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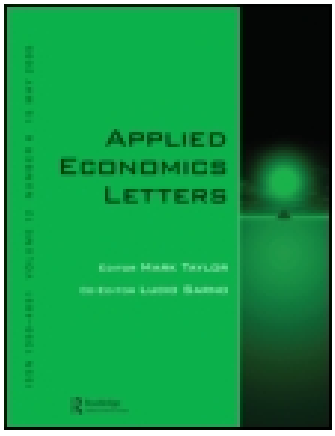

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Future of European funds in a regional economy: Andalusia 2014–2020

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Since the adhesion of Spain to the European Union, Andalusia has been catalogued as an Objective 1 region because its GDP was inferior to 75% of the community average. In this way, funds have contributed to the generation of regional GDP and reduced unemployment during these years, causing that levels exceed 75% with respect to average GDP per capita in the European Union. So, Andalusia will not be considered as one of the Objective 1 priority areas for European Regional Policy. With the changes in the region and the threat of an expected withdrawal of funds, this article proposes an analysis to explain the meaning of this withdrawal of European Funds in Andalusia in the period 2014–2020. With this aim, we develop a Dynamic Applied General Equilibrium Model that will assess the effects of the loss of this funding on the main regional economic indicators and under different simulation scenarios. The model will analyse the effect of economic policy actions on the economy, satisfying the requirements of welfare and technological feasibility when given some restrictions on available resources.

Keywords: social accounting matrix; dynamic applied general equilibrium models; regional economy; European regional policy; impact analysis

JEL Classification: E17; C68

I. Introduction

The main goals of the European Union are to boost both economic and social progress and eliminate the differences existing between the standards of living of State members and regions. Since the adhesion of Spain to the European Union, Andalusia has been catalogued as an Objective 1 region, because its GDP is inferior to 75% of the community average.

Funds have contributed to the generation of regional GDP and reduced unemployment during these years. This great performance has caused Andalusia to exit from this last group and to record levels above 75% with respect to average GDP per capita in the EU-27, according to the latest data from Eurostat.

With the changes in the region and the threat of an expected withdrawal of funds, this article proposes

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an analysis to explain the meaning of this withdrawal of European Funds in Andalusia in the period 2014–2020 and pursuing this goal, a Dynamic Applied General Equilibrium Model is developed to analyse the effects, expanding studies developed by Cardenete *et al.* (2013) and Lima and Cardenete (2007).

The structure of this article is as follows: the second section contains the methodology used and the main features of the model. The third presents the different simulation scenarios raised, the sharing rule for the funds established by the analysis in question and the results. Finally, the concluding remarks are found in the fourth section.

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II. The Model

This section presents the dynamic CGE (computable general equilibrium) model used for the analysis. Following Cardenete and Sancho (2003), the model is formed by 25 productive sectors obtained from an aggregation of the input–output tables for Andalusia, where the domestic output of each sector (Xdj) uses the output of the other sectors as factors.

$$\text{Xdj} = \min\ (\text{X1j/a1j}, \text{X2j/a2j}, \ldots, \text{X25j/a25j}, \text{VAj/vj})\ j = 1, 2, \ldots, 25 \tag{1}$$

In this equation, Xij represents the amount of good i required for the domestic production of good j; aij are the equivalents to technical coefficients in the framework of input–output analysis; VAj stands for the value added of sector j and vj is the minimum amount of value added required to produce one unit of good j.

On the following nesting level, the regional value added of each sector j (VAj) is the result of combining the primary factors (labour, L and capital, K) by using a Leontief fixed-coefficients technology.

$$\text{VAj} = \min\ (\text{Kj/kj}, \text{Lj/lj})\ j = 1, 2, \ldots, 25 \tag{2}$$

The total output (Qj) is the result of combining the domestic output (Xdj) with the equivalent imports (Xrowj) – which are considered imperfect substitutes of domestic production – by applying the already mentioned Leontief technology. In particular, the production of sector j is given by

$$\text{Qj} = \min\ (\text{Xdj}, \text{Xrowj})\ j = 1, 2, \ldots, 25 \tag{3}$$

The government taxes the transactions between the other economic agents to obtain public revenue (R). It has an influence on the consumers' disposable income (DPI), makes transfers to the private sector (TPS) and demands goods and services (GDj). The difference between revenues and payments represents the deficit or surplus of the administration.

In relation to investment and savings, the latter are considered an exogenous component, thus allowing investment to be defined endogenously. In the equilibrium situation, it is necessary to guarantee the macroeconomic equality between savings at the aggregated level and the total investment of the economy.

$$\text{DIi pinv} = \text{DAHO pinv} + \text{DP} + \text{DPRM} \tag{4}$$

In the dynamic version following Ramsey (1928), the representative consumer maximizes the present value of the usefulness of his/her lifetime as follows:

$$\text{Max} \sum_{t=0}^{7} (1/1+p)^t\, U(c_t) \tag{5}$$

where t is the time period, p is intertemporal discount factor, U is the utility function and c_t is consumption in period t. The consumer faces a number of restrictions. First, the total output of the economy is divided into consumption and investment, I_t. Second, capital depreciates at the rate δ. Third, the investment cannot be negative. These constraints can be written as follows:

$$c_t \leq F(K_t, I_t) - I_t \tag{6}$$

$$K_{t+1} = K_t(1-\delta) + I_t \tag{7}$$

$$I_t \geq 0 \tag{8}$$

where K is capital and F represents the production function.

Finally, it is important to remark that the CGE model here presented follows the traditional Walrasian equilibrium doctrine, now expanded to include the public and the foreign sectors.

III. Results

The future of European Funds in Spain is now under debate. To measure the impact of the withdrawal of European Structural funds on the Andalusian economy in 2014–2020, three scenarios have been designed, based on some initial positions of the European Parliament for the next programming period. These scenarios are the following:

(i) Conservative scenario: loss of the total amount of resources of the last period 2007–2013.
(ii) Progressive scenario: structural funding remains at the same level as in the period 2007–2013.
(iii) Effective/realistic scenario: loss of a third of the resources available at the 2007–2013.

Following Monrobel *et al.* (2012) and taking into account the synthesis of the interventions of Community Funds in Andalusia 2007–2013 and its endowment budget, funds will be divided up among the branches of the model taking into account the specific objectives of each of the axes and their priority issues, weighing the amounts according to the weight of each sector's productive output, a total amount of 14 585 508 thousands of euros. In addition, a corrector index is built and applied to the public sector demand variable in the CGE model. This index will be applied to the variable of public sector demand in the model. It reflects the fall in demand in the appropriate sector, which is derived from the total withdrawal of funds or the withdrawal of one-third of the funds, depending on the alternative scenarios.

Below, we present two comparisons of the conservative scenario, one of them with the continuity scenario and another with the effective/realistic scenario for GDP expenditure and its components.[1]

Table 1 shows the growth rates obtained by comparing the *conservative* scenario with the *continuing* scenario and *effective/realistic* scenario. This analysis was performed on each of the components of GDP expenditure. The annual average change in GDP is observed to be around 1.2% comparing the *conservative* scenario with the *continuing* scenario and it is around 0.8% comparing the *conservative* scenario with *effective/realistic* scenario, obtaining the variable public expenditure the highest rate of variation because it is this variable which receives the impact of the funds in the model constructed. In contrast, the investment variable is the one with the lowest rate of variation; this can be attributed to a crowding-out effect that justifies an investment downgrade by increasing public expenditure. The rate of change of the macro grows or falls from one year to the next, depending on the funds injected into the regional economy each year under study.

IV. Concluding Remarks

To complete this analysis, we conclude by emphasizing that the results obtained with the dynamic CGE model in this study on the regional economy in the 2014–2020 reveal the important contribution of European Funds to the main macroeconomic indicators, which will give rise to greater regional development in the seven years studied.

In the results presented, we have observed how the GDP would increase after receiving European Funds in Andalusia to varying degrees depending on the scenario analysed. The results show, in the case of a *continuity* scenario (which means continuing to receive the total amount of funds as in the current 7-year period, as mentioned previously), the GDP would increase an average of 1.2%, and the public expenditure variable would include a higher rate of change while investment would evidence less variation. In the case of a scenario involving more moderate funding (involving two-thirds of the amount of funds approved in the current 7-year period), the GDP would also increase, although to a lesser degree (in this case by 0.8%), thus obtaining different yearly growth rates due to growth and the funds injected into Andalusian economy during each of the years under study, as mentioned above.

All these results point to a remarkable boost in the economy in the region, thanks to Community aid. Therefore, we can conclude by saying that European funding, regardless of how it is administrated, will have a positive effect on the growth of the Andalusian regional economy in the next programming period.

[1] The results obtained in the simulations made for a number of macromagnitudes, which are magnitudes based on the scenarios previously mentioned and where an annual constant growth rate of 0.8% has been established according to economic forecasts afforded by The Economist (2012) – Economist Intelligence Unit.

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Table 1. Conservative scenario versus continuity and effective/realistic scenario. Variation rates (VR) 2014–2020 (thousands of euros)

Year	Macromagnitudes	Consumption	Investment	Public expenditure	Net Exports (XN)	GDP expenditure
2014	No funds	116 262 180	43 759 802	31 787 846	−40 403 129	151 406 699
	Total funds	117 542 794	42 848 995	33 224 646	−40 709 723	152 906 712
	VR (%)	1.101	−2.081	4.520	0.759	0.991
	33% reduction	117 112 207	43 154 559	32 742 208	−40 606 611	152 402 363
	VR (%)	0.731	−1.383	3.002	0.504	0.658
2015	No funds	117 192 278	44 109 880	32 042 149	−40 726 354	152 617 953
	Total funds	118 873 807	42 915 140	33 927 583	−41 128 976	154 587 554
	VR (%)	1.435	−2.709	5.884	0.989	1.291
	33% reduction	118 306 952	43 316 737	33 293 120	−40 993 208	153 923 601
	VR (%)	0.951	−1.798	3.904	0.655	0.856
2016	No funds	118 129 816	44 462 759	32 298 486	−41 052 165	153 838 896
	Total funds	119 823 956	43 259 052	34 198 067	−41 457 806	155 823 269
	VR (%)	1.434	−2.707	5.881	0.988	1.290
	33% reduction	119 252 853	43 663 659	33 558 848	−41 321 020	155 154 340
	VR (%)	0.951	−1.797	3.902	0.655	0.855
2017	No funds	119 074 854	44 818 461	32 556 874	−41 380 582	155 069 607
	Total funds	120 796 879	43 595 001	34 487 665	−41 792 903	157 086 642
	VR (%)	1.446	−2.730	5.931	0.996	1.301
	33% reduction	120 216 306	44 006 271	33 837 889	−41 653 846	156 406 620
	VR (%)	0.959	−1.812	3.935	0.660	0.862
2018	No funds	120 027 453	45 177 009	32 817 329	−41 711 627	156 310 164
	Total funds	121 690 298	43 995 367	34 681 986	−42 109 769	158 257 882
	VR (%)	1.385	−2.616	5.682	0.955	1.246
	33% reduction	121 129 945	44 392 441	34 054 717	−41 975 560	157 601 543
	VR (%)	0.919	−1.737	3.771	0.633	0.826
2019	No funds	120 987 673	45 538 425	33 079 867	−42 045 320	157 560 645
	Total funds	122 679 433	44 336 282	34 976 903	−42 450 387	159 542 231
	VR (%)	1.398	−2.640	5.735	0.963	1.258
	33% reduction	122 109 378	44 740 312	34 338 716	−42 313 868	158 874 538
	VR (%)	0.927	−1.753	3.805	0.639	0.834
2020	No funds	121 955 574	45 902 733	33 344 507	−42 381 683	158 821 131
	Total funds	123 675 985	44 680 267	35 273 632	−42 793 609	160 836 275
	VR (%)	1.411	−2.663	5.785	0.972	1.269
	33% reduction	123.096.137	45.091.125	34.624.574	−42.654.732	160.157.104
	VR (%)	0.935	−1.768	3.839	0.644	0.841

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