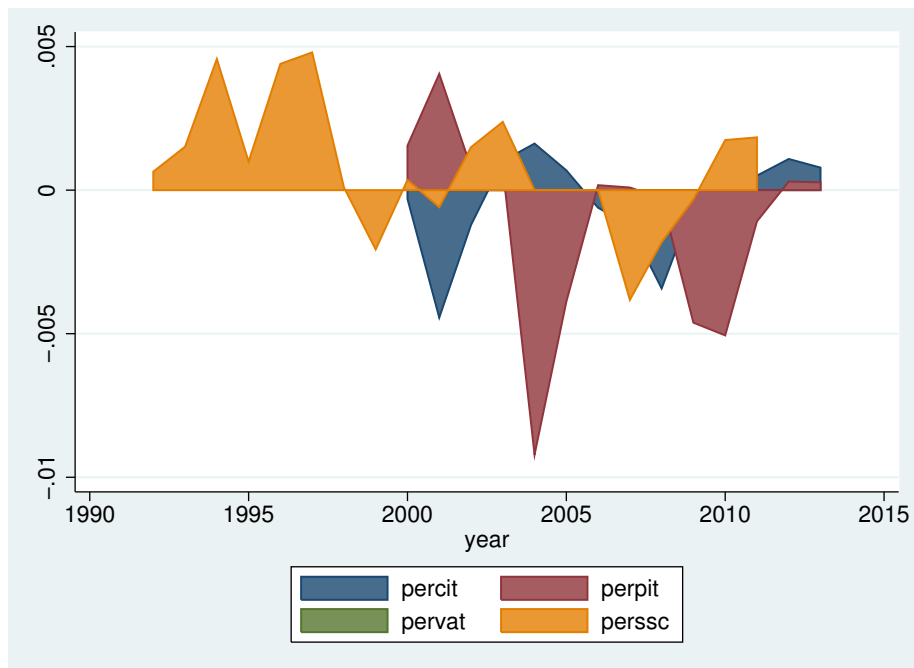
Figure 8: Germany's all exogenous Tax Shocks in percentage of its level of GDP.
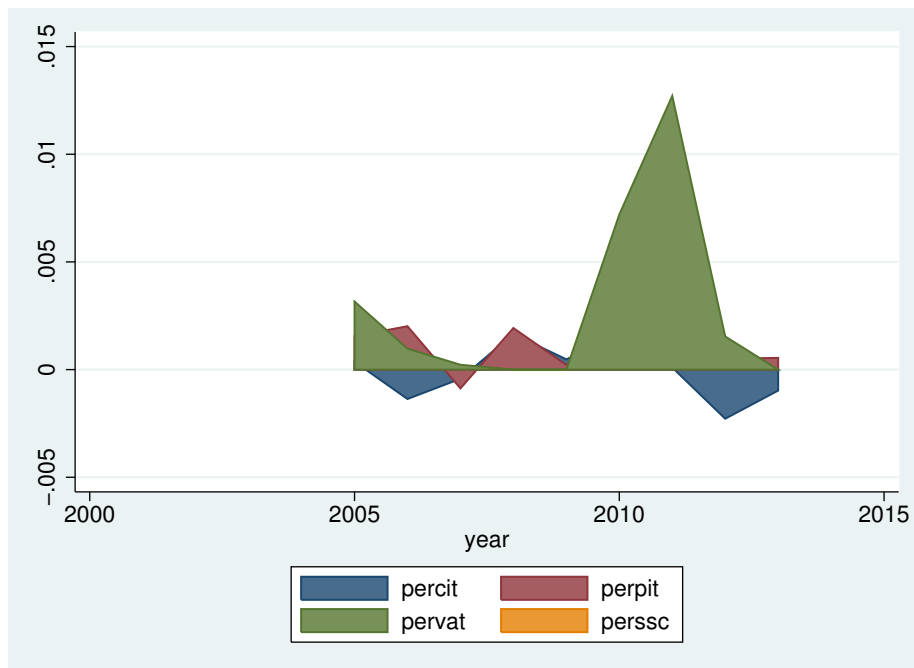
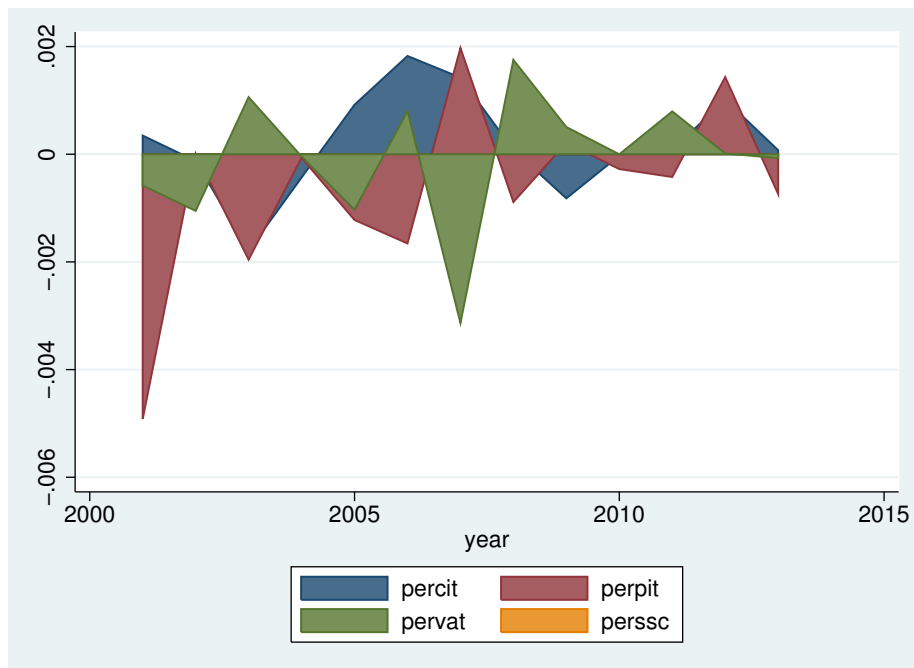Figure 9: Greece's all exogenous Tax Shocks in percentage of its level of GDP.

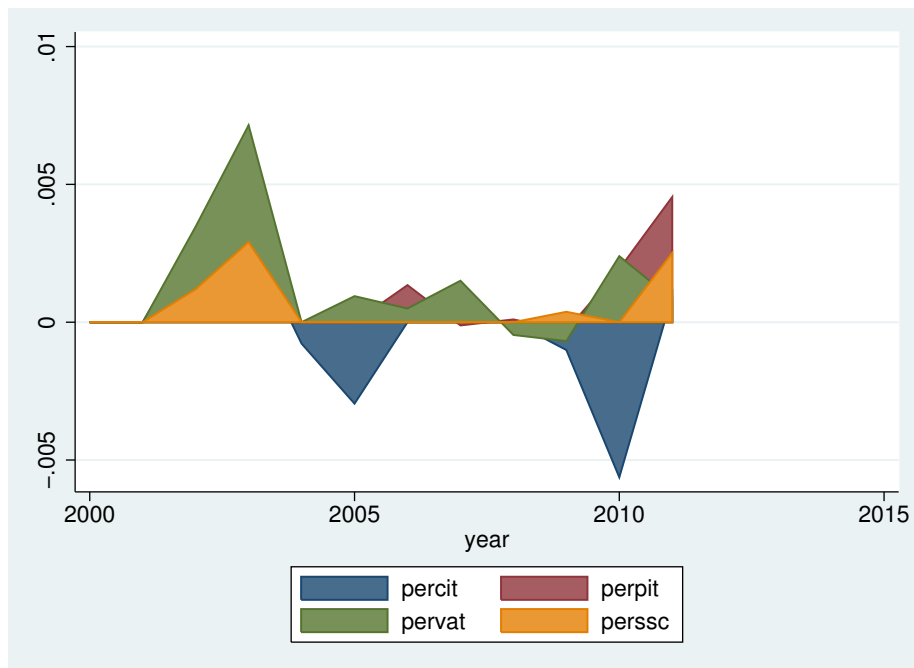Figure 10: Italy's all exogenous Tax Shocks in percentage of its GDP in levels.

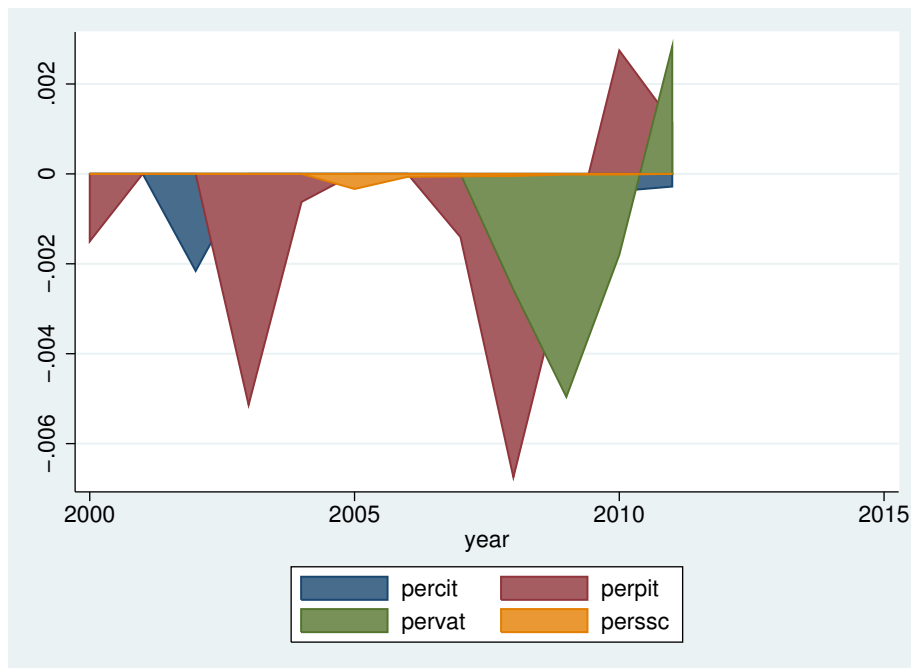Figure 11: Portugal's all exogenous Tax Shocks in percentage of its level of GDP.

Figure 12: Spain's all exogenous Tax Shocks in percentage of its GDP in levels.