MODELLING THE EFFECTS OF TRADE POLICY SCENARIOS ON MULTIFUNCTIONALITY IN GREEK AGRICULTURE: A SOCIAL ACCOUNTING MATRIX APPROACH

By

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Abstract

In this paper two SAM models are constructed, one for Greece and one for the local rural economy of Archanes (Crete) for conducting an assessment on the potential impacts of trade agreements on several multifunctionality indicators in Greek agriculture. Five alternative scenarios are specified with regards to anticipated EU policy reactions under different outcomes of the Doha round negotiations. Results suggest the effects of policy reform upon multifunctionality indicators are rather mixed. Effects of status quo scenarios seem to be optimistic in terms of projected economy-wide output and employment impacts at both the national and local level. The 'fully-decoupled CAP reform' Scenario generates negative projections in terms of farm output and employment for Archanes, land-use abandonment projections are marginal at the national and rather moderate at the regional level, while environmental repercussions are negative at the national level. Finally, impacts of 'full-decoupling and elimination of export subsidies' and 'reduction of pillar 1 decoupled income support' Scenarios are rather worrying in terms of most categories of projections.

1. Introduction

During the last two decades, there have been major changes in the economic structure of European rural areas, mainly induced by agricultural policy reforms, international trade liberalization and globalization of the world economy and the strengthening role of rural

development policies. Within this context, the role of agriculture and farmers in the European economy and society is changing. Agricultural activity has suffered a setback in both economic and social terms and especially in terms of employment, while manufacturing and service employment have spread.

At the same time, and especially in Europe, a number of concerns such as food over-production which has led to major trade disputes and the negative and positive environmental impacts of modern farming, have led to a rethinking of the position of agriculture within society, a reconsideration of the institutional system surrounding agriculture (van Huylenbroeck and Durand, 2004) and consequently, to a strengthened emphasis on the non-productionist functions of farming. In this context and (especially) in view of WTO Doha Round discussions, increased attention has been given to the concept of 'multifunctionality' which is based on the notion that agriculture produces multiple outputs which include both public goods and privately traded commodities (OECD, 1997; Peterson *et al.*, 2002). Furthermore, in Europe, this concept has been 'utilized' by several European Commission statements defending the right of the EU to use CAP support in order to uphold a multifunctional 'European Model of Agriculture' (European Commission, 1998; Thomson, 2004).

Nowadays, over half of the population in the EU-25 are living in rural areas, which cover 90% of the EU territory. Despite the fact that rural areas have been increasingly becoming an environment for living and leisure, farming and forestry still remain of overriding importance for land use, the management of natural resources and subsequently, a most significant platform for economic development in rural communities. Within this context, any changes in agricultural support induced by international trade policy negotiations would surely influence farm activities and thus, the joint production of both public and private goods by agriculture. Taking into account that most of these commodity and non-commodity outputs are both directly and indirectly 'traded' (Bryden, 2005), it is interesting to explore the multifunctionality implications of alternative trade policy scenarios.

Within this context, the objective of this paper is to utilize the Social Accounting Matrix (SAM) analytical framework for conducting an assessment on the potential impacts of trade agreements on several multifunctionality indicators in Greek agriculture. More specifically, two SAM models are constructed, one for Greece and one for the local-rural economy of Archanes (Crete), an agriculturally dependent NUTS V area which has demonstrated a noticeable record in terms of the implementation of Pillar 2 policies. The alternative scenarios considered here were specified by Dwyer *et al.* (2005). Based on this specification, the relevant decisions on the CAP reform and Pillar 2 policies (Council of the EU, 2003; European Commission, 2004a,

2004b) a national/ regional specification of these scenarios is followed by the SAM-based impact analyses. Scenario-specific impacts include estimates of annual average changes in agricultural output, employment and land use, economy-wide output and employment, factor incomes (labour and capital), household and firm income and finally, pollution emissions.

The paper is organized as follows. The next section presents the applied methodology and the model-construction process. Section 3 presents the methodological procedures of the policy impact assessment, while Section 4 presents the specification of the alternative policy scenarios and the estimation of impacts. The paper ends with the relevant conclusions.

2. Modelling Framework

2.1 Methods

The impacts of agricultural and rural policies have been evaluated by different tools and approaches, as regards targeted groups in different rural areas (Bossard *et al.*, 2000). Quantitative evaluations range from descriptive techniques, rational checking procedures and local growth indicators, to more sophisticated macro- and micro- models, input-output (I/O) models, cost-benefit and multicriteria analysis (for a review, see Psaltopoulos *et al.*, 2004). On the other hand, several studies have used some form of qualitative analysis to evaluate rural policy action. Evaluation of CAP effects has also taken a number of directions, such as environmental and competitive aspects, and overall regional analysis in the Cohesion Reports of the European Commission (1996, 2001, 2004a).

The selection of an 'appropriate' evaluation technique mainly depends on the policy actions to be evaluated and on the focus of the evaluation. As policy interventions are made at distinct levels and as policy is usually defined as "a set of activities which may differ and may have different direct beneficiaries at different domains, and which are directed towards common general objectives or goals" (European Commission, 1997), a general equilibrium approach seems more appropriate at evaluating the policy impacts. Such models, based on the SAM technique allow the identification of the effects of both Pillar I and II funding (i.e. investment and direct income transfers), in a national or/ and local economy. Other possible advantages of this modelling framework can be described as follows: (a) the multisectoral dimension of SAM accommodates the analysis of the effects induced by current rural development policies, which have shifted attention from the traditional product/sector-oriented support to a more broadly based (multisectoral) one; (b) while several evaluation approaches estimate only the direct effects of policy action, being a general equilibrium approach, the SAM technique allows for

the estimation of the 'global' economic effects of these injections; and (c) the ability of the SAM technique (in comparison to the more-traditional Leontief I/O approach) to capture the distributional effects of exogenous injections (investment funding and transfers) in an economy. In particular, the increased presence of the CAP subsidy payments to farmers further substantiates the use of the SAM method since analysis which focuses solely on production linkages (I/O) may ignore the implications (particularly the distributional effects) arising from other types of links between rural sectors (especially agriculture) and the macro economy.

On the other hand, it has to be noted that the use of this technique for impact assessment also involves some simplistic assumptions regarding the economic behaviour of sectors, households, etc., which are all assumed to maintain their recorded pattern of expenditure in the base period (the linearity assumption). Furthermore the 'snapshot' nature of the technique does not allow the exploration of changes in technology, relative prices, incomes and expenditures over time. Most of the above weaknesses could have been dealt with here via the use of computable general equilibrium analysis (and a considerable number of additional and often speculative assumptions), but this is clearly beyond the resources of this effort.

The SAM technique has not been often used for policy-impact analysis, mainly due to (usually) severe data demands, especially at the regional level. However, in recent years, some indicative studies have applied this technique; Psaltopoulos (2001) estimated the economy-wide impacts of alternative policy scenarios related to the tobacco sector on the national economy of Greece. Also, Roberts (2003) built a 1997 SAM for the Western Isles in Scotland and estimated the economic impacts of both central government funding of public services and exogenous transfers of income to local households. Finally, Psaltopoulos *et al.* (2004) built regional SAMs for six remote rural areas of Scotland, Finland and Greece, in an attempt to discover how EU Structural Policies have affected their economies, while Psaltopoulos and Balamou (2005) built an interregional SAM for Crete to assess the impacts of CAP Pillar 1 and 2 measures on a rural-urban interregional economy.

2.2 Application

The objective of this Section is to present the analytical procedure applied to the generation of a national SAM for the Greek economy and a regional SAM for the local-rural economy of Archanes (Crete) both for year 1998.

The National SAM for Greece

The basis of the national SAM-construction process was the National Accounts and a detailed Input-Output Table for year 1998. Subsequently, by using the statistical tables of the National Statistical Service of Greece (NSSG) on Accounts of Economic Agents (Household Income and Expenditure Survey, Economic Accounts of Enterprises, Rest of the World and Non-profit institutions, Eurostat National Accounts Principal Aggregates, Transactions Table, data on Taxes, Subsidies, Government Transfers, etc.) the national SAM was constructed.

The product of the above process was a preliminary 17-sector SAM for Greece for year 1998. The matrix contained aggregated structural information for Agriculture and Forestry. Therefore, in order to generate detailed information on the structure of sectors relevant to this study we disaggregated Agriculture and Forestry into Cultivation of Arable Crops, Vegetables, Fruit, Tobacco, Livestock production, and Forestry. As a result, the final form of the constructed national SAM consists of 22 sectors, two production factors (labour and capital), three institutions (households, firms, government), the rest of the world, and a capital account.

The Regional SAM for Archanes

A regional I/O Table was generated for Archanes, using the hybrid GRIT technique developed by Jensen *et al.* (1979). The GRIT technique generates a preliminary regional transactions matrix via the mechanical adjustment of the national direct requirements matrix by using employment-based Simple Location Quotients (SLQs) and Cross-Industry Location Quotients (CILQs). Subsequently, the analyst can 'interfere' with the mechanically produced table through the insertion of 'superior' data from surveys or other sources, at various stages in the development of the table. Thus, GRIT incorporates the advantages of both the 'survey' and 'non-survey' I/O regionalization approaches.

After regionalizing the available national I/O table (first, to the prefecture and then to the study-area level) with the use of the mechanical GRIT procedure, information available from a sectoral business surveys in Archanes was utilized. The selection of target sectors for the business survey was primarily based on the importance of particular sectors within the structure of the local economy, and as recipients of Pillar 1 and 2 funds. Businesses were selected through random sampling from business directories supplied by local authorities. Although sampling was largely random, some major businesses were purposely chosen due to their major economic impact on the study areas (which mostly consists of small enterprises). Surveys were conducted face-to-face with business owners, using a structured questionnaire, while the

sample accounted for 40 per cent of local units. The second main source of superior data was an extended survey of households in Archanes. Around 10 per cent of local households provided information on the sources of their income and their consumption patterns. In order to develop the non-I/O components of the regional SAM, a wide range of regional and national data sources was used (the 1998 Household Income and Expenditure Survey; the National Statistical Service of Greece regional accounts; interviews with local policy makers and local government data).

As a result, the final form of the constructed Archanes SAM consists of 13 sectors (with three agricultural sub-sectors, vine-growing, olive-growing and other agriculture), three production factors (labour, capital and land), three institutions (households, firms, and government), the rest of the world, and a capital account.

With regards to the identification of multifunctionality indicators, these models include farm output levels, agricultural employment, total employment, agricultural land use and pollution emissions. Finally, estimated results are presented in an average annual form for the period 2007-2013, with the exception of tobacco, where estimates relate to the post-2010 period.

3. Impact Analysis Methodology

3.1 Conceptual issues

In accordance to the SAM analytical framework (general-equilibrium, comparative static), impact analysis deals with the comparison of levels of study-area output, employment, etc., calculated by applying multiplier and coefficient values to the injections of expenditure (treated as additional final demand) associated with policy. Implicitly, this compares two alternative equilibrium positions of the national/ regional economy, i.e. mutually balanced levels of production, firm and household incomes, trade flows, etc. which are consistent without, and with, respectively, these expenditure patterns. No account is taken of the time pattern of adjustment to the additions to final demand, while calculations seek to isolate the effects of policy expenditures from those of these other influences.

In this particular exercise scenario-specific domestic policy changes were fed into the SAM models as injections to final demand. More analytically:

- A decrease in subsidies (due to modulation and other revisions to the CAP market support) constitute a negative injection on the agricultural subsidies cell (Government column);

- Any increase in Pillar II funds is converted into projections of rural development action (programmes and measures) and constitutes an increase in the relevant Capital Account column (for investment action) or agricultural subsidies cell (for agri-environment measures). In terms of the sectoral distribution of these changes of exogenous final demand, the 2000-2006 pattern is observed in both study areas;
- Possible adjustments of produced volume and their effects (e.g. increase in the milk quota) can be modelled through the use of the mixed endogenous/exogenous version of the Leontief model, extended to a SAM framework;
- In the case of a decline in prices, supply is linearly adjusted through the use of the relevant product-specific price elasticities (obtained from Mergos, 2003) and relevant effects are modelled through the use of the mixed endogenous/exogenous version of the Leontief model, extended to a SAM framework;
- The impacts of possible substitution (e.g. from cotton to cereals) and/or abandonment of agricultural activity in several sub-sectors attributed to decoupling, are modelled through the use of the mixed endogenous/exogenous version of the Leontief model, extended to a SAM framework. Exogenous estimates of these developments are obtained from Tsiboukas (2003).
- Finally, impacts on land use are projected via the utilization of the relevant input elasticities estimated in Sarris (2003).

3.2 Analytical procedures

Conventional Leontief Procedure

In a SAM framework, the conventional Leontief procedure can be used to estimate the economy-wide impacts of changes in exogenous demand. More analytically, the identification of the shocks whose effects are investigated (e.g. changes in investment due to Pillar 2 measures, in consumer demand, in Pillar 1 subsidies) is followed by the specification of the model's exogenous accounts (in this case Government, the Rest of the World, and Capital) and the 'utilization' of the available SAM multipliers and coefficients, in order to produce economy-wide impacts in terms of output, labour income, firm income, household income and employment.

Economic Impacts of Fixed Supply

In parallel, in a SAM context, exogenous changes in sectoral gross output(s) – as a result of forces outside the model, such as a decline in prices (which causes an adjustment in supply), an abandonment or shift in cultivation due to decoupling, an increase of production quotas and targets, natural disasters, etc. – can have a profound impact on the accounts of the other components of the economy under study, through the relevant interdependence relationships portrayed by this general equilibrium data system.

This method is based on the 'mixed exogenous/endogenous variable version of the I-O model' devised by Miller and Blair (1985) for I-O analysis, extended to a SAM context by Roberts (1992) who estimated the (UK) economy-wide effects of milk quotas, which are an upper limit on the level of gross output of a particular sector, and also extended by Psaltopoulos and Thomson (1998) for estimating the capacity-adjustment effects of structural policy implementation in remote rural areas of the EU. Through these methods, new activity levels lead to the execution of comparative analysis and the estimation of the relevant economic effects (of changes in supply) on output, labour income, capital income, land rent (for the regional model), firm income, household income and employment.

Impact on Pollution Emissions

In order to estimate the scenario-specific levels of pollution emissions, drawing from the methodology developed by Leontief and Ford (1972), we utilized the national pollution matrix produced by the National Statistical Service of Greece (Mylonas, 2000).

This particular matrix was transformed by Loizou (2001), to reflect the disaggregation of agriculture into several sub-sectors. As a next step, a matrix of total pollution coefficients was estimated for both the national (Greece) and regional (Archanes) economies, after carrying out the relevant sectoral classification adjustments. Elements in this matrix reflect total (i.e. direct and indirect) pollution of pollutant k, which occurs from increased economic activity in sector j caused (in turn) by a unitary increase of final demand for this particular sector. Emissions estimated concerned nine pollutants (CO_2, CH_4, N_2O, NOx, CO, NMVOC, SO_2, BOD_5 and Nitrates).

4. Scenario Analysis

At the time of the completion of this analysis, an important problem was related to the determination by the Greek Ministry of Agriculture of the degree of decoupling in various regimes such as arable and sheep and the distribution of the national envelope in the case of (e.g.) olive oil. However, in order to proceed with the country-specific specification of the scenarios, we utilized information provided by the Ministry of Agriculture (2004). This information was related to a Committee of experts established by the Ministry in order to provide opinion on the implementation of the New CAP in Greece. According to the Committee, the main characteristics of the implementation of the New CAP in Greece would be (and at the end, turned out to be in most cases) as follows:

- The implementation of the Single Payment Scheme for all products covered by the reform will start in 1/1/2006.
- There will be full decoupling in the case of arable crops (including durum wheat), sheep and goat, and olive oil.
- In the bovine sector, Greece will opt for keeping 100 per cent of the suckler cow premium and 40 per cent of the slaughter premium coupled.
- Greece will not utilize the regional application options.
- Greece will not utilize the option to grant up to 10 per cent of national ceiling as sector-specific payment for improving quality and marketing of agricultural products
- The Single Payment Scheme will fully apply for the Aegean Islands

4.1 Specification of Scenarios

Based on the relevant decisions on the CAP 2003/2004 reform and Pillar 2 policy (Council of the EU, 2003; European Commission, 2004a, b), we carried out the national and regional specification of the alternative-scenario elements.

For Greece, Scenario 1bis investigated here consists of 5 scenario elements. The first scenario element is Subsidies[1] where in Durum Wheat there will be a decline in subsidies of 12.4 mn. Euro per annum, in Rice a 6,8% decrease of the reference period levels, in Other Cereals an increase of 9 mn. Euro, in Dairy products an increase of 29 ml Euro, in Tobacco (post-2010) a 50% decrease of the reference period levels and in Cotton a decrease of 12 mn. Euro.

[1] These elements are drawn from Bourdaras (2004; 2005).

The second scenario element is Prices; in Rice a 15% reduction in prices (assumption due to market liberalization) is projected. Multiplied by the relevant supply elasticity, this results into a 18.6% decrease in gross production of rice. In Dairy products a 10% decrease in gross output is projected.

In the third scenario element (Modulation), there is a 2.4% decrease in subsidies for the products covered by the CAP reform. In Decoupling (fourth scenario element), it is projected that 30% of Cotton production is abandoned and converted to cereals. Forty percent of Tobacco production is also abandoned, with 11% converted to sugar beet. Gross output decline due to decoupling is also projected for Cereals (-14%), Olive Oil (-10%), Sheep and Goat (-15%) and Beef (-5%). Finally, in the case of Pillar 2, the annual average expenditure for the 2000-2006 period (includes all EAGGF funding for this purpose) is assumed to increase by 88.6 mn. Euro of Community Contribution, related to modulation and sectoral transfers.

For Archanes, Scenario 1 consists of 3 scenario elements. The first one is Modulation, where taking account that 30% of farms (55% of subsidies specific to this product) relate to farmers over the 5000 Euro threshold in olive-oil, this results into a 2.8% decrease of subsidies for this particular product. In Decoupling (second scenario element), 20% of olive-oil production is assumed to be abandoned, while in Pillar 2 (third scenario element) a 25% increase of average 2000-2006 annual expenditure is assumed.

Scenario 2 consists of the above three elements plus the element of Prices. More specifically, in Olive Oil a 10% decrease in prices is assumed due to the assumption of market liberalization; taking account the relevant supply elasticity, this results into a 2,56% reduction in gross output. In the same way in Raisins there will be a 1,46% decrease in gross output, in Grapes for Wine a 4,2% decrease, in Table Grapes a 3,17% decrease in gross output.

Scenario 2b consists of the Scenario 2 elements plus the element of Subsidies, in the case of which, a 20% decrease in olive oil subsidies (reference period levels) is assumed.

Finally, Scenario 3 consists of the Scenario 2b elements, plus the element of Pillar 2, where a further increase in policy expenditure, equivalent to the decline in olive-oil subsidies is assumed.

4.2 Results of the Scenario Effects

Tables 1-2 and 3-6 present the estimated effects of the above Scenarios for Greece and Archanes, respectively. The Tables include results on several variables, some of which may not

be related to multifunctionality. However, comments presented in this Section will refer to estimated changes of indicators linked to the multifunctionality concept.

In the case of Greece, it seems that if Scenario 1bis is realized, effects in the national economy will be marginally positive, with the exception of agricultural employment, where a decline of 10.11% is forecasted (Table 1).

Agricultural output is expected to decline mainly in the case of tobacco (-38.99%), but also in Livestock (-5.49%) and Fruit (-3,22%). Output in the Vegetables sector is forecasted to increase by 1.15%, while the output of arable crops remains more or less constant. Farm employment is projected to decline by a significant 10.11%, mainly due to developments in the tobacco sector. In terms of land-use, a 10.3% reduction of tobacco land is projected, while the livestock figure is expected to decline by 1.73%. At the economy-wide level, output effects seem to be positive (+0.66%) due to the increase of Pillar 2 spending and the declining importance of agriculture in the Greek economy, while (for the same reasons) a moderate increase in total employment is projected (+0.10%). Finally, pollution emissions are expected to increase by 1.97%, a figure attributed to a projected 5.45% increase due to Pillar 2 policies and a decline of 3.48% attributed to the contraction of farm activity.

In terms of the elements of Scenario 1bis, it should be noted that agricultural output (-5.3%), employment (-10.84%) and total employment (-2.38%) mostly 'suffer' from decoupling, which also contributes to a 2.6% reduction of pollution. Effects of the remaining elements of the Scenario (decline in subsidies and prices; modulation) seem to be rather marginal, while developments in Pillar 2 generate positive impacts even in the cases of farm output (+1.64%) and farm employment (+1.45%), but more important, in the case of total employment (+3.05%).

Finally, pollution-emission forecasts may pose to an increase of emissions in total, but there are projections (Table 2) of reductions in the cases of BOD_5 (-7.56%), N_2O (-7.54%), CH_4 (-4%) and Nitrates (-2,30%). On the other hand, these positive projections are rather 'eliminated' by a projected 2.08% increase in CO_2 emissions, as the particular pollutant is by far the most important in Greece.

Table 1: Impacts of Scenario 1bis, Greece (annual average changes from 1998 levels, 1998 prices)

Scenario Elements	Output Effects (mn. Drs)	% Change	Labour Income Effects (mn. Drs)	% Change	Capital Income Effects (mn. Drs)	% Change	Firm Income Effects (mn. Drs)	% Change
A. Decline of Subsidies	-46.972,54	-0,07	-7.329,99	-0,06	-64.367,51	-0,32	-61.571,41	-0,32
B. Decline in Prices	-65.549,41	-0,10	-5.914,43	-0,05	-33.200,80	-0,16	-31.758,57	-0,16
C. Modulation	-15.730,18	-0,02	-2.454,67	-0,02	-21.555,42	-0,11	-20.619,06	-0,11
D. Decoupling	-325.627,10	-0,52	-46.553,68	-0,39	-104.178,69	-0,52	-99.653,20	-0,51
E. Pillar 2	868.512,04	1,38	139.340,20	1,16	397.586,45	1,97	380.315,39	1,96
Total	414.632,81	0,66	77.087,42	0,64	174.284,02	0,87	166.713,17	0,86

Scenario Elements	Household Income Effects (mn. Drs)	% Change	Agricultural Employment Effects (no. of jobs)	% Change	Employment Effects (no. of jobs)	% Change	Pollution Effects (tones)	% Change
A. Decline of Subsidies	-46.020,65	-0,14	-551	-0,08	-10624	-0,17	-248.708,99	-0,30
B. Decline in Prices	-25.888,48	-0,08	-4229	-0,61	-20401	-0,34	-409.075,75	-0,49
C. Modulation	-15.411,42	-0,05	-184	-0,03	-3588	-0,06	-83.287,77	-0,10
D. Decoupling	-109.457,08	-0,34	-74640	-10,84	-144759	-2,38	-2.179.302,14	-2,60
E. Pillar 2	379.071,78	1,17	9988	1,45	185588	3,05	4.570.732,83	5,45
Total	182.314,15	0,56	-69616	-10,11	6246	0,10	1.650.335,18	1,97

Source: Authors' calculations

Table 2: Impacts of Scenario 1bis on Pollution (annual average changes from 1998 levels)

Pollutants	**Changes in Pollution (tones)**	**% Change**
CO_2	1.680.069,28	2,08
CH_4	-13.517,87	-4,00
N_2O	-2.125,88	-7,54
Nox	2.991,64	0,99
CO	2.645,42	0,30
NMVOC	763,74	0,29
SO_2	11.502,17	2,19
BOD_5	-22.925,86	-7,56
Nitrates	-9.047,48	-2,30
Total	1.650.355,18	1,97

Source: Authors' calculations

In the case of the agriculturally dependent local economy of Archanes, Scenario projections are rather negative. Not surprisingly, Scenario 2b (reduction of income support aids) generates the most negative results, followed by those of Scenarios 2 (full decoupling and elimination of export subsidies) and 3. The fact that the status quo-specific Scenario 1 seems to be associated with (comparatively) less-pessimistic prospects is possibly a welcomed consolation.

As in the case of national projections, negative impact projections are quite significant in the case of farm output and employment, being around the -11% mark for Scenarios 2, 2b and 3. Furthermore, economy-wide job losses seem significant for these three Scenarios (ranging from -3.8% to -6.6%), as are reductions in agricultural land use (around -8%). Finally, projections on the reduction of pollution are also quite significant for these three Scenarios, ranging from -2.14% for Scenario 3 to more than -5% for Scenarios 2 and 2b, respectively.

In more detail in the case of the status quo Scenario 1 (Table 3), agricultural output is expected to decline by 5.9%, mainly due to the decline of olive-oil production (-18.6%). For the same reason, farm employment is projected to decline by 5.22%. In terms of land-use, a 5.44% reduction of land dedicated to olive-trees is projected, while land dedicated to vineyards could increase by 0,5%. At the local economy-wide level, output effects seem to be marginally positive (+0.03%) due to the increase of Pillar 2 spending, while (for the same reason) a rather moderate decline in total employment is projected (-1.88%). Finally, pollution emissions are expected to decrease by 0.35%, a figure attributed to a projected 3.55% increase due to Pillar 2 policies and a decline of 3.90% attributed to the contraction of farm activity.

Examining the elements of Scenario 1, it should be noted that agricultural output (-6.6%) and employment (-6.55%), and total employment (-4.74%) decrease due to decoupling, which also

contributes to a 3.86% reduction of pollution. Effects of modulation seem to be marginal, while developments in Pillar 2 generate positive impacts even in the cases of farm employment (+1.33%), but more important, in the case of total employment (+2.91%).

Finally, pollution-emission forecasts show a decline of emissions in total, but this projection is almost solely attributed to a projected reduction of Nitrates (-6,05%).

Results associated with Scenario 2 (elimination of export subsidies) are further negative, due to the impacts of the projected decline in prices. Agricultural output is expected to decline (Table 4) by a significant 11.3%, as olive-oil production declines by 21.17% and vine production by 8.33%. For the same reasons, farm employment is projected to decline by a significant 11.4%. In terms of land-use, a 6.18% reduction of land dedicated to olive-trees is projected, while land dedicated to vineyards could decline by 1.86%. At the economy-wide level, output effects seem to be negative (-1.74%), due to negative effects of both modulation and the expected decline in prices, while (for the same reasons) projections are also negative for total employment (-6.27%). Finally, pollution emissions are expected to decrease by an important 5.29%, as the expected decrease in prices could contribute to a decline of 4.93%.

In Scenario 2 the contributions of decoupling and the expected decline in prices in the forecasted negative trends seem to be rather balanced. However, it seems that decoupling affects negatively (mostly) the olive-oil sub-sector, while a possible decline in prices seems to mostly hit vine-growers. Effects of modulation and Pillar 2 are similar to those of Scenario 1. Finally, pollution-emission forecasts show a decline in almost all categories of emissions and especially Nitrates (-14.4%), CH_4 (-12.91%), N_2O (-12.46%) and even CO_2 (-4.51%).

Results associated with Scenario 2b (further reduction in support) (Table 5) are more pessimistic than those related to Scenario 2, due to the marginally negative impacts of a further decline in support. However, in terms of 'structural characteristics' relevant projections are almost similar to those related to the previous Scenario 2, as the negative contribution of a further cut in subsidies is rather marginal in all categories of estimates.

Finally, the increase in Pillar 2 funds, associated with Scenario 3 improves the projections, especially in the case of economy-wide output and employment (Table 6). On the other hand, projections on agricultural output, agricultural employment and land abandonment differ only marginally from those of Scenarios 2 and 2b, while the decline of pollution emissions is forecasted to decrease by half (compared to the levels of Scenarios 2 and 2b), as Pillar 2 action seems to be associated with an increase of (all types) of emissions.

Table 3: Impacts of Scenario 1, Archanes (annual average changes from 1998 levels, 1998 prices)

Scenario Elements	Output Effects (mn. Drs)	% Change	Labour Income Effects (mn. Drs)	% Change	Capital Income Effects (mn. Drs)	% Change	Land Rent Effects (mn. Drs)	% Change	Firm Income Effects (mn. Drs)	% Change
A. Modulation	-5,50	-0,03	-0,74	-0,02	-11,82	-0,17	-0,50	-0,03	-11,88	-0,14
B. Decoupling	-450,62	-1,91	-36,19	-0,86	-110,47	-1,62	-106,89	-5,60	-209,50	-2,43
C. Pillar 2	463,80	1,96	65,03	1,55	587,06	8,61	31,68	1,66	596,35	6,91
Total	7,68	0,03	28,10	0,67	464,74	6,81	-75,71	-3,96	374,97	4,34

Scenario Elements	Household Income Effects (mn. Drs)	% Change	Agricultural Employment Effects (no. of jobs)	% Change	Employment Effects (no. of jobs)	% Change	Pollution Effects (tones)	% Change
A. Modulation	-9,03	-0,07	0	0	-1	-0,05	-3,32	-0,04
B. Decoupling	-181,00	-1,32	-56	-6,55	-93	-4,74	-335,98	-3,86
C. Pillar 2	479,51	3,49	11	1,33	57	2,91	308,79	3,55
Total	289,49	2,11	-45	-5,22	-37	-1,88	-30,51	-0,35

Source: Authors' calculations

Table 4: Impacts of Scenario 2, Archanes (annual average changes from 1998 levels, 1998 prices)

Scenario Elements	**Output Effects (mn. Drs)**	**% Change**	**Labour Income Effects (mn. Drs)**	**% Change**	**Capital Income Effects (mn. Drs)**	**% Change**	**Land Rent Effects (mn. Drs)**	**% Change**	**Firm Income Effects (mn. Drs)**	**% Change**
A. Modulation	-5,50	-0,03	-0,74	-0,02	-11,82	-0,17	-0,50	-0,03	-11,88	-0,14
B. Decoupling	-450,62	-1,91	-36,19	-0,86	-110,47	-1,62	-106,89	-5,60	-209,50	-2,43
C. Pillar 2	463,80	1,96	65,03	1,55	587,06	8,61	31,68	1,66	596,35	6,91
D. Decline in Prices	-419,59	-1,77	-32,74	-0,78	-107,99	-1,58	-93,27	-4,88	-193,99	-2,25
Total	-411,91	-1,74	-4,64	-0,11	356,78	5,24	-168,98	-8,85	180,98	2,09

Scenario Elements	**Household Income Effects (mn. Drs)**	**% Change**	**Agricultural Employment Effects (no. of jobs)**	**% Change**	**Employment Effects (no. of jobs)**	**% Change**	**Pollution Effects (tones)**	**% Change**
A. Modulation	-9,03	-0,07	0	0	-1	-0,05	-3,32	-0,04
B. Decoupling	-181,00	-1,32	-56	-6,55	-93	-4,74	-335,98	-3,86
C. Pillar 2	479,51	3,49	11	1,33	57	2,91	308,79	3,55
D. Decline in Prices	-166,88	-1,22	-53	-6,18	-86	-4,39	-429,51	-4,93
Total	122,60	0,88	-98	-11,40	-123	-6,27	-460,01	-5,29

Source: Authors' calculations

Table 5: Impacts of Scenario 2B, Archanes (annual average changes from 1998 levels, 1998 prices)

Scenario Elements	Output Effects (mn. Drs)	% Change	Labour Income Effects (mn. Drs)	% Change	Capital Income Effects (mn. Drs)	% Change	Land Rent Effects (mn. Drs)	% Change	Firm Income Effects (mn. Drs)	% Change
A. Modulation	-5,50	-0,03	-0,74	-0,02	-11,82	-0,17	-0,50	-0,03	-11,88	-0,14
B Decoupling	-450,62	-1,91	-36,19	-0,86	-110,47	-1,62	-106,89	-5,60	-209,50	-2,43
C. Pillar 2	463,80	1,96	65,03	1,55	587,06	8,61	31,68	1,66	596,35	6,91
D. Decline in Prices	-419,59	-1,77	-32,74	-0,78	-107,99	-1,58	-93,27	-4,88	-193,99	-2,25
E. Decline of Subsidies	-39,26	-0,17	-5,27	-0,13	-84,46	-1,24	-3,57	-0,19	-84,84	-0,98
Total	-451,17	-1,91	-9,91	-0,24	272,32	4,00	-172,55	-9,04	96,14	1,11

Scenario Elements	Household Income Effects (mn. Drs)	% Change	Agricultural Employment Effects (no. of jobs)	% Change	Employment Effects (no. of jobs)	% Change	Pollution Effects (tones)	% Change
A. Modulation	-9,03	-0,07	0	0	-1	-0,05	-3,32	-0,04
B. Decoupling	-181,00	-1,32	-56	-6,55	-93	-4,74	-335,98	-3,86
C. Pillar 2	479,51	3,49	11	1,33	57	2,91	308,79	3,55
D. Decline in Prices	-166,88	-1,22	-53	-6,18	-86	-4,39	-429,51	-4,93
E. Decline of Subsidies	-64,47	-0,47	-2	-0,18	-6	-0,31	-23,69	-0,27
Total	58,13	0,41	-100	-11,58	-129	-6,58	-483,71	-5,55

Source: Authors' calculations

Table 6: Impacts of Scenario 3, Archanes (annual average changes from 1998 levels, 1998 prices)

Scenario Elements	Output Effects (mn. Drs)	% Change	Labour Income Effects (mn. Drs)	% Change	Capital Income Effects (mn. Drs)	% Change	Land Rent Effects (mn. Drs)	% Change	Firm Income Effects (mn. Drs)	% Change
A. Modulation	-5,50	-0,03	-0,74	-0,02	-11,82	-0,17	-0,50	-0,03	-11,88	-0,14
B. Decoupling	-450,62	-1,91	-36,19	-0,86	-110,47	-1,62	-106,89	-5,60	-209,50	-2,43
C. Pillar 2	463,80	1,96	65,03	1,55	587,06	8,61	31,68	1,66	596,35	6,91
D. Decline in Prices	-419,59	-1,77	-32,74	-0,78	-107,99	-1,58	-93,27	-4,88	-193,99	-2,25
E. Decline of Subsidies	-39,26	-0,17	-5,27	-0,13	-84,46	-1,24	-3,57	-0,19	-84,84	-0,98
F. Increase in Pillar 2 funds	445,25	1,88	62,43	1,49	563,58	8,26	30,41	1,59	572,49	6,63
Total	-5,91	-0,03	52,53	1,25	835,89	12,25	-142,13	-7,44	668,63	7,74

Scenario Elements	Household Income Effects (mn. Drs)	% Change	Agricultural Employment Effects (no. of jobs)	% Change	Employment Effects (no. of jobs)	% Change	Pollution Effects (tones)	% Change
A Modulation	-9,03	-0,07	0	0	-1	-0,05	-3,32	-0,04
B. Decoupling	-181,00	-1,32	-56	-6,55	-93	-4,74	-335,98	-3,86
C. Pillar 2	479,51	3,49	11	1,33	57	2,91	308,79	3,55
D. Decline in Prices	-166,88	-1,22	-53	-6,18	-86	-4,39	-429,51	-4,93
E. Decline of Subsidies	-64,47	-0,47	-2	-0,18	-6	-0,31	-23,69	-0,27
F. Increase in Pillar 2 funds	460,33	3,35	11	1,27	54	2,75	296,44	3,41
Total	518,47	3,78	-89	-10,31	-75	-3,83	-187,27	-2,14

Source: Authors' calculations

5. Overall Conclusion

In overall, results of this analysis suggest that under the scenarios examined, the effects of policy reform upon multifunctionality indicators are rather mixed and perhaps not extremely worrying. Effects of the status quo scenarios seem to be optimistic in terms of projected economy-wide output and employment at both the national and regional level. On the other hand, Scenario 1(bis) generates negative results in terms of farm output and employment (especially for the agriculturally-dependent Archanes economy), land-use abandonment projections are marginal at the national and rather moderate at the regional level, while environmental repercussions are negative at the national level. The regional analysis has also shown that (at least in this case study), the impacts of Scenarios 2, 2b and (even) 3 are rather worrying in terms of all categories of projections, with the exception however, of the important economy-wide output one. Taking account of the specification of Scenario 3, this finding generates rather justified reservations on the 'ability' of Pillar 2 policies to ameliorate for economic activity contraction caused by a decrease in Pillar 1 support in such an agriculturally-dependent local economy.

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