Distributional consequences of fiscal consolidation: The case of Spain[1]

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ABSTRACT

The Great Recession has led an uneven increase in public debt for most of advanced economies, raising concerns about fiscal sustainability. A growing body of literature are focused on the macroeconomic consequences of fiscal adjustment but the research about microeconomic effects and especially distributional effects remains fairly limited. In this paper, we analyze the effects of austerity measures on inequality, as maintaining deficit reduction efforts is difficult when it is perceived as unfair. Moreover, a resulting high income inequality could harm the growth in the medium-term. To do so, we integrate a Computable General Equilibrium (CGE) model and a microsimulation model for the Spanish economy in 2014, within a top-down approach. The results will show the effects on income distribution of a hypothetical reduction of public deficit until 3%, as required by Stability and Growth Pact.

JEL Classification: C63, C68, D63.

Keywords: Computable General Equilibrium Model; Microsimulation; Fiscal Consolidation; Inequality; Poverty; Spain.

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1. Introduction

The Great Recession of 2007-09 has led to an unprecedented increase in public debt, raising serious concerns about fiscal sustainability. Governments have been making substantial fiscal adjustments through a combination of spending cuts and tax hikes to reduce ratios of debt /GDP. Fiscal reforms have been a factor behind rising income inequality by lessening the generosity of social benefits and the progressivity of income tax systems (Woo et al., 2013). As a result, these austerity measures are perceived as unfair by population, resulting difficult to be maintained.

A growing body of literature are focused on the macroeconomic consequences of fiscal adjustment but the research about microeconomic effects and especially distributional effects remains fairly limited. Mulas-Granados (2005) finds evidence that inequality tends to rise following fiscal consolidations in a panel of 15 EU nations in 1960-2000, and that spending cuts are detrimental to income distribution. On the other hand, Agnello and Sousa (2012) study the fiscal consolidation episodes in 18 OECD countries in 1978-2009, and found that income inequality rises during the periods of consolidation. Ball et al. (2013) also examine the inequality effects of fiscal consolidation for 17 OECD countries over 1978-2009 and present evidence that expenditure-based consolidations tend to worsen the inequality more than tax-based ones. Finally, Woo et al., (2013) analyse the fiscal consolidation in 12 OCDE countries, highlighting that unemployment is an important channel through which consolidation increases inequality. The composition of austerity measures also matters.

In this work, a Computable General Equilibrium (CGE) model and a microsimulation model are integrated within a top-down approach, to assess the impact of a reduction of deficit on the Spanish economy in 2014, in terms of inequality and poverty. The proposed methodology goes further in the analysis of poverty and inequality throughout Social Accounting Matrices developed for Spain by De Miguel and Pérez-Mayo (2006, 2010).

The remainder of the paper is organized as follows. Section 2 presents the CGE model, while Section 3 is devoted to the microsimulation model. Section 4 describes the databases employed in the study. Section 5 depicts results and finally, Section 6 offers the main conclusions.

2. The CGE model

Following (Cardenete and Sancho 2003), this section presents the main features of the intersectoral CGE model with one representative firm in each sector, a single representative consumer, one public sector and one foreign or rest of the world sector. Although the model is static, it includes a savings and investment sector whose behavior follows a simple but commonly used rule in applied general equilibrium, enabling us to account for an activity (savings from the point of view of agents as consumers and other agents, and investment from the point of view of final demand) that cannot be isolated from the flows of income the model attempts to capture.

2.1 Producers

The production sphere of the economy is represented by 19 production sectors, whose objective is to maximize after-tax profits, subject to specific technological constraints. Each productive sector produces a homogeneous good using a nested constant-returns-to-scale technology. This means that there will be no excess profits. Under these conditions, the key elements for the description of the behavior of production sectors are conditional input demand functions. The inputs to the production function are of two types: the domestic output of each sector XD_j and imports M_j from the trading partners. Domestic output is obtained as a combination of intermediate inputs (output of other sectors) and a composite primary factor called value-added (*VAj*), following a Leontief fixed-coefficients technology:

$$XD_j = min\left(\frac{X_{1j}}{a_{1j}}, \frac{X_{2j}}{a_{2j}}, \ldots, \frac{X_{19j}}{a_{19j}}, \frac{VA_j}{v_j}\right) \quad i,j = 1,2,\ldots,19 \qquad (1)$$

where X_{ij} indicates the amount of good *i* required for the domestic production of good *j*; a_{ij} are the equivalents to technical coefficients in the framework of input–output analysis; VA_j represents the value added of sector *j* and v_j stands out for the minimum amount of value added required to produce one unit of good *j*.

The value added of each sector *j* is obtained by combining the primary factors, labor and capital, using a Cobb-Douglas technology. Firms minimize the cost of the composite factor:

$$min\, w\left(1+\tau_j^{essc}\right)L_j + r_j K_j \qquad j = 1, 2, \ldots, 19 \qquad (2)$$

$$s.t.VA_j = \beta_j L_j^{\alpha_j} K_j^{(1-\alpha_j)}$$

where L_j and K_j are the endowments of labor and capital whereas l_j and k_j are the technical coefficients for the corresponding factor and τ_j^{essc} is the ESSC tax rate. β_j is the scale parameter and α_j is the distribution parameter for the labor factor. The assumption of constant returns to scale implies that the distribution parameter for capital can be calculated as $1 - \alpha_j$.

Finally, the total output X_j is obtained by combining the domestic output XD_j with the equivalent imports M_j using a Cobb-Douglas technology. This representation of the total production function follows the Armington specification (Armington 1969), in such a way that sectorial imports are considered imperfect substitutes of domestic production. Thus, the production of sector j is given by:

$$X_j \; = \; \delta_j \, XD_j^{\gamma_j} M_j^{1-\gamma_j} \quad j \; = \; 1, 2, \ldots, 19 \tag{3}$$

Where δ_j is the scale parameter and γ_j is a parameter which reflects the share of domestic ouput of j in total production; whereas $1 - \gamma_j$ reflects the share of imports of j in total production.

Given the production structure of the economy, consumption prices (p_j) are equal to the unitary cost of production plus indirect taxes:

$$p_j = (1 + \tau_j^p) \left[\sum_{j=1}^{n} a_{ij} q_j + \left(1 + \tau_j^{essc}\right) w L_j + r K_j + \left(1 + \tau_j^t\right) p_{row} \, a_{mj} \right] \tag{4}$$

where τ_j^p indicates the taxes on production of sector j; τ_j^{essc}represents the Social Security tax paid by employers of sector j; τ_j^t reflects the tariffs of sector j; the w and r are the prices of labor and capital services, respectively; p_{row} can be defined as a weighted average of the prices of foreign goods; and a_{mj} stands out for the technical coefficients for these latter goods.

2.2 Consumers

The representative household maximizes the utility derived from consumption (CD_j) and savings (SD) by means of a Cobb–Douglas function subject to its disposable income (DI). Households gain income as result of the sale of their endowments of labor L_j and capital K_j, for which they receive a salary w and a capital remuneration

r. When unemployment arises, households receive unemployment benefits (T_u). Every household also obtain net transfers from the government (T_g), including retirement pension and other social transfers, and transfers from the rest of the world (T_{row}). Those household with Thus, the disposable income is expressed in nominal terms and equals households' gross income minus personal income tax and social contributions paid by employees, calculated by applying the corresponding taxes, τ^{dt} and τ^{hssc} respectively:

$$Max\ U(CD_j, SD) = \left(\prod_{j=1}^{19} CD_j^{\varepsilon_j} \right) SD^{\left(1-\sum_{j=1}^{19} \varepsilon_j\right)}$$

$$s.t. \sum_{j=1}^{19} p_j CD_j + p_{inv} SD = DI \tag{5}$$

$$DI = wL_j + rK_j + cpi\ T_g + T_{row} - \tau^{dt}\left(rK_j + cpi\ T_u + cpi\ T_g + T_{row}\right) - \tau^{dt}\left(\left(1 - \tau^{hssc}\right)wL_j\right) - \tau^{hssc} wL_j$$

Where SD is defined as the amount of disposable income not consumed, ε_j is the share parameter of consumption, p_{inv} is an investment price index and cpi is a consumer price index, which updates transfers made by public sector. As usual, cpi is calculated as a weighted average of the prices of all sectors according to the share of each one in the overall consumption of the economy. It should be noted that, in the definition of the disposable income, social contribution by employees are not subject to personal income tax due to the current tax legislation.

2.3 Government

The government acts both as a consumer and as a producer, demanding goods and services from the private sector and supplying public goods. These activities are financed by public revenues (R), obtained by levying taxes on income and on transactions among other economic agents. Thus, the public revenues come from indirect (RI) and direct (RD) taxation, also from the payments to the Social Security System made by employers ($ESSC$) and employees ($HSSC$), and finally from tariffs (RT):

$$R = RP + RV + RD + ESSC + HSSC + RT \tag{6}$$

The public revenues from taxes on production (*RP*) and those coming from value added taxation (*RV*) are calculated as follows:

$$RP = \tau_j^p \left[\sum_{j=1}^{19} a_{ij} p_j XD_j + \left(\left(1+\tau_j^{essc}\right) wl_j + rk_j + \left(1+\tau_j^t\right) p_{row}\, a_{mj}\, X_j \right) VA_j \right] \tag{7}$$

$$RV = \sum_{j=1}^{19} \tau_j^v p_j XD_j \tag{8}$$

Those coming from direct taxation (*RD*) are given by:

$$RD = \tau^{dt} \left[\left(1-\tau^{hssc}\right) wL_j + rK_j + cpi\, T_u + cpi\, T_g + T_{row} \right] \tag{9}$$

where τ^{dt} is the tax on personal income applied to the endowments of labor (L_j) and capital (K_j), sold by households to the firms, unemployment benefits (T_u), also to transfers from both the government (T_g) and the rest of the world (T_{row}), discounting the payments to Social Security made by employees $\left(\tau^{hssc} wL_j\right)$.

In our model, the tax of Social Security paid by employers (τ_j^{essc}) works in the same way as other indirect taxes. Specifically, it operates by taxing wages paid by employers to workers. On the other hand, Social Security paid by employees (τ^{hssc}) works as a direct labor tax. The total revenues from both taxes, *ESSC* and *HSSC* respectively, are calculated as follows:

$$ESSC = \sum_{j=1}^{19} \tau_j^{essc}\, wl_j\, VA_j \tag{10}$$

$$HSSC = \tau^{hssc}\, wL_j \tag{11}$$

Finally, the import taxes are collected. The revenues from the foreign sector are calculated as follows:

$$RT = \sum_{j=1}^{19} \tau_j^t p_{row} M_j \tag{12}$$

Notice that the collection of each tax category depends on the corresponding effective tax rate and the equilibrium prices and quantities.

Finally, the difference between revenues and payments represents the deficit or surplus of the administration (*PB*). Payments are due to the transfers to the private sector (T_g), the unemployment benefits (T_u) and the demand of goods and services from each sector (DG_j). Under the government closure assumption, the public activity level remains constant, although government expenditure may vary due to changes in prices,[2] and the public deficit is endogenously determined:

$$PB = R - cpi\, T_u - cpi\, T_g - \sum_{j=1}^{19} p_j DG_j \tag{13}$$

2.4 Foreign sector

The 'foreign' or 'rest of the world' sector is a simplified agent that includes two trading partners (the European Union and "All other countries"). Imports (M_j), exports (E_j) and transfers (T_{row}) are exogenously fixed but the current account balance (*FB*) and the aggregate price index for the traded commodities (p_{row}) are endogenously determined. Thus, the closure rule for the foreign sector is defined as follows:

$$FB = \sum_{j=1}^{19} p_{row} M_j - \sum_{j=1}^{19} p_{row} E_j - T_{row} \tag{14}$$

2.5 Investment and savings

The investment activity is modeled following a fixed-coefficients technology, whose inputs are the sales of the productive sectors to the investment sector and whose output level is driven by the total savings in the economy. The closure rule therefore guarantees the macroeconomic equality between the total investment of the economy and savings at the aggregated level:

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2 T_u ,T_g and DG_j are real variables therefore they are multiplied by the relevant price variable to get the nominal version.

$$\sum_{j=1}^{26} p_{inv} I_j \ = \ p_{inv} SD \ + PB + FB \tag{15}$$

where p_{inv} is a weighted price index of investment goods and I_j is the investment level of the sector j.

2.6 Labor market

Labor and capital demands are computed under the assumption that firms minimize the cost of producing the value-added composite factor. In the labor market, the aggregate labor supply follows the real-wage unemployment equation (Kehoe *et al.*, 1995) that captures the feedback effects between the real wage and the unemployment rate. This feedback represents the frictions in the labor market that cause unemployment (Oswald 1982). Thus, in equilibrium, the aggregate labor supply satisfies the following condition:

$$\frac{w}{cpi} = \left(\frac{1-u}{1-u_0}\right)^{1/\eta} \tag{16}$$

where w/cpi is the real wage, η is a constant that represent the degree of flexibility of the real wage to the unemployment rate, u_0 is the unemployment rate in the benchmark equilibrium and u is the endogenous unemployment rate.

The labor supply is perfectly elastic up to the level of the total labor endowment where it turns inelastic. On the other hand, in the capital market, it is assumed that supply is perfectly inelastic since this factor is not commonly thought of being utility producing for consumers in the short-term (Cardenete *et al.* 2012).

2.7 Equilibrium

The model follows the concept of Walrasian competitive equilibrium enlarged to the public and foreign sector, that is, supply and demand should be equal in all non-labor markets. In the labor market there might be a situation of excess of supply or unemployment. Therefore the equilibrium definition describes a situation in which the producers maximize net profits, the consumers maximize their levels of utility and the activity levels of the public and foreign sectors conditions the values of the public and trade balance respectively. From the previous situation, the model provides an equilibrium solution, that is, a price vector corresponding to commodities, services and production factors, an output vector, an unemployment rate and a level of tax revenues such that prices follow the unit cost rule.

3. Microsimulation model

After computing the General Equilibrium Model, their output is used to simulate the effects on the households' living conditions, especially on the income distribution. The income definition considered in this paper is the adjusted or equivalized disposable household income. This variable comes from the total disposable household income, which comprises all the incomes earned by the household members from labour, capital (self-employment, and financial and real estate yields), public transfers or benefits, unemployment benefits and inter-households or private transfers.

$$\begin{aligned} HIncome = {} & WAGES + CAPITAL + BENEFITS + UNEMPLOYMENT \\ & + OTHER - TAXES \end{aligned} \tag{17}$$

Once all the incomes are gathered, differences in needs have to be taken into account. Thus, the total household income is adjusted by using an equivalence scale, which reports the influence of household size and composition. Among the wide range of options in the literature, the modified OECD equivalence scale is chosen. This scale gives a weigh of 1 to the first adult in the household, 0.5 to the remaining adults and 0.3 to the household members younger than 14. The sum of values provides the household equivalent size and the adjusted household income is computed by dividing the total disposable income by this equivalent size. Finally, the adjusted household income is allocated to each household member before performing inequality and poverty analyses.

Expression (18) is used to reflect the impact of macroeconomic changes on household incomes. After calibration, it is re-written by including some coefficients of change.

$$HIncome_1 = WAGES_1 + CAPITAL_1 + BENEFITS_1 + UNEMPLOYMENT_1 + OTHER_1 - TAXES_1 \tag{18}$$

where each variable at time 1 (after calibration) is expressed as $X_{i1} = \gamma_i X_{i0}$, being γ_i the coefficient that reflects the change in incomes. It is computed so that the total income by source in the microdata database mirrors the variations calibrated in the macroeconomic model.

The simulation of the impact on unemployment benefits deserves special attention. Since a static microsimulation is assumed in this paper, active population is fixed and, therefore, any increase (decrease) in unemployment rate implies the corresponding decrease (increase) in employed people. Thus, the expected individual earnings from unemployment benefits will be formed by the initial benefits plus the potential benefits for the initially employed people given their wages and household type and weighted by the probability of moving from employment to unemployment.

The criteria from the official regulations and laws are applied to build these simulated benefits. Depending on time, different shares of the wage are paid: the 70 per cent the first six months and 50 per cent the remaining months. In this simulation, an average rate of 60 per cent is applied. Besides, there is an additional constraint: the contributing amount, which these rates are applied on, is left-censored. That is, those wages higher that 3751.20 euros will be fixed in this specific value. Finally, once the benefits are computed, it is required to compare them with the minimum and maximum valued defined by Public Administration. These limits are based on the Official Income Indicator for Benefits and the number of depending children. Therefore, the household earnings from unemployment benefits can be expressed as:

$$UNEMPLOYMENT_1 = UNEMPLOYMENT_0 + \sum_{i=1}^{u} p_{e \to u} b_i \tag{19}$$

where $p_{e \to u}$ expresses the probability of becoming unemployed and b_i the simulated personal unemployment benefit.

After simulating the effects of macroeconomic shocks on the households' earnings, the most common indicators of inequality and poverty are applied to estimate and measure the impact on living conditions and well-being.

Among the wide range of indicators proposed in the literature to measure inequality, Gini index, Theil or Generalized Entropy Index and the quantile share will be used. Gini and Theil index have the advantage of summarizing all the information contained in the distribution in a single scalar because since they are functions that assign a real number to each income distribution. However, since both follow different aggregation procedures, they report different figures.

The former is the most usually found in the official reports as well as the academic papers. It is defined by the following expressions:

$$G = \frac{1}{\mu} Cov\big(x, F(x)\big)$$

$$G = \frac{1}{2\mu}\left(\frac{1}{n^2}\right)\sum_{i=1}^{n}\sum_{j=1}^{n}\left|y_i - y_j\right|, \qquad (20)$$

$$G = \frac{1}{2\mu}\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} p(x)p(y)|x-y|dxdy.$$

The second and the third equations are the expression of the first one when the variables are discrete or metric, respectively. Meanwhile, the Theil index is based on the concept of entropy and, therefore, belong to the general class of entropy measures (Cowell, 1995). Depending on *c* parameter, it can be expressed as:

$$T_c = \frac{1}{n}\frac{1}{c(c-1)}\sum_{i=1}^{n}\left[\left(\frac{y_i}{\mu}\right)^c - 1\right], c \neq 0,1$$

$$T_0 = \frac{1}{n}\sum_{i=1}^{n} ln\left(\frac{\mu}{y_i}\right), c = 0 \qquad (21)$$

The second equation will be used in this paper because of its simplicity. Besides, this index shows a very relevant advantage: it is the only one that satisfies the whole range of desirable properties for an inequality index (,). No index, excepting Theil, is additively decomposable so that, the general level of inequality measured with a Theil index can be expressed as the sum of partial index weighted by the share of each group in the population.

Finally, poverty is also analysed in this paper as an outcome of the microsimulation model. Since a relative approach is assumed, the poverty line is fixed at the 60% of the median equivalent income[3]. Once the threshold is fixed, a poverty indicator has to be chosen. Due to their properties, the Foster-Greer-Thorbecke (henceforth, FGT) family of poverty measures is selected to perform the poverty analysis in this paper.

$$FGT(\alpha) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^{\alpha} \tag{22}$$

where n is the population, q the poor population, y_i i-th individual's income and z the poverty line. This expression includes different definitions of poverty depending on the α parameter. It expresses the individual' sensitivity to poverty gap regarding to poverty threshold (i.e., distance from the poverty line). The greater the value of this parameter, people with a greater poverty gap will be the more important in the analysis. Therefore, it can be viewed as the degree of aversion to poverty in the population.

If α=0, the FGT index is merely the share of poor people in the population, the so-called "headcount index" or the widely known "poverty rate". It measures the poverty incidence so that there is no information about how much poor are the poor people. This issue, poverty depth, can be observed by the FGT index when α is equal to 1. Finally, the inequality among poor people –also named poverty severity- is reported with α equal to 2.

4. Databases

The database employed to calibrate the CGE model is the SAMSPA-14 (Campoy et al., 2017). The SAMSPA-14 comes from the SAMSPA-08 (Fuentes et al., 2015). The latter one has been updated to 2014 using both data from National Accounting and Cross Entropy Method (Cardenete and Sancho, 2006). The SAMSPA-14 encompasses 31 accounts, including 19 productive sectors (Table 1), 2 inputs (labor and capital), a representative consumer, a saving/investment account, a government account, the taxes accounts according to the disaggregation required by the proposed model, and a foreign sector.

[3] It is the official poverty threshold established by EUROSTAT.

Table 1. Production sectors

1	Primary sector	11	Financial and insurance services
2	Extractive industries	12	Real estate services
3	Manufacturing industries	13	Professional services
4	Electric power and gas and water production and distribution	14	Administrative services
5	Water production and distribution	15	Public administration and defense
6	Construction	16	Education services
7	Commerce	17	Health and social services
8	Transport services	18	Recreational services
9	Hospitality services	19	Other services
10	Information and communication		

Source: Own elaboration

Using the information contained in the SAMSPA-14 database, numerical values for the parameters in the model are obtained by the usual procedure of calibration (Mansur and Whalley, 1984). The following parameters are calibrated: the technical coefficients of the production functions, that is, those for the production sector, both domestic (a_{ij}) and foreign (a_{mj}); and those for the production factors, labor (l_j) and capital (k_j) that produce unitary value-added; the factor distribution parameters (α_j, γ_j, ε_j); the share parameter of consumption (β_j, δ_j); and all the tax parameters that allow us to define the effective tax rates for all taxes, both the direct and the indirect ones $\left(\tau_j^p, \tau_j^v, \tau^{dt}, \tau_j^{essc}, \tau^{hssc}, \tau_j^t\right)$ as follows:

$$
\begin{gathered}
a_{ij} = SAM_{i,j}/XD_j \\
a_{mj} = SAM_{foreign\,sector,j}/X_j \\
l_j = L_j/VA_j \\
k_j = K_j/VA_j \\
\alpha_j = \frac{L_j\left(1+\tau_j^{essc}\right)}{L_j\left(1+\tau_j^{essc}\right)+K_j} \\
\gamma_{ij} = (1+\tau_j^p)(1+\tau_j^v) \\
\varepsilon_j = SAM_{consumer,j}/DI
\end{gathered}
\qquad (23)
$$

$$\beta_j = \frac{K_j(1+\tau_j^{essc})}{VA_j}$$

$$\delta_j = \frac{XD_j(1+\tau_j^{p})(1+\tau_j^{v})}{X_j}$$

$$Tax_j = Revenue_j / Taxable\ \ base_j$$

The calibration criterion is to reproduce the SAMSPA-14 as an initial equilibrium used as a benchmark for all the simulations. In such a benchmark, all the prices and the activity levels are unitary in the benchmark equilibrium, so that, after any of the simulation exercises, it is possible to observe the rate of change of relative prices and activity levels in the resulting equilibrium. The nominal wage (w) is used as the numeraire in all simulations and therefore the variations of the remaining prices should be interpreted in terms of the nominal wage, that is, a price increases of 10 percent means that this price increased 10 percent more than the numeraire. The elasticity of the real wage to unemployment η is set at 1.2, according to García-Mainar and Montuenga-Gómez (2003), and the unemployment rate used for 2014 is 24.4% (INE, 2017).

The microsimulation model is based on the 2015 Spanish subset of the EU-SILC microdata, because incomes in EU-SILC are referred to the year before, in this case, 2014. This survey, coordinated by EUROSTAT, aims at allowing the comparability of results across the European Union. Besides, it is specially designed to analyse income and living conditions (EU-SILC stands for European Union Survey on Income and Living Conditions), so that it the best database to develop an analysis about microsimulation, inequality and poverty. Each wave contains four files: D (general information about households), H (specific information about households), R (general information about persons) and P (specific information about adult people). Since the individual is used as the unit of analysis and not all the income sources appear in all files, it is required to combine the files H and P as well as R in order to estimate the household income (Equation 17). Afterwards, the equivalent income for every individual in file R is computed by using the following expression:

$$EqIncome = \frac{HIncome}{Equivalence\ scale} \tag{24}$$

After an analysis of prior validation to eliminate extreme values or outliers, the sample employed in the study comprises 31403 observations. In addition to income, background information such as labour market status, age, sex, household size and type or region are used to perform the proposed analysis.

5. Simulations and results

The CGE model outlined in the above section is used to simulate the reductions of public deficit until the 3% of GDP, as established in the Stability and Growth Pact. Two scenarios are simulated, one where the target of deficit is reached by increasing 2.7 pp the effective value-added tax, whereas in the second one, government spending is reduced 14.5% to lead the ratio to the target level.

Table 2. Output from macroeconomic simulation

	Benchmark	Scenario 1		Scenario 2	
	Millions euros, %	Millions euros, %	Δ	Millions euros, %	Δ
Public deficit ratio (%GDP)	5.80%	3%		3%	
GDP	1,036,939	1,054,399	1.68%	1,040,984	0.39%
Labour income	430,839	415,132	-3,65%	426,155	-1.09%
Capital income	466,471	444,112	-4,79%	476,522	2.15%
Public Transfers	206,404	214,213	3,78%	208,672	1.10%
Unemployment rate (%)	24.2	27.2	12.39%	25.2	4.13%

Source: Authors' calculation by GAMS.

Table 2 clearly reports the effects of both policy changes on several economic variables. Increasing the effective tax rate in VAT makes labour as well as capital incomes decrease along with a pronunced increase of unemployment. Although the scenario 2 shows some unfavourable results, a higher unemployment rate while labour income declines, the former is shockingly worse.

This impression is confirmed by the results of microeconomic situation (Table 3). The impact on household and personal incomes of that tax-rate increase are significantly higher than the reduction in government expenditure. Since labour and capital incomes fall down together with the rising unemployment, the equivalent income mean suffers a noticeable drop, despite of the slight rise of public benefits. On the contrary, the scenario 2 reports a situation in terms of income means very close to the benchmark.

Table 3. Inequality and poverty estimates after microeconomic simulation

	Benchmark	Scenario 1	Scenario 2
Per capita income mean	30,220.04	28,576.44	29,785.78
Equivalent income mean	15,762.35	14,946.42	15,550.09
Gini index	0.3363	0.3333	0.3421
Theil (0) index	0.2167	0.2151	0.2274
FGT (0)	0.2154	0.2235	0.2262
FGT (1)	0.0781	0.0821	0.0842

Source: Authors' calculation by Stata.

However, regarding inequality, the results contrast with the former. Despite of considerably declining means, inequality in scenario 1 is slightly lower than benchmark, whichever index is used. This apparently unexpected outcome is easily explained when Table 2 is observed in detail. Two forces appear in opposite directions: while public benefits show some growth, capital and labour incomes fall. Since the former are mainly earned by the lower tail of the distribution and the latter are much further away from the mean in economic booms, inequality drops due to a "general process of worsening". In this case, inequality values depict the same society as income means: one with worse living conditions.

Besides, this conclusion is reinforced by poverty indicators. The decrease of incomes along with the rise in unemployment make poverty grow in terms of incidence –more people is expected to live at risk of poverty- and depth –poor people is even poorer. Although public transfers are assumed to increase, they would not be able to support the dramatic drop in well-being. Even more, it very important to take into account that the effects of that policy change are simulated on the net income instead of the ability of meeting household ends. If the VAT tax rate rises, prices will also be expected to grow so that the households' actual living conditions and consumption will become worse with the consequent fall in household capacity to face future income shocks.

On the contrary, scenario 2 results stand out because inequality and poverty are clearly higher than benchmark although income means seem to be the ones from the starting point. These results are not only higher than those from benchmark. Inequality and poverty even are over the values estimated in scenario 1. Again, table 2 includes the required information to enlighten these figures. Disparity between labour and capital incomes in favour of the latter has been observed along last decades in the majority of the OECD countries and it is identified as one of the sources of the rising income inequality in them. Therefore, a reduction of labour incomes combined with an increase of capital incomes make that disparity becoming higher. Meanwhile, public transfers slightly go up so that they cannot balance the forces towards more inequality and poverty.

In sum, both alternative public policies to reach the public deficit / GDP rate established in the Stability and Growth Pact would have significantly aggravated living conditions in Spain. Besides, it is important to know that inequality and poverty levels have grown from the beginning of the economic crisis although the objective of public deficit was not achieved.

6. Conclusions

The Great Recession has caused that the relationship between macroeconomic conditions and household actual living conditions gains importance. Besides, the increasing trend of inequality in OECD countries from the 70's decade focuses the political and economic debate on this issue. Questions as which is the path of transmitting economic booms or crises to living conditions or if macroeconomic recovery always means people's wellbeing recovery are key to understand and explain the current and future society. Given the dramatic drop in GDP, but also in household incomes, the need of exploring this relationship becomes even more important. In addition, this kind of analysis can help one understand why often political decisions do not understand by public opinion. An evaluation of the effects of policy changes should be carried out before applying the policy in order to assess it in a whole.

Among the techniques proposed in the literature, the top-down approach, carried by the combination of a CGE model and a microsimulation model, offers some interesting insights about the impact of fiscal measures to achieve Stability and Growth Pact on income inequality. The macroeconomic results point out that the increase of VAT rate has a worse impact on the different sources of households' income compared to the drop in public expenditure. In terms of inequality, the increase of VAT rate leads to a less unequal situation compared to the reduction of public expenditure, but also poorer living conditions. That very slight reduction of inequality combined with a noticeable decrease of household income mean depict an impoverished society, as poverty indicators confirm.

These results highlight the nexus between income inequality of income and the distribution of the different income sources in a society. Therefore, the analysis performed in this paper can help the policy designers to choose the best strategies to achieve the socially desirable goals of reducing inequality and poverty.

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