An AGE evaluation of government responses to shocks in Spain

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Abstract

The goal of this paper is twofold. First, it assess the effects of transitory public investment plans implemented by the Spanish Government in 2009 and 2010 to softened the effects of negative external and domestic shocks that hit production and employment in 2008 and 2009. Second, it also presents estimates of the effects of several permanent tax rate hikes set in place by the government in 2010 to counteract the rapid increase of the public deficit and debt observed in 2009 and 2010. The simulations are carried out with an applied general equilibrium model under both a neoclassical and a Keynesian closure rules. The model is calibrated with a Social Accounting Matrix for 2000 elaborated by the authors. The effects of public investment plans have negligible effects under neoclassical closure rule as they crowd out private investment but they reduce temporarily unemployment under the Keynesian closure. Regarding the effects of tax rate increases, the results indicate that the policies implemented do raise revenues far more than reduce the public deficit due to general equilibrium effects.

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1. Introduction

As many developed economies, Spain entered into recession in the fourth quarter of 2008. Since 1995, Spain had enjoyed a sustained expansion fueled by the four devaluations of the peseta implemented by the Government between September 1992 and May 1995 and the availability of "unlimited" credit at low interest rates since the launching of the euro on January 1, 1999. At the end of the boom in 2007, the current account deficit amounted to 10 % of GDP and residents had accumulated a large external (mainly private) debt close to 1.6 times the value of GDP.

The closure of international financial markets and the global recession put a sudden end to the private capital accumulation process and reduced exports to the rest of the world. The average volume index of gross fix capital formation from the third quarter of 2008 until the second quarter of 2009 fell 13.07 % in relation to its average in the previous four quarters and the average volume index of exports of goods and non tourists' services and non-residents demand fell 9.4 and 8.75 percent, respectively. As a result of domestic and external shocks, GDP dropped 2.16 % and the unemployment rate increased 5.96 percentage points in the same time span.

The sudden turnabout of the economic scenario put highly indebted credit institutions, non-financial firms and families under serious stress. Although the expansionary budget of 2008 (an election year) and the fall of tax revenues had already turned the 2007 budget surplus (20.057 million) into a large deficit (45.162 million), the Government -convinced that with a bit of public aid things would turn to normal within months- further increased current expenditures (7.8 %) and launched an 8.000 million euro extraordinary investment program in 2009, and approved in October 2009 another 5.000 million investment plan for 2010. But since production and income tax revenues continued falling (14.7 %) in 2009, the public deficit kept increasing. Despite the increased in tobacco, alcohol and oil taxes implemented in June 2009, the public deficit reached 11.1 % of GDP and prompted the Government to eliminate income tax deductions and raise VAT rates in the 2010 budget.

The goal of the paper is to assess the effects of those temporary investment plans launched to create employment in the construction sector and the permanent tax reforms implemented by the Spanish Government in 2009 and 2010 to increase revenues. These policies are simulated with a static disaggregated general equilibrium model of the Spanish economy calibrated with a social accounting matrix (SAM) elaborated by the authors for 2000. Although "temporary" and "permanent" are terms not exempted of some ambiguity, they seem quite appropriate to describe both the nature of investment plans and tax reforms implemented by the Spanish Government.

AGE models are a standard tool widely used to simulate the effects of fiscal and trade policies. They provide valuable quantitative insights on changes in the allocation of resources, households' welfare fiscal and other major macroeconomic aggregates. However, the results obtained with AGE models are quite sensitive to the assumptions made on the labor market and the closure rule chosen. If the labor market clears, no unemployment can ever be observed and changes in exogenous variables such as exports or public expenditures have mainly reallocation effects. In Spain with an unemployment rate over 20 % at the end of 2010, labor market clearing seems an awkward assumption to make.[1]

But even when price frictions are introduced in the model to account for observed unemployment, domestic and external shocks may have implausible effects on private investment when this variable is determined by domestic and foreign savings, the so called neoclassical closure rule. While one can give sensible arguments to defend that an increase in public investment crowds out private investment, to assume that a fall in exports boosts private investment seems unreasonable (see, Valle and Polo, 2008 and Álvarez- Martínez and Polo, 2010)

An alternative way to close the model is to assume that private investment is exogenous and unemployment endogenous, the so called Keynesian closure. In this setting, the value of private savings, the public deficit and the current account surplus adjust to match the value of

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[1] The assumption is used in dynamic macroeconomic models (see, Gonzalo de Córdoba-Torres (2010) and Conesa *et al.* 2010) where the representative household optimally allocates available time between working hours and leisure.

exogenous private investment. The assumption that investment is exogenous has been rightly criticized for decades, but investment savings determined models do not capture the sharp fall of investment and GDP observed during downturns (Polo and Viejo, 2010).[2]

In this paper, the effects of the temporary local investment programs launched by the Spanish government are calculated with both closures. Under the neoclassical closure, the crowding out of private investment reduces the effectiveness of public policies, while under the Keynesian closure there are significant effects on the unemployment rate, employment and GDP. On the other hand, the effects of permanent changes in tax rates are presented only under the neoclassical rule, although the results are very similar in both cases.

The rest of the paper is divided in four sections. First, the main features of the model are presented. In section 3, the policies simulated are explained and the simulation results obtained with the neoclassical and the Keynesian closure discussed. The main results are summarized in the concluding section.

2. The model

The simulations are performed with a static AGE model that captures the optimization behavior of firms, families, government and foreign sectors.

Agents and commodities

There are 30 producers, one representative consumer, the government, the corporate sector and two external sectors and non-residents consumers, the EU and the ROW. There are 30 produced commodities, 30 consumption goods and services, labor and capital and six types of private and public capital goods.

Producers

Firms combine domestic commodities and equivalent imports to produce. Two primary factors, labor and capital, produce value added. Firms combine produced commodities with value added

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[2] Polo and Viejo solve recursively an AGE model of the Spanish economy updating all exogenous variables and parameters with the best available information for the years 1990-97. Their results indicate that the model replicates reasonably well the evolution of major macroeconomic variables, except during the downturn of 1992-93

to produce domestic production. Production commodities are also used to produce consumption commodities.

Production technology is represented by nested constant returns to scale production. At the first level, total production of commodity i, Y_i, is a CES aggregate of domestic products, Y_{di}, and imports from the EU, Y_{eui}, and the ROW, Y_{rowi}.

$$Y_i = \phi_i \left(\delta_{di} Y_{di}^{\rho_i} + \delta_{eui} Y_{eui}^{\rho_i} + \delta_{rowi} Y_{rowi}^{\rho_i} \right)^{1/\rho_i}, \quad -\infty < \rho_i < 1$$

where δ_{di}, δ_{eui} and δ_{rowi} are, respectively, the domestic and foreign distributive parameters and ρ_i is the parameter that determines the degree of substitution between domestic production and imports and also between imports from the EU and the ROW. In the second level, domestic production is obtained combining intermediate inputs and value added in fixed proportions.

$$Y_{di} = \min \left(\frac{X_{1i}}{a_{1i}}, \frac{X_{2i}}{a_{2i}}, ..., \frac{X_{30i}}{a_{30i}}, \frac{V_i}{v_i} \right)$$

where X_{ji} (V_i) is the demand of the commodity j (value added) used in the production of i and a_{ji} (v_i) is the corresponding technical coefficient (unitary requirement of value added). Finally, valued added is obtained as a Cobb-Douglas combination of labor (L_i) and capital (K_i).

$$V_i = \gamma_i L_i^{\beta_{li}} K_i^{(1-\beta_{li})}$$

where γ_i, β_{li} and $(1-\beta_{li})$ are, respectively, the scale parameter and the labor and capital elasticity. Firms maximize benefits; therefore they minimize production costs subject to their value added constraint at the lowest level in the nesting.

$$\min w \left(1 + \tau_i^{ssc}\right) L_i + r K_i \qquad s.t. \quad V_i = \gamma_i L_i^{\beta_{li}} K_i^{(1-\beta_{li})}$$

where w and r are the prices of labor and capital and τ_i^{ssc} are the social security contribution rates of employers and employees.

The 30 consumption commodities are produced with total production using a Leontief technology.

$$C_c = \min\left(\frac{Z_{1c}}{z_{1c}}, \frac{Z_{2c}}{z_{2c}}, ..., \frac{Z_{30c}}{z_{30c}}\right)$$

where Z_{ic} is the quantity of commodity i, used to produce the consumption commodity c, and z_{ic} is the unitary requirement. Consumption commodities are subject to value added taxes.

Household

The representative household derives utility from consumption and savings by means of a Cobb-Douglas function:

$$U(C_1, C_2, ..., C_{30}, S) = \prod_{c=1}^{30} C_c^{\alpha_c} S^{1-\sum_{c=1}^{30} \alpha_c}$$

Households' gross income stem from the sale of labor services in the domestic economy, $(\overline{L})$, in the EU, $(\overline{L}^{eu})$ and in the Rest of the World $(\overline{L}^{row})$ as well as the capital endowments, $(\overline{K})$; Households also receive unemployment and welfare benefits, property incomes and other current transfers

$$GI_h = w(1-u)\overline{L} + w^{eu}\overline{L}^{eu} + w^{row}\overline{L}^{row} + r\overline{K} + PSCEC \cdot SCEC$$

$$+ \mu \cdot w \cdot u \cdot \overline{L} + p^{cpi}(ADJ + TRR + PIR + WFR)$$

where w and r are the prices of labor and capital services, respectively; u is the unemployment rate; $PSCEC$ is the share of households in social security contributions of employers revenues; ADJ are the transfers due to the adjustments for the change in net equity of households in pension funds reserves, TRR current transfers, PIR property income revenues and WFR are the welfare benefits other than social transfers in kind, valued all them with a consumer price index, p^{cpi}. Finally, μ is the proportion of the wage rate paid to the unemployed.

Disposable income, DI_h, equals GI_h minus personal income tax, social contributions paid by self-employees, as well as current transfers, property income, welfare benefits and

residential consumption in the EU and the ROW valued with the consumer price index. Consumption and savings demand are the solution to the maximization problem of households:

$$\max \prod_{c=1}^{30} C_c^{\alpha_c} S^{1-\sum_{c=1}^{30}\alpha_c} \qquad \text{s.t.} \qquad DI_h = \sum_{c=1}^{30} p_c C_c + p_s S$$

where p_s is a weighted price index of investment goods. Moreover, there are six private capital goods and one of them is the residential investment. In this model the representative household dedicates a fix proportion of their savings (ι_r) to purchase residential investment (RI).

$$p_r RI = \iota_r p_s S$$

where p_r is obtained by multiplying the production price of construction (sector 17) by the corresponding value added tax factor:

$$p_r = p_{17}\left(1 + \tau_{17}^{vat}\right).$$

Government

The Government collects taxes from labor, income, production and consumption, which together with capital income and transfers finance public consumption, public investment, unemployment benefits and transfers. Public consumption and investment are exogenous but since prices, revenues and some expenditure are endogenous, also is the budget surplus.

Foreign sector

There are two foreign sectors, the EU and the ROW. Revenues stem from labor endowments, imports of commodities, residents' consumption out of the territory and taxes and transfers received from domestic agents. These revenues are used to pay exports, income payments to residents and transfers. Since imports and prices are endogenous, the current account balance is endogenous while the level of exports and transfers are exogenously fixed.

Factors' markets and closure rules

In the neoclassical version, there is a real wage-unemployment equation that captures frictions in the labor market whereby labor endowment may be not fully employed and the unemployment rate may change in response to a shock

$$\frac{w(1-\tau^i)}{p^{cpi}} = k(1-u)^{\frac{1}{\eta_l}} , \quad \eta_l > 0$$

In this equation $\frac{w}{p_c}$ is the real wage; τ^i is the income tax rate; k is a calibration constant; η_l is

the parameter that determines the response of the real wage to unemployment rate and u is the

endogenous unemployment rate. In this case, it is assumed that non-residential private

investment is endogenously determined by changes in domestic and foreign savings and the

current account deficit (Polo and Sancho, 1993a and 1993b, Kehoe, Polo and Sancho, 1995,

Fernández and Polo, 2004 and Polo and Viejo, 2009).

Under the Keynesian closure, non-residential private investment is exogenous and the

value of private savings, public deficit and current account adjusts to match the value of private

investment. In this case, the real wage-unemployment equation is removed from the model.

Nominal wage is the numeraire.

Equilibrium

The equilibrium can be defined as a set of prices $(\hat{p}_i, \hat{p}_c, \hat{w}, \hat{r})$, production plans for producers,

a consumption-savings plan for the representative household, an unemployment rate, a public

deficit and a current account deficit such that producers maximize profits, the household

maximize utility, all commodity markets and the capital market clears and the effective labor

supply is equal to labor demand:

Calibration of the model

The 2000 SAM for the Spanish economy (SAMES-00) elaborated by the authors is the database

used to specify the parameters and the exogenous variables of the model. This is a 128x128

square balance matrix whit one representative domestic household and two non-resident

consumers, a corporate sector, the Government and two foreign sectors. There are thirty

production and consumption commodities and six public and private capital goods. The

elasticities of substitution between domestic products and equivalent imports have been taken

from Blake (2000) and the elasticity of real wage to unemployment is derived from the Phillips

curve estimated by Andrés et al. (1988) for Spain. Finally, the unemployment rate in the base year is 13.87 %.

3. An evaluation of transitory and permanent government policies

This section presents the results of simulating several policies implement by the Spanish Government in 2009 and 2010 to counteract the devastating effects of the recession on production, employment and the public deficit. First, the characteristics of the transitory public investment programs undertaken to counteract the effects of the recession in 2009 and 2010 and the permanent tax rate increases adopted in the same years to cut down the public deficit are explained. Then, the changes of the exogenous variables (public investment) and parameters (tax rates) in the model due to those policies are calculated. Finally, the results obtained under the neoclassical and the Keynesian closure rules are explained.

3.1. Government policies and simulation scenarios

As indicated the Spanish government reacted to the hardest recession ever registered since the 1950's launching two large extraordinary investment programs to boost employment and tightening fiscal pressure to increase revenues. After briefly describing the main characteristics of the programs and reforms, the simulation scenarios are presented.

Transitory increases in public investment

The Spanish Government decided to launch in December 2008 an 8.000 million public construction plan to foster employment.[3] Local authorities presented small and medium projects (under 4 million euro) that once approved by the central government had to be implemented along 2009. A new local investment plan of 5.000 million of similar characteristics was announced in October 2009 and carried out in 2010.[4]

In order to simulate the impact of both investment projects, the amounts invested 8.000 and 5.000 have first been deflated to the base year using the National Accounts gross fix capital deflator. Then, the resulting figure has been expressed net of VAT taxes to obtain the figure

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[3] The Local Investment State Fund ("Fondo estatal de inversion local") was approved in December 2008 and implemented throughout 2009.
[4] The State Fund for Local Employment and Sustainability ("Fondo estatal para el empleo y la sostenibilidad local") was approved in October 2009 and implemented along 2010.

actually destined to investment projects. Finally, the value obtained has been used to calculate the growth rate of public investment in "Other constructions".

Table 1 provides the growth factors for the period 2000-08 of gross capital formation in current and volume terms. The implicit gross capital formation deflator has been used to estimate the size of the investment program in 2000. That figure has been expressed net of VAT. Finally, it has been calculated the growth rate of public investment resulting from the local investment programs launched by the Spanish Government. They imply substantial increases (33.74 and 54.82 percent) over investment figure in "Other constructions" (14,611.5 millions) in 2000, the base year.

Table 1. Public investment programs in Other constructions		
Gross capital formation (million euro)		
2000	**2008**	**Nominal growth factor**
162,806	321,503	1.975
Gross capital formation volume index		
2000	**2008**	**Real growth factor**
100.0	141.2	1.412
Gross capital formation deflator in 2008		
1.399 (1.975/1.412)		
Local investment fund in 2008 and 2000 (million euro)		
2008	**Implicit capital formation deflator: 2000-08**	**2000**
8,000	1.399	5,718.37
13,000 (8.000+5.000)	1.399	9,292.35
Percentage increase in public investment in Other Constructions in 2000		
Local investment fund	**Local investment Fund net of 16 % VAT**	**Percentage increase of Investment in Other constructions**
5,718.37	4,929.63	33.74 (4,929.63/14,611.5)
9,292.35	8,010.65	54.82 (8,010.65/14,611.5)
Source: National Accounts.		

Permanent increases in tax rates

The rapid deterioration of public accounts in 2008 and 2009 led the Spanish Government to increase excise taxes, eliminate households' tax rebates and raise the VAT rates.

1. Other taxes on products. The Government increased tax rates on tobacco and oil products in June 2009 and provided figures of the expected additional revenues. Using this information and data from the IO Supply table, we have calculated the impact on the effective tax rates used in the model. The effect of an estimated 16.3 % increase in tax revenues on tobacco amounts to a 13.08 % increase in the effective tax rate on Food, beverages and tobacco in the model. In the case of oil, the increase is 10.5 %.

2. Income tax on households. The Government has withdrawn in 2009 the 400 euro tax rebate introduced before the general elections hold in March 2008. Government sources estimated the policy change will raise revenues by 7.2%.

3. VAT. The government included in the 2010 budget (approved in December 2009) to raise VAT rates on July 1, 2010. The reduced rate was raised from 7 to 8 percent and the normal rate from 16 to 18 percent. In the simulation performed, all effective VAT tax rates have been raised 12.5 %.[5]

Altogether, we present the results of six simulations:

S1. A 33.74 % increase of public investment in Other constructions

S2. A 54.82% increase of public investment in Other constructions.

S3. A 10.5% increase of other taxes on products on energy and 13.08 % on food, beverages and tobacco.

S4. A 12.5 % an increase of VAT rates.

S5. A 7.2 % increase in effective income tax rates on households.

S6. A joint simulation of S3, S4 and S5.

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[5] The increase in reduced VAT rates is 14.3 % and that of normal 12.5 %. Since it is not a big difference and it is difficult to sort out how those changes will affect consumption commodities in the SAMES-00, the same increase is applied to all.

3.2. Simulation results

Public investment programs as those implemented by the Spanish Government are typically undertaken based on the belief that those programs use idle resources that set up in motion a Keynesian multiplier process. Many economists, however, consider that the multiplier of public expenditure is less than one. In the present case, since the increase in expenditure is transitory its effects will also be short-lived. In the next paragraphs, the results of an increase in transitory public investment programs with the neoclassical closure reported in columns S1 and S2 of Tables 2-6 are compared with the results under the Keynesian macro closure detailed in Tables 7-11.

Effects of transitory public investment programs

Since the qualitative effects of simulations S1 and S2 are the same, it is only commented simulation S1. The effects on prices and quantities are quite different depending on the closure rule. Under the neoclassical closure, prices change very little and production levels increase in construction related sectors (Non-metallic products and Extraction of other mining and quarrying, Wood, Non-metallic mineral products and Construction), falls in other investment oriented sectors and does not change in non-investment sectors. Under the Keynesian closure, there is a general increase in prices and production increases in all sectors especially in construction related sectors.

Turning the attention to fiscal variables, the most remarkable changes observed are, on the expenditure side, the increase in the weight of public investment in Other constructions on GDP and, on the revenue side, a slight increase in the ratio of VAT revenues on GDP, since public investment in Other constructions is subject to VAT. The public deficit over GDP ratio takes quite different values under the neoclassical and Keynesian closures due to the substantial reduction in the unemployment rate and the expansion of GDP in the latter case. Both reduce the weight of unemployment benefits and public consumption over GDP.

The changes in macroeconomic variables implied by the increase in public investment appear in Tables 6 (neoclassical closure) and 11 (Keynesian closure). While in the first case the changes in the unemployment rate, the employment level and real GDP are small, the policy has

a significant effect on the unemployment rate (-1.14 percentage points), employment (1.32 %) and real GDP (0.80 %) growth, under the Keynesian closure. Applying the employment growth rate obtained in the simulation to the employment figure (19,856,800) in the last quarter of 2008, one can conclude that the policy created 262.110 additional jobs.[6]

The key difference between the neoclassical and Keynesian closure results lies in the contraction of private investment resulting in the first case as a result of the increase in the public deficit. Whether public investment crowds out or not private investment has been debated at least since Keynes proposed to increase public expenditures to compensate a lack of aggregate demand. In the case at hand, it is hard to believe that the funding of the two public investment projects crowded out private investment projects in 2009: private investment was falling and credit markets were close to private investors. Another issue is whether to spend 15.000 million euro to create transitory jobs was a clever decision when the government had to raise taxes to curtail the deficit.

Effects of permanent tax increases

As indicated, the Spanish government increased the tax rates on tobacco and alcohol and energy products in June 2009. It also eliminated an important income tax rebate and raised VAT rates in the 2010 budget. Since the public deficit hit 11.1 % of GDP in 2009 and the Government is committed to bringing it down to 3 % by 2013, it is reasonable to assume that these changes are permanent.

The results of the simulations appear in columns S3-S6 in Tables 2-5 for the neoclassical closure and Tables 7-11 for the Keynesian closure. Column S3 simulates the increase in taxes on products (tobacco and energy), S4 the increase in VAT rates and S5 the increase in the income tax rate on households. The results in column S6 show the joint effects of all three tax policies.

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[6] According to the Government, the projects created many more jobs. However, most of those jobs lasted between 3 and 6 months.

	Table 2. Variation in domestic production prices (In percentage)						
	Sector	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**
II1	Agriculture, fishing and aquaculture	-0.08	-0.13	-0.01	-0.48	-0.43	-0.92
II2	Extraction of other mining and quarrying	-0.06	-0.10	0.18	-0.37	-0.33	-0.52
II3	Extraction of energetic products, coke and refined petroleum	-0.06	-0.10	4.78	-0.39	-0.34	4.03
II4	Electricity, gas and water	-0.07	-0.12	0.82	-0.44	-0.39	-0.02
II5	Food, beverages and tobacco	-0.06	-0.10	0.98	-0.38	-0.34	0.25
II6	Textile and dressing	-0.05	-0.09	-0.01	-0.33	-0.29	-0.64
II7	Leather products	-0.05	-0.09	0.04	-0.34	-0.30	-0.59
II8	Wood	-0.05	-0.09	0.06	-0.34	-0.30	-0.58
II9	Paper, publishing and printing	-0.06	-0.09	-0.01	-0.35	-0.31	-0.67
II10	Chemical industry, rubber and plastic products	-0.06	-0.09	0.23	-0.35	-0.31	-0.43
II11	Non-metallic mineral products	-0.06	-0.09	0.06	-0.35	-0.31	-0.60
II12	Metallurgy and metal products	-0.05	-0.09	0.06	-0.34	-0.30	-0.57
II13	Mechanical machinery and equipment	-0.05	-0.08	0.01	-0.32	-0.28	-0.60
II14	Manufacture of electrical machinery and precision instruments	-0.05	-0.09	0.03	-0.33	-0.29	-0.59
II15	Manufacture of vehicles and other transport material	-0.05	-0.09	0.06	-0.33	-0.29	-0.56
II16	Other manufacturing industries	-0.05	-0.08	0.00	-0.32	-0.29	-0.61
II17	Construction	-0.05	-0.08	0.00	-0.30	-0.26	-0.56
II18	Wholesale trade and retail trade	-0.06	-0.09	-0.08	-0.36	-0.32	-0.76
II19	Accommodation and catering	-0.06	-0.09	0.10	-0.36	-0.32	-0.57
II20	Transport and communications	-0.06	-0.10	0.16	-0.40	-0.35	-0.59
II21	Financial intermediation	-0.05	-0.08	-0.11	-0.32	-0.28	-0.71
II22	Real estate activities	-0.07	-0.11	-0.15	-0.42	-0.37	-0.93
II23	Market Education	-0.04	-0.07	-0.04	-0.26	-0.23	-0.53
II24	Market Healthcare and Social services	-0.05	-0.08	-0.05	-0.32	-0.28	-0.65
II25	Other activities and associative market services	-0.06	-0.10	-0.09	-0.37	-0.33	-0.79
II26	Households which employ household personnel	0.00	0.00	0.00	0.00	0.00	0.00
II27	Public Administration	-0.03	-0.05	-0.01	-0.20	-0.17	-0.38
II28	Non market Education	-0.01	-0.02	0.02	-0.07	-0.06	-0.11
II29	Non market healthcare and Social services	-0.02	-0.04	0.07	-0.14	-0.12	-0.20
II30	Other activities and associative non market services	-0.04	-0.07	0.04	-0.28	-0.24	-0.48
S1: 33.74 % increase in public investment in Other constructions.							
S2: 54.82 % increase in public investment in Other constructions.							
S3: Taxes on products: Extraction of energetic products, etc.: 10.5 %; Food, beverages and tobacco: 13.08 %.							
S4: VAT: 12.50 %.							
S5: Income tax on households: 7.2 %.							
S6: S3+S4+S5.							

Table 3. Variation in consumer prices

(In percentage)

	Sector	S1	S2	S3	S4	S5	S6
II1	Agriculture, fishing and aquaculture	-0.08	-0.12	0.02	0.06	-0.41	-0.33
II2	Extraction of other mining and quarrying	-0.06	-0.10	0.21	0.84	-0.33	0.71
II3	Extraction of energetic products, coke and refined petroleum	-0.06	-0.10	3.03	1.40	-0.33	4.13
II4	Electricity, gas and water	-0.07	-0.12	0.82	1.53	-0.39	1.96
II5	Food, beverages and tobacco	-0.06	-0.10	0.90	0.56	-0.34	1.12
II6	Textile and dressing	-0.05	-0.09	0.05	1.26	-0.30	1.00
II7	Leather products	-0.05	-0.09	0.08	1.15	-0.30	0.92
II8	Wood	-0.06	-0.09	0.09	1.18	-0.30	0.96
II9	Paper, publishing and printing	-0.06	-0.09	0.02	0.72	-0.31	0.43
II10	Chemical industry, rubber and plastic products	-0.06	-0.09	0.24	0.75	-0.31	0.67
II11	Non-metallic mineral products	-0.06	-0.09	0.07	1.50	-0.31	1.26
II12	Metallurgy and metal products	-0.05	-0.09	0.10	1.85	-0.30	1.65
II13	Mechanical machinery and equipment	-0.05	-0.09	0.10	1.61	-0.30	1.41
II14	Manufacture of electrical machinery and precision instruments	-0.06	-0.09	0.13	1.79	-0.30	1.61
II15	Manufacture of vehicles and other transport material	-0.05	-0.09	0.13	1.33	-0.30	1.15
II16	Other manufacturing industries	-0.05	-0.09	0.04	1.36	-0.29	1.10
II17	Construction	-0.05	-0.08	0.00	1.38	-0.26	1.11
II18	Wholesale trade and retail trade	-0.06	-0.09	-0.07	1.38	-0.32	0.98
II19	Accommodation and catering	-0.06	-0.09	0.10	0.44	-0.32	0.22
II20	Transport and communications	-0.06	-0.10	0.17	1.12	-0.35	0.93
II21	Financial intermediation	-0.05	-0.08	-0.09	-0.28	-0.28	-0.66
II22	Real estate activities	-0.07	-0.11	-0.12	0.28	-0.36	-0.20
II23	Market Education	-0.04	-0.07	-0.04	-0.25	-0.23	-0.52
II24	Market Healthcare and Social services	-0.05	-0.08	-0.05	-0.31	-0.28	-0.64
II25	Other activities and associative market services	-0.06	-0.10	-0.07	0.40	-0.33	0.00
II26	Households which employ household personnel	0.00	0.00	0.00	0.00	0.00	0.00
II27	Public Administration	-0.03	-0.05	-0.01	-0.20	-0.17	-0.38
II28	Non market Education	-0.01	-0.02	0.02	-0.07	-0.06	-0.11
II29	Non market healthcare and Social services	-0.02	-0.04	0.07	-0.14	-0.12	-0.20
II30	Other activities and associative non market services	-0.04	-0.07	0.04	-0.26	-0.24	-0.47
	Consumption Prices Index (CPI)	-0.05	-0.08	0.21	0.45	-0.28	0.39

S1: 33.74 % increase in public investment in Other constructions.

S2: 54.82 % increase in public investment in Other constructions.

S3: Taxes on products: Extraction of energetic products, etc.: 10.5 %; Food, beverages and tobacco: 13.08 %.

S4: VAT: 12.50 %.

S5: Income tax on households: 7.2 %.

S6: S3+S4+S5.

Table 4. Variation in domestic production

(In percentage)

	Sector	S1	S2	S3	S4	S5	S6
II1	Agriculture, fishing and aquaculture	0.01	0.01	-0.39	-0.38	-0.49	-1.25
II2	Extraction of other mining and quarrying	0.93	1.51	0.13	-0.18	-0.04	-0.10
II3	Extraction of energetic products, coke and refined petroleum	0.06	0.10	-7.05	-0.70	-0.37	-7.94
II4	Electricity, gas and water	0.01	0.02	-0.48	-0.74	-0.38	-1.59
II5	Food, beverages and tobacco	0.03	0.05	-0.95	-0.63	-0.65	-2.20
II6	Textile and dressing	-0.05	-0.07	0.11	-1.03	-0.60	-1.51
II7	Leather products	0.01	0.02	0.07	-0.86	-0.53	-1.31
II8	Wood	0.52	0.85	0.01	-0.40	-0.21	-0.61
II9	Paper, publishing and printing	-0.19	-0.31	0.00	-0.42	-0.36	-0.77
II10	Chemical industry, rubber and plastic products	0.00	0.00	-0.06	-0.32	-0.23	-0.60
II11	Non-metallic mineral products	1.72	2.80	0.03	-0.19	-0.07	-0.24
II12	Metallurgy and metal products	-0.26	-0.43	0.24	-0.20	0.01	0.03
II13	Mechanical machinery and equipment	-1.33	-2.16	0.34	-0.10	0.18	0.40
II14	Manufacture of electrical machinery and precision instruments	-1.22	-1.99	0.40	-0.13	0.17	0.42
II15	Manufacture of vehicles and other transport material	-1.01	-1.64	0.43	-0.33	-0.05	0.05
II16	Other manufacturing industries	-0.79	-1.28	0.09	-0.67	-0.25	-0.83
II17	Construction	2.73	4.43	0.03	-0.13	-0.01	-0.12
II18	Wholesale trade and retail trade	-0.17	-0.28	-0.35	-0.53	-0.34	-1.21
II19	Accommodation and catering	0.03	0.04	-0.21	-0.60	-0.70	-1.50
II20	Transport and communications	0.05	0.08	-0.19	-0.29	-0.19	-0.67
II21	Financial intermediation	-0.02	-0.04	-0.07	-0.16	-0.49	-0.72
II22	Real estate activities	-0.71	-1.16	0.01	-0.19	-0.15	-0.34
II23	Market Education	-0.01	-0.01	-0.10	-0.07	-0.56	-0.73
II24	Market Healthcare and Social services	-0.01	-0.01	-0.09	-0.03	-0.58	-0.70
II25	Other activities and associative market services	-0.20	-0.33	-0.02	-0.44	-0.52	-0.98
II26	Households which employ household personnel	-0.02	-0.04	-0.15	-0.28	-1.15	-1.57
II27	Public Administration	0.00	0.00	0.00	0.00	0.00	0.00
II28	Non market Education	0.00	0.00	-0.01	-0.01	-0.06	-0.08
II29	Non market healthcare and Social services	0.00	0.00	0.00	0.00	-0.01	-0.01
II30	Other activities and associative non market services	0.00	0.00	-0.01	0.00	-0.03	-0.04
S1: 33.74 % increase in public investment in Other constructions.							
S2: 54.82 % increase in public investment in Other constructions.							
S3: Taxes on products: Extraction of energetic products, etc.: 10.5 %; Food, beverages and tobacco: 13.08 %.							
S4: VAT: 12.50 %.							
S5: Income tax on households: 7.2 %.							
S6: S3+S4+S5.							

Table 5. Public revenues and expenditures

(In percentage of GDP)

	Base year	S1	S2	S3	S4	S5	S6
Total revenues	**52.92**	**52.96**	**52.99**	**53.14**	**53.44**	**53.48**	**54.21**
Property income	1.17	1.17	1.17	1.17	1.17	1.17	1.18
Total income tax	10.15	10.14	10.13	10.15	10.13	10.67	10.64
Income tax (households)	6.95	6.95	6.94	6.95	6.93	7.47	7.45
Income tax (corporate)	3.20	3.20	3.19	3.20	3.19	3.21	3.20
SSCE	9.51	9.51	9.51	9.50	9.46	9.52	9.45
SSCH	1.92	1.92	1.92	1.92	1.91	1.93	1.91
SSCS	1.11	1.11	1.11	1.11	1.10	1.11	1.10
Current transfers	16.08	16.06	16.05	16.14	16.14	16.13	16.24
Taxes on production	1.25	1.24	1.24	1.25	1.24	1.25	1.24
Taxes on imports	0.02	0.02	0.02	0.02	0.02	0.02	0.02
VAT	5.68	5.77	5.83	5.68	6.30	5.65	6.27
Taxes on products	4.41	4.40	4.40	4.60	4.37	4.41	4.55
Capital	1.62	1.61	1.61	1.61	1.61	1.62	1.60
Total current expenditure	**49.84**	**49.77**	**49.73**	**49.99**	**49.97**	**50.07**	**50.35**
Public consumption	18.05	18.03	18.02	18.08	18.02	18.13	18.12
Property income	3.27	3.26	3.26	3.28	3.28	3.28	3.30
Unemployment benefits	1.97	1.96	1.96	2.00	2.04	2.04	2.14
Other social benefits	9.68	9.66	9.65	9.71	9.71	9.70	9.77
Current transfers	15.75	15.73	15.71	15.80	15.80	15.79	15.90
Subsidies on production	0.63	0.63	0.63	0.63	0.63	0.63	0.62
Subsidies on products	0.50	0.50	0.50	0.50	0.50	0.50	0.49
Public investment	**3.22**	**4.00**	**4.48**	**3.22**	**3.26**	**3.23**	**3.27**
Non residential public investment	3.10	3.87	4.36	3.10	3.13	3.10	3.15
Agriculture products	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machinery and mechanical products	0.48	0.48	0.48	0.48	0.49	0.48	0.49
Transport equipment	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Other constructions	2.32	3.10	3.58	2.32	2.35	2.33	2.36
Other products	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Residential public investment	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Public surplus	**-0.14**	**-0.81**	**-1.22**	**-0.07**	**0.21**	**0.17**	**0.58**

S1: 33.74 % increase in public investment in Other constructions.

S2: 54.82 % increase in public investment in Other constructions.

S3: Taxes on products: Extraction of energetic products, etc.: 10.5 %; Food, beverages and tobacco: 13.08 %.

S4: VAT: 12.50 %.

S5: Income tax on households: 7.2 %.

S6: S3+S4+S5.

Table 6. Aggregate variables

Main aggregates and welfare index

	Base year	S1	S2	S3	S4	S5	S6
Unemployment rate (%)	13.87	13.82	13.78	14.09	14.34	14.30	14.98
Employment growth rate	-	0.06	0.10	-0.25	-0.54	-0.50	-1.29
Variation of households' net disposable income	411,757.00	-0.02	-0.04	-0.15	-0.28	-1.16	-1.58
Variation Consumer price index	-	-0.05	-0.08	0.21	0.45	-0.28	0.39
Households' welfare	-	0.04	0.06	-0.41	-0.80	-0.84	-2.04
Nominal GDP	630,263.00	0.08	0.14	-0.10	0.09	-0.58	-0.60
Real GDP	630,263.00	0.14	0.22	-0.27	-0.24	-0.30	-0.81

Demand side aggregate variables

(In percentage of GDP)

	Base year	S1	S2	S3	S4	S5	S6
Private consumption	**57.91**	**57.85**	**57.81**	**57.89**	**57.70**	**57.58**	**57.35**
Total private investment	**22.61**	**21.76**	**21.24**	**22.68**	**22.65**	**22.82**	**22.92**
Non-residential private investment	16.62	15.78	15.26	16.69	16.68	16.87	16.99
Agriculture products	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Machinery and mechanical products	5.20	4.94	4.77	5.22	5.22	5.28	5.32
Transport equipment	2.38	2.26	2.19	2.39	2.39	2.42	2.44
Other constructions	4.87	4.63	4.47	4.90	4.89	4.95	4.98
Other products	4.08	3.88	3.75	4.10	4.10	4.14	4.17
Residential private investment	5.99	5.99	5.98	5.99	5.97	5.96	5.93
Public consumption	**18.05**	**18.03**	**18.02**	**18.08**	**18.02**	**18.13**	**18.12**
Public investment	**3.22**	**4.00**	**4.48**	**3.22**	**3.26**	**3.23**	**3.27**
EU current balance	**1.06**	**0.95**	**0.89**	**1.03**	**1.02**	**1.05**	**0.98**
ROW current balance	**2.96**	**2.92**	**2.89**	**3.07**	**2.88**	**2.94**	**2.98**

S1: 33.74 % increase in public investment in Other constructions.
S2: 54.82 % increase in public investment in Other constructions.
S3: Taxes on products: Extraction of energetic products, etc.: 10.5 %; Food, beverages and tobacco: 13.08 %.
S4: VAT: 12.50 %.
S5: Income tax on households: 7.2 %.
S6: S3+S4+S5.

Increases on taxes on gasoline and tobacco

The increase of tax rates on tobacco and oil has a noticeable impact on domestic prices of a few production commodities. Under the neoclassical closure, domestic prices of sectors directly affected by the tax rates hikes go up. The price of sector II3 that includes refined petroleum increases 4.78 % and Food, beverages and tobacco near 0.98 %. Prices of Electricity, gas and water, Chemical industry, Extraction of other mining and quarrying, Transportation and Accommodation and catering also go up. There are, however, other sectors whose prices fall. The explanation is that the price of capital services falls and prices only increase in the sectors more affected by the increase in tax rates. It is interesting to notice that price changes are very similar to those obtained using the Keynesian closure (see, Table 7). Changes in domestic prices are passed through and the consumer price index increases 0.21 % in the neoclassical case and 0.17 % in the Keynesian case.

Under neoclassical closure, domestic production falls in those sectors most affected by the tax hike but goes up in investment oriented sectors since the tax increase reduces the public deficit. Since the deficit does not crowds in private investment under the Keynesian closure, production falls a bit more in the sectors more affected by the tax change and increases less in investment oriented sectors.

The effects of the tax increases on public revenues are small. There are no significant differences between the results obtained with the neoclassical and Keynesian closures and in the following comments we refer to the neoclassical results. Taxes on products go up from 4.41 points of GDP to 4.60. Applying 0.19 percentage points to the GDP in 2009[7] one obtains an increase in revenue of 1,997,2 million, a figure lower than the government estimate, 2,317 million, calculated by applying the new types to the old quantities. However, the results indicate that quantities do not remain constant after the tax reform. It is worth noticing that public deficit falls less than the increase in taxes on products because the ratios of several current expenditures items over GDP go up.

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[7] 1,051.151 million euros.

Under the neoclassical closure, the increase in taxes on products raises a bit the unemployment rate (0.22 percentage points) and lowers employment (0.25 %) and GDP (0.27 %). Those changes are larger under the Keynesian closure since the reduction of the public deficit has no effect on the level of private investment. In sum, raising taxes on oil and tobacco has a noticeable effect on production and consumer prices of a few commodities and negligible effects on the rest. Production of sectors affected by the increase in tax rates fall while the other sectors register either negligible changes or even some advances in investment oriented sectors. The public deficit falls less than the increase in revenues from taxes on products and there is a negative although limited impact on macroeconomic variables.

Effects of an increase in VAT rates

The effect of a 12.5 % increase in all effective VAT rates reduces domestic and total prices (due to the fall of the price of capital services) but consumer prices increase in all but a few sectors (Market education and Health care and all public service sectors) not subject to the tax.**[8]** These results are pretty similar for both closures although the reductions (increases) in production (consumption) prices are lower (higher) under the neoclassical closure than the Keynesian closure. For quite a few products, the increase in consumption prices exceeds 1 %, although the overall impact measured by the CPI is 0.45 % under the neoclassical and 0.35 % under the Keynesian closure.

The increase in consumer prices has a negative impact on domestic production levels. Under the neoclassical closure, the effect depends on three factors: the increase in the consumer price, the change in households' income and the effect of the reduction in the public deficit on private investment. The latter effect explains why production cuts are smaller under the neoclassical closure since the reduction of the public deficit increases private investment.

The increase in VAT rates raises 0.62 percentage points the ratio of VAT revenues over GDP under both closures. VAT revenues go up 11% and total revenues 1.02%. Using the figure

[8]The increase in VAT rates has been analyzed by Fernández de Córdoba and Torres (2010) and Conesa et al. (2010) with dynamic macroeconomic models of closed economies. Fernández de Córdoba and Torres find that "in the long run, the main macroeconomic aggregates will diminish by 0.75 percent", VAT revenues increase by 9 % and total revenues by 1.9 %. Conesa et al. estimate that both consumption and investment fall around 1 percent in the long run.

of GDP in 2009, the implied increase in VAT revenues is 6,517.14 millions, a figure the 5.150 million expected by the Government.[9] The result is independent of the closure rule used. However, the reduction of the public deficit is slightly greater under the neoclassical (0.35 percentage points) than the Keynesian (0.28) closure. Notice that in both cases, the reduction of the public deficit is less than half the increase in VAT revenues due to general equilibrium effects. The fall in production and employment and the increase in consumer prices reduce the shares of other taxes (income, social security contributions and taxes on products other than VAT) on GDP and increases public expenditures (unemployment and other social benefits, current transfers and public investment in other constructions).

Under the neoclassical closure, the VAT reform raises the unemployment rate 0.47 percentage points and reduces employment and GDP 0.54 and 0.24 percent, respectively. These effects are larger in the Keynesian case since the reduction in the public deficit has no effect on private investment.

Effects of an increase in households' income tax rate

The increase in the personal income tax has also negative effects on production prices in a magnitude quite similar to those found in the VAT simulation. That is no surprise since the fall in the equilibrium price of capital services in both simulations (0.7 % in the VAT and 0.6 % in the income tax) are quite similar. In this case, however, the reductions in production prices are translated into consumer prices. The CPI falls 0.28 % under the neoclassical closure and 0.45 % under the Keynesian closure.

The reduction of disposable income reduces consumption and savings. However, the reduction in private savings is compensated by the reduction in the public deficit that favors investment oriented sector under the neoclassical closure. This explains that under the neoclassical closure production levels fall a bit less in consumption oriented and even increase in investment oriented sectors.

Personal income revenues over GDP increase 0.52 percentage points as a result of the elimination of the tax rebate. Applying the increase to the 2009 GDP, the increase in revenues is

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[9] The model results assume zero tax evasion although VAT evasion is widespread.

estimated in 5,465.98 millions, close to 5.700 millions expected by the Government assuming other things equal. But, tax changes do not leave other things equal. Notice also that the reduction in the public deficit (0.31 percentage points) is also well below the increase in the personal income tax share.

General equilibrium effects are responsible for other things not being equal. The increase in personal income tax raises 0.43 percentage points the unemployment rate and reduces 0.5 % employment and 0.3 % GDP. On the revenue side, there is a small fall in the share of VAT revenues and the share of public consumption, unemployment and other social transfers and current transfers go up on the expenditure side.

Effects of an increase in taxes on products, VAT rates and the personal income tax

The joint simulation of the three tax reforms just discussed produces mix effects on prices and quantities that can not be explained so easily. Consumer price effects, for instance, go in opposite directions when there is an increase in VAT rates or in the personal income tax rate. Therefore, it seems more appropriate to analyze the effects on revenues, the public deficit and the main macroeconomic indicators.

The increases in the shares of the personal income tax, VAT and taxes on products are similar and the results do not depend on the closure rule. Under the neoclassical (Keynesian) rule, the share of the three taxes increases 1.23 (1.25) percentage points. Applying this to the value of GDP in 2009, the increase in revenues is estimated in 12.929,16 (13.139,39) millions. However, the reduction in the public deficit is just 0.72 (0.54) percentage points.

The effects on the macroeconomic variables are also more favorable under the neoclassical closure due to the positive effect of the reduction in the public deficit on private investment. In this case, the unemployment rate increases 1.11 points and employment and real GDP fall. Under the Keynesian closure, the unemployment rate increases 1.60 points and employment and real GDP fall 1.86 and 1.11 per cent, respectively. In sum, tax rate hikes as those implemented by the Spanish government in 2009 and 2010 will increase revenues far more than they will reduce the public deficit due to general equilibrium effects. They will raise the unemployment rate and reduce employment and real GDP.

4. Conclusions

In this article, it has been simulated the impact of transitory increases in public investment launched by the Spanish Government in 2009 and 2010 to counteract the effects of the recession on activity and employment and three permanent tax increases (taxes on energy and tobacco, VAT and households' income tax) undertaken by the Government to cut down an all times public deficit record in 2009.

The public investment programs implemented throughout 2009 and 2010 have very different effects depending on the closure rule chosen. Under the neoclassical closure, the increase in public investment has negligible effects on the unemployment rate, the employment level and real GDP. The worsening of the public deficit undoes whatever good does the increase in public investment. Under the Keynesian closure, private investment is fixed and the increase in demand raises prices and production levels, especially in the construction related sectors, diminishes the unemployment rate and increases employment and real GDP.

Applying the employment growth rate obtained in the simulation to the employment figure in the last quarter of 2008, it can be concluded that the policy created 262,110 additional jobs.

In the text, the results of each simulation have commented. Regarding the joint simulation of changes on taxes, its effects on prices and quantities can not be explained so easily. Consumer price effects, for instance, go in opposite directions when there is an increase in VAT rates or in the personal income tax rate. As expected, the tax rate increases simulated have noticeable effects on the shares of the personal income tax, VAT and taxes on products, similar although a bit lower than in the individual simulations. Moreover, the results imply an increase in revenues pretty close to the figures estimated by the Government at the time the reforms were announced. Interestingly, revenue results are insensitive to the closure rule used.

Another interesting result is that the reduction of the public deficit is substantially smaller (even more so under the Keynesian closure) than the increase in revenues of those tax figures whose tax rates are increased. The reason is that the fall in prices and production increases unemployment and lowers employment and GDP. Proceeds from other tax figures fall

a little bit and government expenditures and transfers increase. In sum, tax rate hikes as those implemented by the Spanish government in 2009 and 2010 will increase revenues far more than they will reduce the public deficit due to general equilibrium effects. However, the fact that tax increases have negative effects on real variables does not imply they should be dismissed altogether when the size of the public deficit is too large.

Table 7. Variation in domestic production prices

(In percentage)

	Sector	S1	S2	S3	S4	S5	S6
II1	Agriculture, fishing and aquaculture	0.96	1.56	-0.08	-0.65	-0.68	-1.39
II2	Extraction of other mining and quarrying	0.73	1.19	0.13	-0.50	-0.52	-0.88
II3	Extraction of energetic products, coke and refined petroleum	0.76	1.24	4.73	-0.52	-0.54	3.63
II4	Electricity, gas and water	0.88	1.43	0.76	-0.59	-0.62	-0.45
II5	Food, beverages and tobacco	0.76	1.23	0.92	-0.51	-0.54	-0.12
II6	Textile and dressing	0.66	1.07	-0.06	-0.45	-0.47	-0.96
II7	Leather products	0.66	1.08	-0.01	-0.45	-0.47	-0.92
II8	Wood	0.67	1.09	0.01	-0.46	-0.48	-0.92
II9	Paper, publishing and printing	0.69	1.12	-0.07	-0.47	-0.49	-1.01
II10	Chemical industry, rubber and plastic products	0.69	1.12	0.18	-0.47	-0.49	-0.77
II11	Non-metallic mineral products	0.69	1.13	0.01	-0.47	-0.50	-0.94
II12	Metallurgy and metal products	0.66	1.08	0.01	-0.45	-0.47	-0.90
II13	Mechanical machinery and equipment	0.63	1.03	-0.04	-0.43	-0.45	-0.91
II14	Manufacture of electrical machinery and precision instruments	0.65	1.06	-0.02	-0.44	-0.46	-0.91
II15	Manufacture of vehicles and other transport material	0.65	1.06	0.01	-0.44	-0.46	-0.88
II16	Other manufacturing industries	0.64	1.04	-0.05	-0.43	-0.46	-0.92
II17	Construction	0.59	0.96	-0.04	-0.40	-0.42	-0.85
II18	Wholesale trade and retail trade	0.72	1.16	-0.13	-0.48	-0.51	-1.11
II19	Accommodation and catering	0.71	1.15	0.05	-0.48	-0.50	-0.92
II20	Transport and communications	0.79	1.28	0.10	-0.53	-0.56	-0.97
II21	Financial intermediation	0.63	1.02	-0.16	-0.43	-0.45	-1.02
II22	Real estate activities	0.82	1.34	-0.21	-0.56	-0.59	-1.33
II23	Market Education	0.51	0.82	-0.08	-0.34	-0.36	-0.78
II24	Market Healthcare and Social services	0.63	1.03	-0.09	-0.43	-0.45	-0.96
II25	Other activities and associative market services	0.74	1.20	-0.15	-0.50	-0.52	-1.15
II26	Households which employ household personnel	0.00	0.00	0.00	0.00	0.00	0.00
II27	Public Administration	0.39	0.63	-0.04	-0.26	-0.28	-0.57
II28	Non market Education	0.14	0.23	0.01	-0.10	-0.10	-0.19
II29	Non market healthcare and Social services	0.28	0.45	0.05	-0.19	-0.20	-0.33
II30	Other activities and associative non market services	0.54	0.89	0.00	-0.37	-0.39	-0.75
S1: 33.74 % increase in public investment in Other constructions.							
S2: 54.82 % increase in public investment in Other constructions.							
S3: Taxes on products: Extraction of energetic products, etc.: 10.5 %; Food, beverages and tobacco: 13.08 %.							
S4: VAT: 12.50 %.							
S5: Income tax on households: 7.2 %.							
S6: S3+S4+S5.							

Table 8. Variation in consumer prices

(In percentage)

	Sectors	S1	S2	S3	S4	S5	S6
II1	Agriculture, fishing and aquaculture	0.93	1.51	-0.04	-0.10	-0.66	-0.79
II2	Extraction of other mining and quarrying	0.73	1.18	0.15	0.71	-0.52	0.35
II3	Extraction of energetic products, coke and refined petroleum	0.75	1.21	2.98	1.27	-0.53	3.75
II4	Electricity, gas and water	0.88	1.43	0.75	1.38	-0.62	1.52
II5	Food, beverages and tobacco	0.75	1.22	0.84	0.43	-0.54	0.74
II6	Textile and dressing	0.67	1.09	0.00	1.14	-0.48	0.67
II7	Leather products	0.67	1.09	0.03	1.03	-0.48	0.58
II8	Wood	0.68	1.10	0.04	1.06	-0.48	0.62
II9	Paper, publishing and printing	0.69	1.13	-0.03	0.60	-0.49	0.08
II10	Chemical industry, rubber and plastic products	0.70	1.13	0.19	0.63	-0.50	0.32
II11	Non-metallic mineral products	0.70	1.13	0.02	1.38	-0.50	0.91
II12	Metallurgy and metal products	0.67	1.10	0.05	1.73	-0.48	1.31
II13	Mechanical machinery and equipment	0.67	1.08	0.05	1.49	-0.47	1.07
II14	Manufacture of electrical machinery and precision instruments	0.68	1.10	0.08	1.67	-0.48	1.27
II15	Manufacture of vehicles and other transport material	0.67	1.10	0.08	1.21	-0.48	0.81
II16	Other manufacturing industries	0.65	1.06	-0.01	1.25	-0.46	0.78
II17	Construction	0.59	0.96	-0.04	1.27	-0.42	0.81
II18	Wholesale trade and retail trade	0.72	1.16	-0.12	1.26	-0.51	0.63
II19	Accommodation and catering	0.71	1.15	0.05	0.31	-0.50	-0.13
II20	Transport and communications	0.78	1.27	0.11	0.98	-0.56	0.54
II21	Financial intermediation	0.63	1.03	-0.14	-0.39	-0.45	-0.97
II22	Real estate activities	0.82	1.33	-0.17	0.14	-0.58	-0.60
II23	Market Education	0.51	0.82	-0.08	-0.34	-0.36	-0.77
II24	Market Healthcare and Social services	0.63	1.03	-0.09	-0.42	-0.45	-0.95
II25	Other activities and associative market services	0.74	1.20	-0.12	0.27	-0.52	-0.37
II26	Households which employ household personnel	0.00	0.00	0.00	0.00	0.00	0.00
II27	Public Administration	0.39	0.63	-0.04	-0.26	-0.28	-0.57
II28	Non market Education	0.14	0.23	0.01	-0.10	-0.10	-0.19
II29	Non market healthcare and Social services	0.28	0.45	0.05	-0.19	-0.20	-0.33
II30	Other activities and associative non market services	0.54	0.89	0.00	-0.36	-0.39	-0.73
	Consumption Prices Index (CPI)	0.63	1.03	0.17	0.35	-0.45	0.07

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S4: VAT: 12.50 %.

S5: Income tax on households: 7.2 %.

S6: S3+S4+S5.

Table 9. Variation in domestic production

(In percentage)

	Sectors	S1	S2	S3	S4	S5	S6
II1	Agriculture, fishing and aquaculture	0.08	0.13	-0.39	-0.39	-0.51	-1.28
II2	Extraction of other mining and quarrying	2.15	3.49	0.05	-0.37	-0.35	-0.66
II3	Extraction of energetic products, coke and refined petroleum	0.35	0.56	-7.07	-0.74	-0.44	-8.06
II4	Electricity, gas and water	0.51	0.82	-0.51	-0.82	-0.51	-1.81
II5	Food, beverages and tobacco	0.15	0.24	-0.96	-0.64	-0.68	-2.26
II6	Textile and dressing	0.29	0.47	0.09	-1.08	-0.68	-1.66
II7	Leather products	0.22	0.36	0.06	-0.90	-0.59	-1.41
II8	Wood	1.56	2.53	-0.06	-0.57	-0.47	-1.08
II9	Paper, publishing and printing	0.35	0.58	-0.03	-0.51	-0.49	-1.02
II10	Chemical industry, rubber and plastic products	0.50	0.81	-0.09	-0.39	-0.36	-0.83
II11	Non-metallic mineral products	3.01	4.89	-0.06	-0.39	-0.39	-0.83
II12	Metallurgy and metal products	1.11	1.81	0.14	-0.42	-0.33	-0.60
II13	Mechanical machinery and equipment	0.58	0.94	0.21	-0.40	-0.29	-0.47
II14	Manufacture of electrical machinery and precision instruments	0.68	1.10	0.27	-0.43	-0.30	-0.45
II15	Manufacture of vehicles and other transport material	0.26	0.43	0.34	-0.53	-0.36	-0.54
II16	Other manufacturing industries	0.38	0.61	0.01	-0.85	-0.53	-1.36
II17	Construction	4.51	7.33	-0.09	-0.41	-0.45	-0.94
II18	Wholesale trade and retail trade	0.50	0.81	-0.39	-0.64	-0.50	-1.52
II19	Accommodation and catering	0.24	0.38	-0.23	-0.63	-0.75	-1.59
II20	Transport and communications	0.51	0.83	-0.23	-0.36	-0.30	-0.88
II21	Financial intermediation	0.49	0.80	-0.11	-0.24	-0.62	-0.96
II22	Real estate activities	0.39	0.63	-0.06	-0.36	-0.42	-0.84
II23	Market Education	0.33	0.53	-0.13	-0.12	-0.64	-0.88
II24	Market Healthcare and Social services	0.24	0.39	-0.11	-0.07	-0.64	-0.81
II25	Other activities and associative market services	0.20	0.33	-0.05	-0.51	-0.62	-1.17
II26	Households which employ household personnel	0.94	1.52	-0.21	-0.43	-1.38	-2.00
II27	Public Administration	0.00	0.00	0.00	0.00	0.00	0.00
II28	Non market Education	0.04	0.07	-0.01	-0.02	-0.07	-0.09
II29	Non market healthcare and Social services	0.00	0.01	0.00	0.00	-0.01	-0.01
II30	Other activities and associative non market services	0.01	0.02	-0.01	0.00	-0.03	-0.04

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Table 10. Public revenues and expenditures
(In percentage of GDP)

	Base year	S1	S2	S3	S4	S5	S6
Total revenues	**52.92**	**52.79**	**52.70**	**53.15**	**53.46**	**53.52**	**54.29**
Property income	1.17	1.16	1.15	1.17	1.17	1.17	1.18
Total income tax	10.15	10.11	10.08	10.16	10.13	10.68	10.66
Income tax (households)	6.95	6.92	6.89	6.95	6.94	7.48	7.46
Income tax (corporate)	3.20	3.19	3.18	3.20	3.19	3.21	3.20
SCE	9.51	9.51	9.50	9.50	9.46	9.53	9.46
SCH	1.92	1.92	1.92	1.92	1.91	1.93	1.91
SCS	1.11	1.11	1.11	1.11	1.10	1.11	1.10
Current transfers	16.08	15.96	15.88	16.14	16.16	16.16	16.29
Taxes on production	1.25	1.25	1.25	1.24	1.24	1.24	1.23
Taxes on imports	0.02	0.02	0.02	0.02	0.02	0.02	0.02
VAT	5.68	5.75	5.79	5.68	6.30	5.66	6.28
Taxes on products	4.41	4.40	4.40	4.60	4.37	4.41	4.55
Capital	1.62	1.62	1.62	1.61	1.60	1.62	1.60
Total current expenditures	**49.84**	**49.23**	**48.86**	**50.02**	**50.06**	**50.21**	**50.60**
Public consumption	18.05	17.86	17.75	18.09	18.05	18.17	18.20
Property income	3.27	3.24	3.22	3.28	3.28	3.28	3.31
Unemployment benefits	1.97	1.78	1.67	2.02	2.06	2.09	2.23
Other social benefits	9.68	9.60	9.55	9.71	9.72	9.72	9.80
Current transfers	15.75	15.62	15.54	15.80	15.82	15.82	15.95
Subsidies on production	0.63	0.63	0.63	0.63	0.63	0.63	0.62
Subsidies on products	0.50	0.50	0.50	0.50	0.50	0.50	0.49
Public investment	**3.22**	**3.97**	**4.43**	**3.23**	**3.26**	**3.24**	**3.28**
Non residential public investment	3.10	3.85	4.31	3.10	3.14	3.11	3.16
Agriculture products	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Machinery and mechanical products	0.48	0.48	0.47	0.48	0.49	0.48	0.49
Transport equipment	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Other constructions	2.32	3.07	3.54	2.32	2.35	2.33	2.37
Other products	0.23	0.22	0.22	0.23	0.23	0.23	0.23
Residential public investment	0.13	0.12	0.12	0.13	0.13	0.13	0.13
Public surplus	**-0.14**	**-0.42**	**-0.59**	**-0.10**	**0.14**	**0.08**	**0.40**

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Table 11. Aggregate variables

Main aggregates and welfare index

	Base year	S1	S2	S3	S4	S5	S6
Unemployment rate (%)	13.87	12.73	12.02	14.16	14.51	14.57	15.47
Employment growth rate	-	1.32	2.15	-0.34	-0.74	-0.81	-1.86
Variation of households' net disposable income	411,757.00	0.94	1.53	-0.21	-0.43	-1.39	-2.01
Variation of consumer price index	-	0.63	1.03	0.17	0.35	-0.45	0.07
Households' welfare	-	0.23	0.37	-0.42	-0.83	-0.89	-2.12
Nominal GDP	630,263.00	1.44	2.35	-0.19	-0.13	-0.91	-1.21
Real GDP	630,263.00	0.80	1.30	-0.32	-0.35	-0.46	-1.11

Demand side aggregate variables

(In percentage of GDP)

	Base year	S1	S2	S3	S4	S5	S6
Private consumption	**57.91**	**57.63**	**57.45**	**57.90**	**57.74**	**57.63**	**57.45**
Total private investment	**22.61**	**22.46**	**22.36**	**22.64**	**22.54**	**22.65**	**22.60**
Non residential private investment	16.62	16.49	16.42	16.65	16.56	16.69	16.66
Agriculture products	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Machinery and mechanical products	5.20	5.16	5.14	5.21	5.18	5.22	5.21
Transport equipment	2.38	2.36	2.35	2.39	2.37	2.39	2.39
Other constructions	4.87	4.84	4.82	4.88	4.86	4.89	4.89
Other products	4.08	4.05	4.03	4.09	4.07	4.10	4.09
Residential private investment	5.99	5.96	5.94	5.99	5.97	5.96	5.94
Public consumption	**18.05**	**17.86**	**17.75**	**18.09**	**18.05**	**18.17**	**18.20**
Public investment	**3.22**	**3.97**	**4.43**	**3.23**	**3.26**	**3.24**	**3.28**
EU external current balance	**1.06**	**1.13**	**1.18**	**1.02**	**0.99**	**1.00**	**0.90**
ROW external current balance	**2.96**	**2.99**	**3.02**	**3.07**	**2.87**	**2.92**	**2.94**

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S6: S3+S4+S5.

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