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A Euro-Mediterranean deal in agro-food and fisheries trade: Long run impacts in Greece[1]

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Abstract
We employ a heavily modified 'agricultural' variant of the GTAP model and a realistic baseline scenario to assess the impact on the Greek economy from a hypothetical 'hub and spoke' and a 'FTA' EUMED agro-food and fisheries trade agreement. Long run estimates show that Greek agro-food and fisheries sectors are not seriously affected, where surprisingly, trade diversionary losses to Greece from the FTA scenario are minor given minimal south-south trade links between Mediterranean Partner Countries (MPC). Further research shows that under complete CAP decoupling, notable additional welfare gains for MPC are realised, whilst Greece stands to lose approximately €300 million.

Keywords: *Impact Analysis, Computable General Equilibrium (CGE), Global Trade Analysis Project (GTAP)*

JEL Classification: C68, D58, F15, Q17, Q18

Introduction

Background

On the 28th November 1995, the European Union (EU) and 12 Mediterranean Partner Countries (MPC) signed the Barcelona Declaration.[2] The agreement, in the form of a series of bilateral association agreements (AA) between the EU and the MPC, set a framework for economic, political and social co-operation. Under the current terms of the AA, free industrial market access between the EU and each MPC is already implemented, whilst efforts to ratify an agricultural agreement languished. A further long term objective of the Declaration was to establish a Euro-Mediterranean Free Trade Area (FTA) by 2010. This will depend heavily on greater South-South co-operation between MPC, principally through the Agadir agreement.[3]

In many MPC, agricultural yields are highly susceptible to drought and poor water management, whilst other longer term environmental pressures (e.g., climate change, soil erosion, desertification etc.) also threaten agricultural livelihoods. Coupled with poor social and structural infrastructure and land fragmentation, a polarisation in agri-

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cultural production in many MPC has emerged, encompassing a large subsistence base and a relatively minor commercial sector. Notwithstanding, the EU still perceives a competitive threat from the southern basin of the Mediterranean[4] for (*inter alia*) fruits and vegetables (particularly tomatoes, courgettes, citrus fruits) and olive oil, which also share the same seasonality. As a result, an agricultural 'exception' clause was implemented into each of the EU's bilateral AA.

It was not until November 2003, that a Euro-Mediterranean Ministerial Conference was held to put rural development back on the agenda, whilst in 2005, deemed by the EU as the 'Year of the Mediterranean', there was renewed commitment to foster a strategic roadmap which would lead to a progressive trade agreement in agricultural and fishing products. Since 2006, a panel of experts has been assigned to i) promote reciprocal liberalisation on both shores of the Mediterranean; ii) examine the potential for asymmetric liberalisation periods; iii) and draw up, by country, exemption lists of sensitive products (Hervieu, 2007). In that same year, bilateral negotiations for agriculture were launched with a number of MPC although the degree of success has been mixed, with some members (i.e., Jordan) having advanced further than others (i.e., Egypt, Morocco, Tunisia). Most recently, in an attempt to realise deeper trade stability in the region, trade ministers re-affirmed their commitment to establishing a Euro-Med FTA by 2010 at the 6th Euro-Med Trade Ministerial meeting in Lisbon on 21 October 2007, in particular reiterating greater MPC participation in south-south relations.

Objectives

In the context of these developments, two clear trade scenarios emerge. On the one hand, a series of 'hub and spoke' (bilateral) agricultural agreements to complement existing industrial agreements between the EU and MPC, whilst a more distant possibility is the formation of an EU-MPC FTA in agricultural and industrial goods. With improvements in computational facility and the development of the Global Trade Analysis Project (GTAP) database, computable general equilibrium (CGE) models have become the standard workhorse in assessing the economic impacts of bilateral, regional and multilateral trade reform scenarios. Recent relevant CGE trade studies (Francois *et al.*, 2005; Kuiper, 2006) demonstrate that tariff free access to the EU market is expected to yield significant gains to the MPC, as the benefits of trade creation outweigh trade diversionary losses. Indeed, given the MPC trade dependency on EU markets, this result is to be expected. Interestingly, there is a paucity of quantitative research on the potential sectoral trade impacts for EU members and in particular its Southern Mediterranean counterparts.

Accordingly, employing a heavily modified agricultural variant of the GTAP model and accompanying version 6 database, we compare the economic impacts of a 'hub and spoke' and a FTA agricultural agreements between the EU and the MPC, with a realistic baseline scenario. In the context of these trade scenarios, we also examine the extent to which further probable CAP reform (i.e., decoupling of *all* EU domestic support) may impact on the EU and MPC. We present welfare estimates for the EU27 and the MPC, whilst detailed agricultural sector results are presented for the Greek economy; one of the EU member regions facing a direct 'threat' from any potential agreement.

Our long run estimates suggest that Greek agro-food and fisheries sectors are not greatly affected by a potential agro-food EUMED trade agreement, whilst marginally

larger real income gains in Greece are attributed to the 'hub and spoke' agreement. Under complete decoupling in all EU sectors, MPC trade gains are increased notably due to greater EU market access, whilst Greece realises a welfare loss of €304m, largely due to a deteriorating CAP budgetary position.

The next section of the paper describes the CGE methodology and discusses the numerous modifications to the model structure. Section three provides a description of the data aggregation and the scenario design of our research. Section four discusses the results, whilst section five concludes.

Methodology and Modelling Extensions

As a basis, the study employs the comparative static GTAP CGE model and the accompanying GTAP 6 database, benchmarked to 2001. GTAP is a 'demand' led model, based on a system of neoclassical final, intermediate and primary demand functions. Given the assumption of weak homothetic separability, optimisation is broken into nests to allow greater flexibility through the incorporation of differing elasticities of substitution, whilst accounting identities and market clearing ensures a general equilibrium solution. Once the model structure is calibrated to the chosen data aggregation, specific exogenous macroeconomic or trade policy 'shocks' can be imposed to key policy variables. The model responds with the interaction of economic agents within each market, where an outcome is characterised by a 'counterfactual' set of equilibrium conditions.

Significant modelling modifications have been made to more realistically characterise the vagaries of agricultural factor and intermediate input markets. Following the work on GTAP-AGR by Keeney and Hertel (2005), CES substitution possibilities are incorporated between intermediate inputs and primary factor demands, whilst in livestock sectors, intermediate feed inputs are also now CES substitutable.[5] Finally, a CET function controls the transfer of labour types and capital between primary agricultural and non-primary agricultural sectors to capture observed differentials in agricultural/non-agricultural wages and rents.[6]

In the standard GTAP, land is 'homogeneous' in that it is equally substitutable between agricultural activities, controlled by a single CET transformation elasticity. Moreover, the land endowment is exogenous, thereby obviating the possibility of land abandonment in the EU, or in non-EU regions, the introduction of marginal land into agricultural activity. In this study, both these modelling restrictions are relaxed. Thus, following the OECD's Policy Evaluation Model (OECD, 2003), we employ a three-stage weakly separable CET nest to group agricultural sectors by ease of land substitutability. As we descend down the nest, the CET elasticity doubles, implying easier substitution of land between competing agricultural uses.[7] In estimating land supply functions for each of the 87 member countries/regions of the GTAP database, we follow the non linear functional form:

$$Accumulated\ Area = a - \frac{b}{C_0 + \mathrm{Re}nt^{\rho}} \tag{1}$$

where 'a' is the asymptote or maximum potentially available agricultural land; 'b', 'C' and 'ρ', are estimable parameters, and 'Rent' is the price of land. Data are employed on potential agricultural areas and yields provided by a bio-physical model IIASA-FAO

(YEAR). This model combines geo-referenced inventories of data across 158 countries on (i) the biophysical characteristics of land (e.g., soil, terrain, slope etc.); with (ii) the growing requirements of crops (e.g., solar radiation, temperature, humidity, etc.), to classify land area suitable for each crop and the maximum potential agronomical yield. Subsequently, yields data are sorted in descending order (with the corresponding potentially suitable areas), whilst the ascending area is accumulated. Thus, the marginal cost (i.e., price) of land supply is defined as the inverse of the potential yield (i.e., marginal product). Thus, observations on accumulated land area and relative price follow an upward sloping curve (land supply). To improve the fit of the estimated supply parameters (b, C and p) to the observed data points, a Maximum Likelihood non linear regression method is employed.[8]

In this study we also aim to capture increased harmonisation of EU product standards resulting in greater product substitution in the model (Harrison, 1996; Herok *et al*., 2002). Indeed, Herok *et al*. (2002) note that with 'deep' integration, "price differentials become smaller as buyers more easily substitute among the products from different member states" (pp2). Consequently, in the EU Armington structure, we create intra-EU and extra-EU import nests, where the Armington elasticity in the former is double the 'standard' elasticities in the latter (Herok *et al*., 2002).

Finally, we employ the latest developments in the relevant literature to explicitly model the common agricultural policy (CAP) and the agenda 2000 and mid term review (MTR) reforms, which constitute an important component of our 'baseline' scenario.[9]

Data aggregation and scenario design

Since we are focusing on the EUMED agreement, we fully disaggregate the MPC from the GTAP database into Morocco, Tunisia, Turkey and the composite regions, 'Rest of the Middle East' (RME) and 'Rest of North Africa' (RNA). Given the sensitivity of the Southern EU regions to tariff free EU-MPC agro-food trade, we separate out Greece, Italy and Spain, whilst the principal focus of this study is on Greece. The remaining EU regions are grouped into composite regions. Residual trade and production flows are captured within the rest of the world (ROW) region. In terms of the sectors, all crops, livestock, fishing and food sectors are fully disaggregated within the GTAP database, with remaining sectors aggregated into 'raw materials', 'manufacturing' and 'services'.

One problem encountered is that the coverage of 'single' MPC countries in version 6 of the GTAP data is restricted to Morocco, Tunisia and Turkey. Based on geographical proximity, remaining North African (Algeria and Egypt) and Middle Eastern (Israel, Jordan, Lebanon, Palestinian Authority, Syria) MPC are subsets of the aggregate composites RME and RNA, respectively. This implies that tariff removal with the entire composite region would overstate considerably the trade impacts of any agreement. Consequently, we employ European Commission (2007) data to estimate the proportion of RNA and RME region trade with the EU which is within the EUMED agreement (for the Hub and Spoke scenario), whilst United Nations COMTRADE (2007) data is used to establish corresponding statistics on intra-MPC trade (for the FTA scenario). Thus, in all EUMED tariff trade shocks, we assume that bilateral tariff reductions are proportional to the degree of EUMED trade coverage between relevant partners.[10]

In our baseline scenario (Figure 1), we implement Uruguay Round tariff commit-

ments, Chinese accession, EU enlargement to 27 members, Agenda 2000, MTR and subsequent decoupling reforms (i.e., sugar, olive oil, tobacco, hops), and the manufacturing component of the EUMED trade deal. In our 'policy' scenarios we focus on the agro-food and fisheries component of the EUMED deal. Scenario 1 characterises an agricultural 'hub and spoke' agreement, whilst scenario 2 broadens the agricultural tariff elimination shocks to incorporate south-south trade links within an EU-MPC 'free trade area'.[11] In scenario 3, we repeat the more probable 'Hub and Spoke' agreement, and in addition, decouple *all* EU agricultural (particularly fruit and vegetables) and fishing sector support.

1. Uruguay Round Commitments (+)
- i. Enforce developed country commitments (export subsidy limits, applied tariff levels)
- ii. Complete developing country commitments (export subsidy limits, applied tariff levels)

2. EU Enlargement to 27 Members (+)
- i. Remove border protection between existing and 'new' member states.
- ii. Impose common external tariff for all new EU members of the customs union.

3. Additional Trade Policy shocks (+)
- i. Chinese Accession

4. Agenda 2000 (A2000) commitments and the Mid Term Review (MTR)
- i. Modelling of CAP mechanisms (CAP budget, modulation, quotas, set-aside, intervention prices)
- ii. Reduction of intervention prices under A2000 and MTR reforms
- iii. Imposition of set-aside for the 'new' EU member states
- iv. Milk quota adjustments under the MTR. Sugar quota unchanged.
- v. Removal of ALL coupled support in the AC12 and MTR agreed components of coupled support (#) in the EU15.
- vi. CAP budget including the implementation of Modulation funding and the UK Rebate mechanism.
- vii. 'Full decoupling' option on agreed sectors is implemented; SFP ceiling limit imposed (#) and land idling shocks.

5. The manufacturing component of the Euro-Mediterranean agreement.
- i. Eliminate all manufacturing tariffs between the EU27 and each of its bilateral MPC partners (Hub and Spoke)

+ = All tariff shocks account for the binding overhang
# = data taken from UK Department of Environment Food and Rural Affairs - DEFRA (2007)

Figure 1. Assumptions Shaping the Baseline

Results

Greek Trade, Output and Market prices – Scenario 1 (Hub and Spoke agreement)

In scenario 1, Greek agro-food output increases moderately relative to the baseline in a number of agro-food sectors (e.g., 'vegetables, fruits and nuts',[12] cereals, 'plant fibres', 'other crops', poultry and its corresponding downstream sector 'other meat',

'wool', 'rice processing', 'other food' processing and 'beverages and tobacco' (Table 1)), since MPC tariff protection are relatively more pervasive. Importantly, in 'fishing', there is no discernable change despite the large share of Greek import trade from the MPC region (principally Morocco and Turkey).[13] This is because there are zero EU tariffs on fishing and because most Greek fishing exports go to the EU. In remaining Greek agro-food sectors, output falls (e.g., 'paddy rice'; 'sugar beet/cane'; 'vegetable oils and fats'; 'sugar processing'; 'dairy'; 'meat processing') reflect higher comparative levels of Greek import protection; whilst output reductions elsewhere ('oilseeds'; 'sugar beet'; 'raw milk', 'cattle and sheep') are due to reduced intermediate input demands by corresponding downstream Greek sectors ('vegetable oils and fats'; 'sugar processing'; 'dairy'; 'meat processing'). Despite a small increase in agricultural activity (0.04%), Greece's agro-food and fishing sector contracts by a modest 0.32%.

The proportion of total Greek agro-food trade with MPC countries inside the EUMED agreement is relatively small, whilst the sectors of interest to this analysis (i.e., agro-food and fisheries) also constitute a small share of GDP. Consequently, trade induced import price reductions are moderate. The weighted index of agro-food market prices in Greece falls by 0.19% compared with the baseline. This is primarily motivated by cheaper imports of intermediate inputs which reduce total costs. Interestingly, in wheat and 'other crops' sectors, market prices rise reflecting the effect of increased import demand by the MPC regions. Trade balance changes in Greece are also muted, where the agro-food and fisheries trade balance deteriorates €2.7m (Table 1), whilst the aggregate trade balance deteriorates by €1.1m.

Trade, Output and Market prices – Scenario 2 (FTA agreement)

The results from the FTA scenario are highly similar to the 'Hub and Spoke' scenario. This suggests (perhaps surprisingly) that south-south agro-food and fisheries trade between MPC is minor, which consequently has a very small trade diversion effect for Greece. With slightly greater trade creation between the MPC, Greek agro-food output falls compared with scenario 1, resulting in a larger agro-food and fisheries output decline of 0.45% (Table 1). Market price trends are also broadly the same as in scenario 1. With a greater contraction in agriculture compared with scenario 1 and the release of 'sluggish' agricultural labour and capital, the index of primary factor prices also falls in comparative terms (not shown), whilst imports of cheaper intermediate inputs are reduced slightly. That market prices in most agro-food and fisheries sectors are falling relative to scenario 1 reflects the fact that the first effect is stronger in most cases. Compared with scenario 1, EU-MPC trade activity falls, whilst the agro-food and fisheries trade balance deteriorates €25.7m compared with the baseline.

Real Income Changes – Scenarios 1, 2 and 3

Equivalent variation (EV) changes are presented for Greece, the EU27, and the MPC regions (Table 2), and decomposed into 'terms of trade', 'efficiency', 'CAP Budget' and 'other' effects. The terms of trade measures the rate of exchange between export and import prices. In the context of our scenarios, tariff reductions reduce import prices directly, whilst the trade led impacts on factor prices and cheaper imported intermediate

Table 1. Trade Balances, Market Prices and Output compared with baseline

	Trade Balance (€2001m)		Market Prices (%)		Output (%)	
	Scenario 1	**Scenario 2**	**Scenario 1**	**Scenario 2**	**Scenario 1**	**Scenario 2**
Rice	-1.1	-1.1	-2.11	-2.14	-7.68	-7.85
Wheat	3.5	2.6	0.29	0.25	6.10	5.91
Ograins	-0.4	-0.4	-0.19	-0.20	0.86	0.85
Vegfrunuts	6.4	6.1	-0.19	-0.22	0.35	0.27
Oilseeds	3.2	3.2	-1.39	-1.40	-14.85	-14.90
Sugar*	-0.8	-0.8	-1.99	-2.04	-16.73	-16.76
Plants	4.4	5.0	-0.06	-0.06	1.27	1.43
Ocrops	12.9	10.6	0.18	0.16	3.86	3.77
Catshp	2.1	0.5	-0.32	-0.30	-0.75	-0.87
Pigspoultry	-0.9	-2.8	-0.02	-0.03	2.57	2.38
Raw Milk*	0.1	0.1	-0.18	-0.19	-0.19	-0.26
Wool	0.1	0.1	-0.05	-0.05	1.80	1.80
Fishing	0.5	0.4	-0.04	-0.04	0.00	0.00
Meatpro	-17.7	-20.1	-0.16	-0.16	-0.95	-1.19
Omeatpro	50.5	45.6	-0.02	-0.03	2.60	2.48
Vegoilsfats	-82.2	-83.6	-0.62	-0.63	-16.44	-16.49
Dairy	-3.2	-3.6	-0.10	-0.10	-0.25	-0.39
Ricepro	0.3	0.3	-1.31	-1.33	0.30	0.22
Sugarpro	-4.6	-5.2	-1.56	-1.58	-12.71	-12.89
Ofoodpro	9.9	5.4	-0.04	-0.05	0.77	0.73
BevsTobac	14.4	12.0	-0.07	-0.07	0.61	0.59
NaturalRes	1.3	1.3	0.01	0.01	0.01	0.01
Manu	0.7	2.1	0.00	0.00	-0.01	0.00
Svces	-0.4	0.5	-0.01	-0.01	0.02	0.02
AGRIC	29.9	23.5	-0.23	-0.25	0.04	-0.01
FOOD	-32.6	-49.2	-0.16	-0.17	-0.54	-0.67
AGFOOD	-2.7	-25.7	-0.19	-0.20	-0.32	-0.45
TOTAL	-1.1	-21.8				

* quota constrained sector (in neither sector is the Greek quota binding in the benchmark data)

inputs, influence export prices. The efficiency measure gauges changes in 'marginal social values' where a subsidy is considered wasteful on the grounds that it encourages artificially higher resource usage than under free market conditions (Huff and Hertel, 2001). Similarly, a tax implies under usage of resources compared with free market conditions. Consequently, policies which promote reduced (increased) usage of a subsidised (taxed) activity, yield efficiency gains. The 'CAP' budget measures changes in net contributory positions with respect to the agricultural component of the FEOGA budget. The 'other' category is a money metric measure of: (i) household incomes from productivity changes on land set aside and land idling and (ii) milk/sugar quota rents.

Under the 'hub and spoke' agreement, Greece makes a small welfare gain of €42.9m

Table 2. Real income gains and CAP Budget decomposition (€millions (2001 prices) unless otherwise stated)

	Scenario 1 (Hub and Spoke) vs. Baseline						
	European Union		Middle East, North Africa and Turkey				
	Gre	EU27	Mor	Tun	Tur	RNA	RME
EV	42.9	706.8	276.4	278.3	370.1	125.8	68.7
Per Capita (%)	0.046	0.011	1.021	1.650	0.306	0.085	0.014
EV decomposition:							
Terms of Trade	-2.5	-442.9	158.8	115.6	329.4	51.5	0.4
Efficiency	43.8	1160.7	111.1	159.8	30.8	60.4	64.4
CAP Budget	1.4	0.0	–	–	–	–	–
Other	0.2	-11.0	6.5	2.9	9.9	14.0	3.8

	Scenario 2 (Free Trade Area) vs. Baseline						
	European Union		Middle East, North Africa and Turkey				
	Gre	EU27	Mor	Tun	Tur	RNA	RME
EV	36.9	676.6	277.1	287.6	406.2	133.7	92.6
Per Capita (%)	0.039	0.010	1.023	1.655	0.336	0.090	0.018
EV decomposition:							
Terms of Trade	-3.9	-463.4	154.9	124.4	354.7	54.0	10.4
Efficiency	39.2	1150.4	115.9	160.0	39.2	65.0	76.4
CAP Budget	1.4	0.0	–	–	–	–	–
Other	0.1	-10.4	6.4	3.2	12.2	14.6	5.8

	Scenario 3 (completely decoupled agricultural support) vs. Baseline						
	European Union		Middle East, North Africa and Turkey				
	Gre	EU27	Mor	Tun	Tur	RNA	RME
EV	-303.9	135.5	482.4	529.8	706.2	339.2	289.6
Per Capita (%)	-0.326	0.001	1.781	3.140	0.584	0.228	0.057
Terms of Trade	-82.6	-1089.2	280.2	208.3	434.7	155.8	118.8
Efficiency	136.5	2382.5	194.1	318.5	260.2	166.0	164.8
CAP Budget (a. – b.)	-320.1	0.0	–	–	–	–	–
Other	-37.6	-1157.8	8.0	3.0	11.3	17.4	6.0
CAP Budget Decomposition:							
a. CAP Receipt	-473.3	-9101.7	–	–	–	–	–
of which:			–	–	–	–	–
i. Amber Box	*-14.9*	*-482.9*	–	–	–	–	–
ii. Direct Payments	*-482.5*	*-7003.4*	–	–	–	–	–
iii. Intermed. inputs	*-34.8*	*-1615.4*	–	–	–	–	–
b. CAP Payments	-153.1	-9107.7	–	–	–	–	–
Of which:							
i. Tariff Revenues	*-1.6*	*-105.6*	–	–	–	–	–
ii. GDP Contributions	*-140.6*	*-8996.1*	–	–	–	–	–
iii. UK Rebate	*-10.9*	*0.0*	–	–	–	–	–

(0.046% per capita utility) compared with the baseline, notably above the 'average' EU27 utility gain. Decomposing Greek EV, efficiency improves due to increased MPC imports with reductions in tariffs,[14] although slight increases in subsidised agricultural activity (see Table 1) moderate these gains. Greece's terms of trade falls very slightly (€2.1m), due to drops in agro-food and fisheries market prices. With much of the budgetary changes associated with CAP reform in the baseline, the incremental impacts on the CAP budget are expected to be small. Indeed, the €1.4m gain to Greece reflects small changes in agricultural tariff revenues (from trade diversion) and compensating GDP contributions to balance the budget.

In Scenario 2 Greek efficiency gains are smaller (€39.2m) than in scenario 1. Indeed, whilst agricultural activity contracts compared with scenario 1 (relative allocative efficiency gain), compared with scenario 1 imports fall from the MPC regions in scenario 2 (relative allocative efficiency loss). Similarly, the terms of trade also falls compared with scenario 1 given slightly larger market price falls in Greece. Overall, Greece's real income rises by €36.9m. For the EU27, relative trade diversion from greater south-south trade, results in smaller EV gains in the FTA compared with the Hub and Spoke agreement (€706.8m and €676.6m respectively).

In accordance with the literature, all MPC regions realise welfare gains in both scenarios. In per capita utility terms, the largest beneficiaries under the 'hub and spoke' agreement (in order) are Tunisia, Morocco and Turkey. This result reflects their higher level of EU agro-food and fisheries trade as a proportion of GDP. Under the FTA agreement in scenario 2, greater South-South trade benefits Turkey the most (in per capita terms), although the moderate impact on real income for all of the MPC again reinforces the fact that that intra-MPC trade links are surprisingly weak.

Under the Hub and Spoke agreement including complete decoupling of all CAP support (scenario 3), MPC real income (EV) rises notably in all cases (Table 2) from increased market access. The highest per capita utility rises are to be found in Tunisia (3.14%), whilst the largest value increase in real income occurs in Turkey (€706m).

In the EU, terms of trade losses are larger compared with scenarios 1 and 2, whilst allocative efficiency improves considerably, due to output contractions in subsidised primary agriculture. The losses in the 'other' row are related to productivity reductions in land abandonment from increased removal of decoupled support in the EU. Interestingly, the EU27 is unaffected as terms of trade and 'other' losses are balanced by efficiency gains from the redistribution of resources into non agro-food and fisheries activities. Similar trends are found in Greece, although from the perspective of the CAP budget, Greece traditionally receives proportionally more from the CAP budget than it pays. Consequently the loss of remaining coupled support (-€473.3m) is not compensated by reduced budget contributions (-€153.1m), such that Greek EV declines €304m (0.326% per capita income), compared with the baseline.

Conclusions

We employ a heavily modified variant of the GTAP model and a realistic baseline scenario to assess the impacts in Greece from two EUMED agricultural trade reform scenarios. A sizeable portion of Greek agro-food trade would not be affected by any

hypothetical EUMED deal, whilst in 'fishing', where a considerable proportion of import trade is concentrated with the Mediterranean Partner Countries (MPC), Greece's average applied fishing tariff is insignificant. Consequently, long run estimates suggest that Greek agro-food and fisheries sectors are not seriously affected from either form of EUMED agro-food trade agreement. Under the 'hub and spoke' agreement, agro-food and fisheries production in Greece falls marginally (0.32%), although Greece's two largest sectors ('fishing' and 'vegetables fruits and nuts') are largely unaffected. Under the FTA agreement, trade diversion from greater intra-MPC trade compromises Greek agro-food and fishing activities further, although with surprisingly weak south-south trade links, the sectoral results in scenarios 1 and 2 are similar. Consequently, larger welfare gains in Greece are attributed to the Hub and Spoke agreement.

Importantly, our MPC welfare gain estimates concur with the literature, although the economic potential of a EUMED agro-food and fisheries agreement is severely tempered by the lack of further CAP reform. Subsequently, in scenario 3 we decouple all EU agricultural sectors' support in the context of the more probable Hub and Spoke agreement. We find that the size of the MPC EV gains more than double, whilst the EU27 is largely unaffected. The worsening real income result for Greece is influenced by a deteriorating net contributory position with the CAP budget from reductions in coupled support. Clearly, CAP reform is not tied to the notion of an EUMED agricultural agreement, although our research clearly demonstrates the mitigating effect of CAP support on MPC and Greek real income positions. In terms of the 'CAP Health Check', current proposals focus on the redistribution of existing agricultural spending limits, which is likely to favour Greece's highly fragmented farming structure. However, the budget review is likely to scrutinise agricultural spending limits for the next financial framework, which in the context of our research could benefit the MPC (if an EUMED agreement is reached), whilst simultaneously spelling bad news for Greece.

Notes

[1] The views expressed in this article do not necessarily represent those of DEFRA or the Government of Aragón, Spain.

[2] Malta and Cyprus have subsequently joined the EU. Thus, the remaining MPC are: Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Authority, Syria, Tunisia and Turkey.

[3] Initiated in 2004, the Agadir Agreement seeks to establish a free trade area between the southern Mediterranean neighbours. At the current time, the agreement encompasses Egypt, Jordan, Morocco and Tunisia, whilst other countries in the region have expressed an interest to participate.

[4] In particular from Israel, Morocco and Turkey.

[5] In the standard GTAP model, a Leontief function characterises the combination of intermediate input and primary factors. This implies that, for example, the intensiveness of fertiliser application on land cannot alter with a policy change, or that

competing feeds are not substitutable in livestock sectors. In our model, both these unrealistic restrictions are removed. In each case, the substitution elasticities are calibrated to OECD central values of Allen partial elasticities (Keeney and Hertel, 2005).

[6] The CET elasticity of transformation which controls the passage of labour and capital between primary agricultural and non-primary agricultural usage, is calibrated to econometric central estimates of factor supply elasticities to agriculture in the literature (Keeney and Hertel, 2005).

[7] The top nest CET elasticity is calibrated to econometric estimates of land supply to agriculture (Keeney and Hertel, 2005).

[8] A full description of this procedure can be gained from the corresponding author upon request.

[9] A full description of the CAP modelling (see Figure 1) can be obtained from the corresponding author.

[10] For example, if only 10% of RME imports in agro-food and fisheries sector 'j' were from MPC, then only 10% of the full tariff elimination is imposed.

[11] In this scenario, we only focus on the impacts of agro-food and fisheries trade reforms.

[12] As the second largest primary agriculture, food and fisheries sector, it accounts for 14.3% of all agricultural and fishing activity and 9.4% of all agricultural, fishing and food activity.

[13] Fishing covers 66.3% of all agro-fishing activity and 43.9% of all agro-food and fishing activity.

[14] Whilst tariffs are falling, simultaneously import demands are rising. Cumulatively, there is an increased usage of a taxed activity which implies greater efficiency.

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