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Modelling the Common Agricultural Policy with the Modular Agricultural GeNeral Equilibrium Tool (MAGNET)

Effects of the 2014-2020 CAP financial agreement on welfare, trade, factor and product markets

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Abstract

This JRC report presents methodological development of the Modular Applied GeNeral Equilibrium Tool (MAGNET), a global computable general equilibrium (CGE) model, for representing the Common Agricultural Policy (CAP). Using original data on European Union (EU) domestic support, it examines some likely macroeconomic effects of the expected CAP budget over the period 2014-2020. Results suggest that agreed budget cuts, in constant price, have limited impacts on EU and world markets, given the broadly non-distortive representation of present CAP policy.

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Any errors remain the responsibility of the authors whose on-going research aims at further refining the data and modelling work. The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

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1. Introduction

The Common Agricultural Policy (CAP) remains one of the central tenets of the European Union (née European Economic Community) project, which consists of over 500 million consumers, contains more than one-third of its land area classified as 'rural' and is a key player on world agri-food markets. Established in 1957 under the auspices of the Treaty of Rome, the *raison d'être* of the CAP has evolved in the ensuing period. Since the 1992 CAP reform there was a sharp shift away from price to coupled, and then decoupled support, with a view toward the reduction of market distortions, greater provision of 'public goods' and an easing of the burden of targeting and, monitoring said payments. Alongside these incremental policy changes (1992, 1999, 2003, 2008), CAP expenditures constitute approximately 40 per cent of the EU budget compared with 70 per cent in early 1970's.

The allocation of CAP expenditures is subject to European objectives, regardless of the beneficiary member states. It is the financial corollary from the adoption of a common policy for EU agriculture.[1] Notwithstanding, the 1984 Fontainebleau European Council's decision to insert a rebate mechanism on the United Kingdom's net contribution to the European budget as well as resulting correction mechanisms for other member states runs against this principle of solidarity. As a consequence, budgetary return becomes the sticking point around the negotiating table when dealing with CAP reform,[2] especially for those EU members that receive rebates, large contributors such as Germany or large CAP recipients such as France.

Taking a more holistic approach, some commentators (Le Cacheux, 2005) argue that the CAP budget should not be merely treated as a financial zero sum game, especially when considering the non-pecuniary advantages of European policies and integration. Notwithstanding, Boulanger (2011) observes that in times of high national public deficits and gross debt, political expediency tends to exacerbate member states' budgetary return stance within the negotiations. As an example of this, in June of 2013, a hard fought political agreement between member states was reached for the next seven year CAP budgetary allocation – the so-called multiannual financial framework (MFF). This deal contemplates a decrease in CAP expenditures for the 2014-2020 MFF.

There is a lack of published modelling literature examining the impacts of CAP budget reform. One example is Nowicki et al. (2009), who explicitly model the CAP budget mechanism and analyse (inter alia) the effect of a 75% budgetary reduction in real terms (55% in nominal term). This

[1] "The Community shall have as its task [...] by implementing common policies or activities [...] to promote throughout the Community [...] solidarity among Member States" (Treaty Establishing the European Economic Community, Mar. 25, 1957, art. [2]).

[2] The statement of the 2008-2009 budget review clearly links CAP spending with UK rebate: "*The European Council therefore invites the Commission to undertake a full, wide ranging review covering all aspects of EU spending, including the CAP, and of resources, including the United Kingdom rebate, to report in 2008/9. On the basis of such a review, the European Council can take decisions on all the subjects covered by the review. The review will also be taken into account in the preparatory work on the following Financial Perspective*" (European Council, 2005).

reduction is achieved via elimination of pillar 1 support (market measures and direct payments) and increases in pillar 2 support (rural development measures) by 100%. The liberalization scenario also anticipates the removal of trade measures. Results suggest that except for livestock, cuts in direct payments have little effect on European agricultural production but significant impacts on agricultural income and the number of farms. Although this paper offers interesting insights, it does not provide a comprehensive representation of pillar 2 rural development payments.[3] This common omission is largely due to the heavy data demands of including these payments as well as the heterogeneity in implementation strategies across national/regional borders (Psaltopoulos et al, 2012).

The current paper also employs a multi-sector market model approach to estimate the welfare, macro and sectoral impacts of the current political agreement on CAP budget cuts. To significantly improve the assessment, a rich dataset of pillar 2 payments is employed; a highly detailed baseline scenario is implemented capturing actual payment changes to specific member state EU agricultural sectors under the CAP Health Check reforms (including the re-coupling of support payments); and an account of the CAP budget 'own resources' mechanism to track both payments to, and from, member states originating from the CAP budget.

The rest of this report is structured as follows: Section two discusses the model framework, data, baseline and scenario design. Section three analyses some effects of the 2014-2020 CAP budget political agreement on welfare, trade, factors and product markets. Section four provides concluding remarks.

2. Methodology

2.1 Modelling framework

For advanced applied trade policy analysis, the GTAP toolkit (Hertel, 1997) constitutes an important point of departure. Notwithstanding, additional modelling and data work are necessary in state-of-the-art CGE applications to fully explore the policy question at hand. As a first step, the paper employs a GTAP model variant known as the Modular Agricultural GeNeral Equilibrium Tool (MAGNET).[4] A key strength of the MAGNET model is that it allows the user to choose a la carte those sub-modules of relevance to the study. In the context of the current work aims, additional modules are 'activated' to capture the specificities of agricultural factor and product markets. Thus, modifications to the nesting structures characterise the heterogeneity of land usage by agricultural activity; a regional endogenous land supply function; the sluggishness of capital and labour

[3] Pillar 2 payments include target competitiveness (Axis 1), environment (Axis 2), quality of life and diversification of the rural economy (Axis 3), and community-led local development strategy (Axis 4 or Leader).

[4] MAGNET is part of the integrated Modelling Platform for Agro-economic Commodity and Policy Analysis (iMAP) hosted by the European Commission's Joint Research Centre, Institute for Prospective Technological Studies (M'barek et al., 2012). For a fuller description of the MAGNET model see Woltjer and Kuiper (2014).

transfer between agricultural and non-agricultural sectors with associated wage and rent differentials; the inclusion of substitution possibilities between feed inputs in the livestock sectors; and additional behavioural and accounting equations to explicitly characterise EU agricultural policy mechanisms (that is, production quotas, single farm payment, pillar 2 payments). In addition to the standard MAGNET model, further in-house refinements to the GTAP data and MAGNET model structure are included to improve the precision of the study (Box 1).

Box 1: Overview of GTAP data and MAGNET model main enhancement

- Recalibration of existing EU domestic support policies in the 2007 benchmark (such as more comprehensive representation of pillar 2 accounts, and re-representation of pillar 1 decoupled support).
- Identification of each class of support payment (that is *'decoupled'; 'coupled direct payments'; 'market measures'; 'additional direct transfers'; 'other European Agricultural Guarantee Fund (EAGF) payments'; 'agri-monetary transfers'; 'rural development Axis 1 and 2 payments' and 'national payments'*), such as an ad valorem intermediate input-, output- or factor tax, across the 12 primary agricultural sectors. This knowledge serves as a starting point for designing and implementing detailed baseline scenarios.
- Use of detailed time series CAP policy data on pillars 1 and 2 in order to contemplate meticulous contemporary baseline CAP scenarios, in particular the re-coupling of support payments under the article 68 provision. To the best of our knowledge, this level of detail in the coupled/decoupled split has not been attempted in previous EU focused CGE applications.
- Inclusion of additional variables into the CAP budget module to link specific EU payment shocks (i.e., pillar 1 coupled, agri-monetary transfers, other EAGF payments, additional direct transfers) for all tax wedges with the modified CAP budget expenditure accounts.
- Extension of the MAGNET model to capture the 'own resources' component to the CAP budget, complete with the UK rebate and associated correction mechanisms.

Importantly, all decoupled payments are calibrated to the land factor assuming equal subsidy rates across all agricultural sectors. Most of rural development payments are assumed to affect productivity (output and input augmenting technological change). The parameterisation of euro payments into productivity changes is taken from the literature and expert opinions (Woltjer and Kuiper, 2014).

In the standard MAGNET model, rural development measures are aggregated into groups according to the similarities in the economic mechanisms which underlie them. This paper adopts five classes of pillar 2 payments: (i) investment in human capital (e.g., vocational training, setting up of young farmers, use of advisory services, etc.); (ii) investment in physical capital (e.g., modernisation of agricultural holdings, infrastructure investments, adding value to agricultural and forestry products, etc.); (iii) agri-environmental payments (e.g., Natura 2000 payments, forest-environment payments, etc.); (iv) support to less favoured areas (e.g., payments to farmers in mountainous areas); and (v) wider rural development schemes (e.g., diversification into non-agricultural activities; encouragement of rural tourism; village renewal and development, etc.). By their nature, 'agri-environmental schemes' and 'less favoured areas' are directly tied to the land factor (Nowicki et al., 2009), whilst the remaining three classes of pillar 2 payments, which are not linked to any specific factor demand, intermediate input demand or output, are not calibrated to any subsidy wedge within the GTAP data.

In terms of productivity effects, pillar 2 payments of classes (i), (ii), (iii), and (v) are assumed to incur endogenous output or input productivity effects. Investments in physical capital are posited to lead to increases in productivity in agricultural sectors. Estimates (indirect and direct) of vintage effects of investment in physical capital on output productivity suggest a rate of return of 30% (Nowicki et al., 2009), based on research by Wolff (1996) and Gittleman et al. (2006).

Investments in human capital are assumed to increase output productivity in agricultural sectors. Greater awareness of farming practise leads to (*inter alia*) better use of machinery, improved fertiliser, pesticide and feed application, and more efficient land use (e.g., better timing, producing higher quality products). The assumed productivity parameter of 0.4 is employed in MAGNET based on the research of Evenson (2001), which suggests an internal rate of return of 40% for the OECD countries. Accordingly, an investment of one euro per unit of physical capital stock increases output productivity by 40%.

As the largest budgetary component of pillar 2, expenditures on agri-environmental measures compensate farmers in return for a more extensive (i.e., less capital and labour intensive production processes) production system. Pufahl and Weiss (2009) show that agri-environmental payments can generate an increase in marginal land use that might otherwise have gone out of production. Following Nowicki et al. (2009), it is assumed in the MAGNET model that labour and capital productivity in agricultural sectors decreases by 5% for every one euro of expenditure on agri-environmental schemes.

Finally, wider rural development schemes encapsulate a broad variety of initiatives to reverse economic and social decline in rural areas by promoting innovation and creating employment opportunities in rural areas, thereby promoting output productivity change not only in agriculture but also in the wider rural economy. By way of assumption (Woltjer and Kuiper, 2014), MAGNET employs the same rate of return as that used for physical capital investments (i.e., 30%).

In modelling terms, output augmenting technical change in agricultural sector 'j' (OA_j) follows an *ad hoc* endogenous specification. Total expenditures of human capital (HK), physical capital (PK) and wider rural development measures (WID) are inserted as follows (dropping the regional subscripts):

$$OA_j = \Theta \times \left[\frac{HK}{\sum_{k \in AGRIC} VOA_k} \right] + \Phi \times \left[\frac{PK}{\sum_{k \in AGRIC} VK_k} \right] + \Xi \times \left[\frac{WID}{\sum_{k \in TRAD} VOA_k} \right] \quad j \in AGRIC \tag{E.1}$$

where Θ, Φ and Ξ are technical change transfer parameters relating to HK, PK and WID schemes with values of 0.4, 0.3 and 0.3, respectively. Thus, the ratio of HK to the total cost-price value of agricultural output (based on GTAP data) multiplied by Θ, yields the output augmenting technical change in agricultural sector 'j' from HK. The proportion of PK to the total cost-price value of the agricultural capital stock (based on GTAP data) multiplied by Φ ,yields the output augmenting technical change in agricultural sector 'j' from PK. Finally, the proportion of WID to the total cost-price value of *all* sectors' output (based on GTAP data) multiplied by Ξ, yields the output augmenting technical change from physical capital expenditures in agricultural sector 'j' from WID.

In the non-primary agricultural sectors, output augmenting technical change is assumed to respond to changing WID expenditures only (dropping the regional subscripts):

$$OA_j = \Xi \times \left[\frac{WID}{\sum_{k \in TRAD} VOA_k} \right] \quad j \in NAGRIC \tag{E.2}$$

In levels terms, the endogenous specification for changes in labour and capital factor 'f' (in the set NLAND) augmenting technical change in agricultural sector 'j' ($FA_{f,j}$) resulting from changes in agri-environmental (AE) pillar 2 payments is given below (dropping the regional subscripts):

$$FA_{f,j} = \Psi \times \left[\frac{AE}{\sum_{i \in NLAND} \sum_{k \in AGRIC} EVFA_{i,k}} \right] \quad f \in NLAND \quad j \in AGRIC \tag{E.3}$$

where Ψ is a technical change transfer parameter relating to changes in agri-environmental pillar 2 expenditures with a value of -0.05. Thus, the ratio of AE payments to the total value of labour and capital factor usage in agriculture (based on GTAP data) multiplied by Ψ, yields the input augmenting technical change from human capital expenditures in agricultural sector 'j'.

The appendix (section 7) explains further the data changes made to the version of the CAP budget in this paper. From a modelling perspective, the MAGNET treatment of the CAP budget does not include an ‘own resources’ component. Thus, additional accounting and behavioural equations are inserted to complete the accounts of the CAP budget. At the outset, only the CAP expenditure component of the EU budget is modelled, where the CAP expenditure share of the EU budget share is falling (exogenously) over time employing financial framework projections data and own calculations (see scenario design). This CAP expenditure share is employed to estimate those resource costs from member states which correspond to the CAP component of the EU budget.

Thus, in line with EU law, 75% of tariff revenue is collected (the remaining 25% is assigned to administrative costs), whilst GTAP data on value added tax contributions is incomplete and consequently not employed in the CAP budget module. The difference between member state receipts (i.e., from pillar 1 and 2) and member state contributions from import tariffs multiplied by a CAP budget expenditure share, gives an aggregate EU resource cost. This shortfall is met by an EU-wide uniform GDP contribution rate by each member state. Thus, whilst the EU budget balances, at the member state level a region may be a net contributor (regional income < regional expenditure) or a net beneficiary (regional income > regional expenditure).

Further accounting equations are inserted to consider the UK rebate and subsequent corrections to other member states in response to this distorting mechanism. In accordance with the EU budgetary agreement, the UK recovers 66% of its net contribution (if in deficit). From 2014, Denmark also receives an annual lump sum payment. Austria, Germany, the Netherlands and Sweden only pay 25% of their GDP share contribution, whilst the latter two also receive an annual lump sum compensation payment. In the 2007 benchmark, the CAP budget only applies to the EU27 regions. Additional exogenous dummy variables are employed to incorporate Croatia both within the CAP budget own resources, the UK rebate and subsequent member state correction mechanisms (in line with 2013 MFF Agreement).

2.2 Aggregation, closure and baseline

For the purposes of this work, the GTAP data is aggregated to 21 tradables, of which 17 are agri-food related, and 28 countries or regions (Box 2). In terms of the regional disaggregation, those European countries which benefit from budget rebates are separated, (i.e. United Kingdom, Germany, Netherlands, Austria, Sweden, and Denmark). As significant recipients of CAP funding, France, Spain and Italy are disaggregated, whilst Poland and Romania represent large recipient new member states from the 2004 and 2007 enlargements, respectively.

The remaining EU countries are aggregated into 'Other EU15' and 'Other EU12'. Lastly, as the 28th EU member state from July 1st, 2013, Croatia is treated separately. To examine third country impacts from CAP budget reform, non EU regions are grouped into either 'large players' on global agri-food markets or impoverished partners. All residual trade and output flows are captured within a Rest of the Word (ROW) region.

Box 2: GTAP data aggregation

- **Sectoral disaggregation** (21 GTAP sectors)

Wheat; Other grains; Oilseeds; Raw sugar; Vegetables, fruits and nuts; Other crops; Cattle and Sheep; Pigs and Poultry; Raw Milk; Wool; Red Meat; White Meat; Dairy; Sugar Processing; Other Food Processing; Beverages and Tobacco; Energy; Extraction; Manufacturing; Services.

- **Regional disaggregation** (28 GTAP regions)

United Kingdom; Netherlands; Sweden; Denmark; Germany; Austria; France; Italy; Spain; RoEu15; Poland; Romania; RoEU12; Croatia; EFTA; USA; Canada; Mercosur; Russian Federation; Eastern Partnership; China; India; Japan; Australia & New Zealand; Middle East & North Africa; Everything But Arms; Rest of South Saharan Africa; Rest of the World.

In terms of the model closure, all policy variables (ad valorem taxes and tariffs) are assumed exogenous. An exogenous region specific technical change variable is shocked to meet targeted real GDP projections, whilst exogenous land productivity shocks are also contemplated. Additional output- and input-augmenting technical changes in relation to pillar 2 expenditures are treated endogenously. As in the standard GTAP model, all primary factor endowments (except land) are exogenous. Labour projections follow changes in regional population, whilst capital endowment shocks are equal to regional real GDP forecasts (i.e., fixed capital-output ratio). Data on GDP and population are sourced from USDA (2013) whilst land productivity data is from IMAGE (Bruinsma, 2003).

It is assumed that regional investment demand is allocated such that expected rates of return across regions are equated subject to exogenous projections of regional capital stocks. Moreover, the MAGNET model variant used here employs a recursive dynamic treatment of investment behaviour which ensures that investment distribution across regions is consistent with exogenous shocks in capital over time periods. The standard neoclassical macro closure ensures that withdrawals (i.e., savings and imports) equal injections (i.e., investment and exports) such that the balance of payments is zero. In this modelling work, this is modified to include additional injections and withdrawals arising from CAP budget receipts and payments to/from each member state. At the margin, this modification has important implications for the model results.

The baseline (Box 3) is implemented over two time periods (2007-2013-2020) which coincide with the MFF and Croatia's accession to the EU. The baseline consists of an array of macro projections, envisaged trade policy shocks and CAP policy shocks. Within this time horizon, additional multilateral (i.e., Doha) and some bilateral (i.e., USA, Canada, Mercosur, Japan etc.) trade shocks are not contemplated due to the uncertainty of a firm timetable for agreement.

Box 3: Assumptions shaping the baseline scenario

I. Baseline shocks (2007-2013 period)

I.a. Projections

- Skilled and unskilled labour, capital, natural resources, population, and real GDP

I.b Trade Policy Shocks

- Non reciprocal EU tariff eliminations with the Everything But Arms countries

I.c Agricultural Policy (including 2008 Health Check reforms)

- Phasing in of decoupled payments for 2004 and 2007 accession members
- Targeted removal of specific pillar 1 coupled support payments: Arable crops, olives and hops to be fully decoupled from 2010; Seeds, beef and veal payments (except the suckler cow premium) decoupled by 2012, Protein crops, rice and nuts will be decoupled by 1 January 2012, Abolish the energy crop premium in 2010
- Re-coupling of support under the article 68 provision: Member states may use up to 10 per cent of their financial ceiling to grant measures to address disadvantages for farmers in certain regions specialising in dairy, beef, goat and sheep meat, and rice farming
- Pillar 2 payments to the EU27 under the financial framework
- Cumulative shocks for milk quotas rise of 1 per cent annually from 2009 to 2013
- Projected reduction in CAP expenditure share of the EU budget
- Change in Swedish and Dutch lump sum rebates corresponding to CAP expenditure share of EU budget

II. Baseline shocks (2013-2020 period)

II.a Projections

- Skilled and unskilled labour, capital, natural resources, population, and real GDP

II.b Trade Policy Shocks

- EU Enlargement elimination of border protection between incumbent EU27 and Croatia
- Erection of an EU common external tariff (CET) on third country trade for Croatia and reciprocal third country CETs extended to Croatia as an EU member state
- Non reciprocal EU tariff eliminations with the MENA, Eastern Partnership and Sub-Saharan Africa regions
- Non reciprocal EU tariff eliminations extended to Croatia
- Removal of all export refunds

II.c Agricultural Policy

- CAP budget envelope remains the same as in 2013 as well as pillar 2 co-finance rates
- Phasing in of decoupled payments for 2007 accession members and Croatia
- Pillar 2 payments extended to Croatia
- Abolition of raw milk (2015) and raw sugar (2017) quotas
- Croatia incorporated within the CAP budget and UK rebate mechanism
- Projected reduction in CAP expenditure share of the EU budget
- Change in Swedish, Dutch and Danish lump sum rebates corresponding to CAP expenditure share in EU budget. UK rebate is maintained (European Council, 2013)

The baseline includes detailed pillar 1 and 2 expenditure shocks based on 2011 financial year's real expenditure (not ceiling limits) changes to specific member state EU agricultural sectors under the CAP Health Check reforms. The numerous pillar 2 initiatives are aggregated to five categories employed within the MAGNET model (see above). Given the co-financed nature of pillar 2 support, additional nationally funded pillar 2 expenditure shocks are also implemented in the first period based on data from the European Commission's CATS (DG Agri) database. For lack of alternative data, it is assumed that both the co-finance rates and the allocation of pillar 2 expenditures in member states in the second period remain the same as in the first period.

In addition to all of these baseline shocks, a CAP budget scenario is explored in the second period. Both exogenous pillar 1 and 2 expenditure reductions and exogenous CAP expenditure share reductions of the EU budget are implemented assuming that the non-agricultural spending concepts remain unchanged.[5] Budget cuts reflect the political agreement reached on June 27, 2013, with 13% and 18% cuts in pillar 1 and pillar 2 expenditures, respectively (European Council, 2013) in comparison to the 2020 baseline. These cuts *in constant price* have been approved by the European Parliament on November 19, 2013, and European Council on December 2, 2013.

It should be made clear that the analysis does not account for member states' possibilities to transfer up to 15% of their envelopes between pillars and any further redistribution of decoupled payments among and between them. Thus no changes in decoupling schemes (regional, historical, hybrid) are assumed for the next period. Also agreed ceiling are respected during the 2014-2020 period, i.e. no financial discipline mechanism is activated.

3. Application

3.1 CAP budget scenario

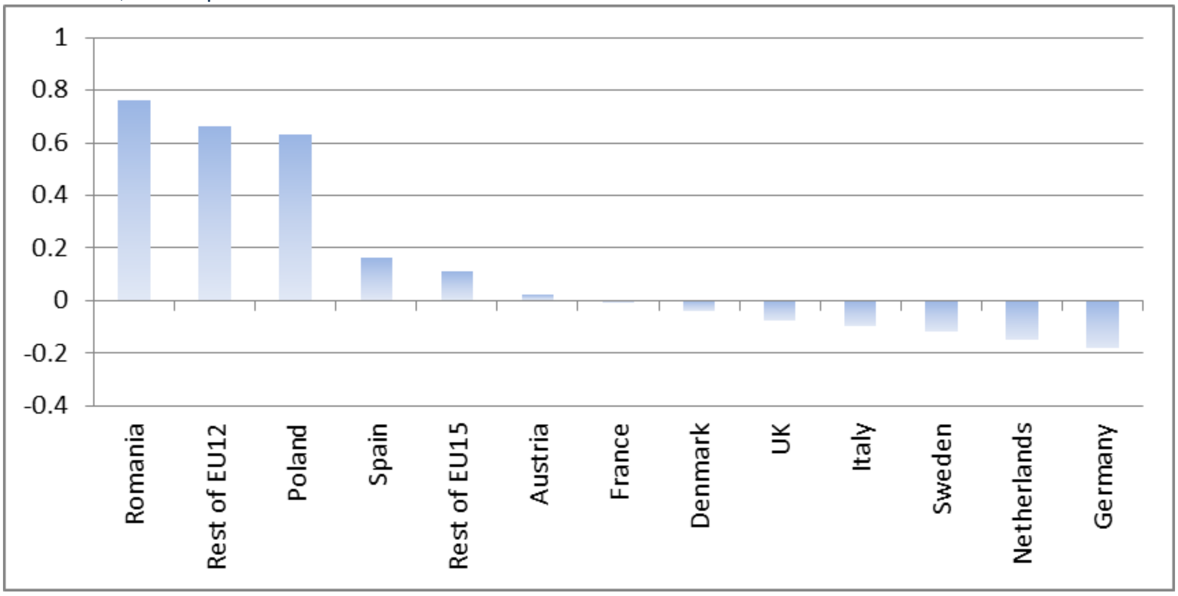
In this section, unless otherwise stated, estimates are presented in comparison with the baseline (status quo) scenario. The complexity of the CGE model framework renders a full discussion of all the model results as unwieldy. Thus, the focus is on the CAP budgetary and welfare effects, as well as the output, price and trade balance impacts for specific regional and sectoral aggregates. To understand the driving mechanism behind the results, a useful starting point is the representation of the revenues and costs corresponding to the CAP budget at the end of the baseline period 2007-2013 (top of Table 1). The first row shows CAP receipts of €52,340 million accruing to the EU member states. This total is split between pillars 1 and 2 amounting to €41,114 million and €11,222 million, respectively.[6] Of the former, decoupled payments total €38,435 million and remaining coupled payments sum to €2,684 million. These costs are met by member state CAP budget contributions in the form of tariff revenues and GDP, which are scaled according to the CAP share of the EU budget. The rebate row accounts for the net impacts on EU members of both the UK rebate and resulting correction mechanisms to other member states.

The net position shows that most of the EU15 is a net contributor to the CAP budget, whilst the newer member states (as expected) are net beneficiaries. This underlies the redistributive nature of the CAP. Although France is a large recipient of CAP budget funding, it does not receive special dispensation such that it remains a marginal net contributor (Figure 1).

[5] Given the focus of this analysis, no attempt is made to model remaining EU budgetary policies (e.g., structural funds).

[6] Pillar 2 figure excludes nationally co-financed support, which although calibrated to the land factor, does not pass through the CAP budget accounting mechanism. However, when modelling changes in EU part co-financed support, we model equivalent changes in nationally co-financed support.

Figure 1. CAP budget net position in 2013
% of GDP, 2007 prices



The Austrian rebate (in the form of reduced GDP contributions), on the other hand, renders this country as a small net beneficiary from the CAP. As expected, Spain and the RoEU15 (including Greece and Portugal) are net beneficiary member states from CAP budgetary funding. As a percentage of GDP the largest contributors are Germany and the Netherlands (0.18% and 0.15% respectively) despite the fact that both receive partial rebates. Moreover, even with a sizeable rebate, the UK is still a net contributor to the CAP portion of the EU budget (-€1,733 million or 0.08% GDP). The newer member states typically receive net support which amounts to between 0.6 to 0.8% of GDP.

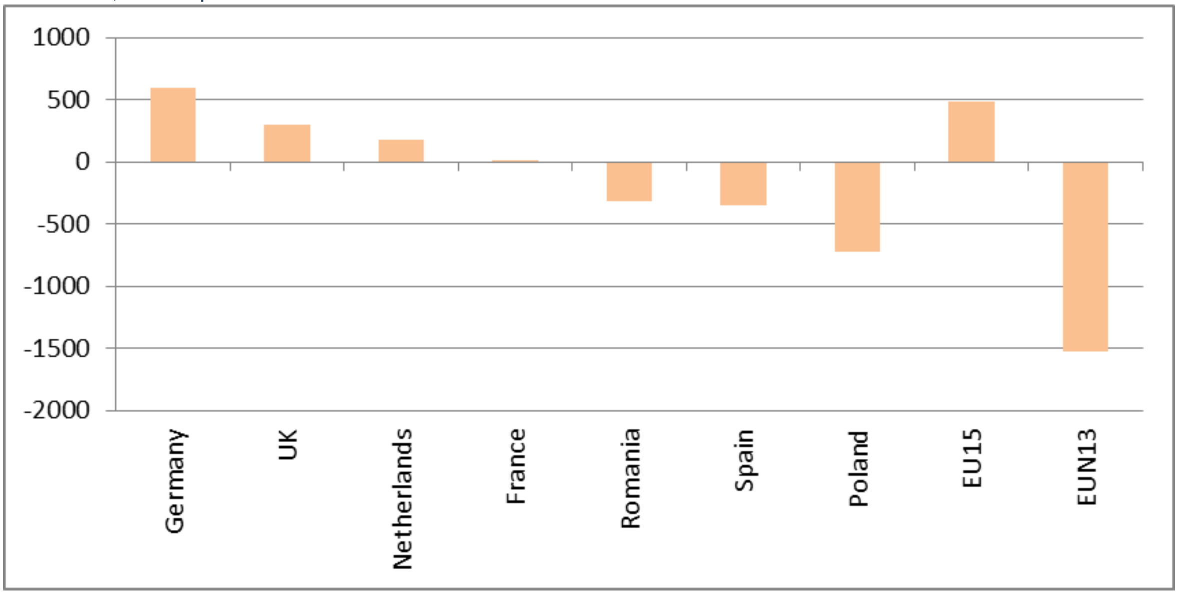
On the basis of these estimates, a CAP budget cut would benefit (detriment) net contributors (net beneficiaries) in the form of a taxpayer saving (loss). In the model, income changes feedback to each economy as an increase (decrease) in expenditure and savings. This effect is demonstrated in the lower part of Table 1.

3.2 Impacts on welfare

As an initial observation, results of CAP budget decrease are consistent in terms of the comparative magnitudes across member states and the signs of the estimates (Figure 2). Notice that the expected EU CAP budget cut implies relatively small adjustment costs with the largest gainer (loser) being Germany (Poland) with an monetary gain (loss) of €589 million (-€356 million).

Figure 2. Income (EV) changes in 2020

€millions, 2007 prices



Decomposition of the real income (equivalent variation (EV)) changes for a selection of regions is presented in Table 2. Measured in per capita income terms, the impacts are small owing to the localised nature of the incremental shocks (i.e., restricted to EU agriculture). In the EU, the largest per capita real income gains accrue to the net contributors, the Netherlands and Germany. This is consistent with the CAP budget cost as a percentage of GDP statistic reported in Table 1. Under a similar line of reasoning, the biggest per capita income losers are the new member states, especially Romania (-0.2%).The EV results suggest that the EU28 does not undergo a zero sum gain owing to the larger EV losses accruing to the 'new' EU member states (EUN13) vis-à-vis the EV gains of the 'old' EU member states (EU15). This result is driven by the endowment and technology effects (see below).

Decomposing EV into money metric measures within the EU, the dominating driver is the CAP budget effect (CAP), resulting in EV gains for the UK, the Netherlands, Germany and France and concomitant losses in Spain, Poland and Romania.[7] Elsewhere, EU members generally realise allocative efficiency (Alloc) gains due to the contraction in agricultural activities; increased imports of tariffed manufactured goods; and output rises in domestic services sectors.[8] In Spain, Poland and Romania, although subsidised agricultural activity contracts (i.e., allocative efficiency gain), manufacturing imports and domestic services output also fall relative to the baseline resulting in

[7] Although the results are not shown for all the EU Member States, as a rule, net contributors (beneficiaries) to (of) the CAP budget realise EV gains (losses). The full set of results is available upon request.

[8] Allocative efficiency gains arise from changing resource or product usage in the presence of market distortions (taxes, tariffs and subsidies). For example, a taxed activity leads to below pareto optimal purchases/employment of a product or factor, such that policies that encourage increased usage of that product or factor result in an allocative efficiency gain. This monetary gain is quantified by multiplying the real (quantity) usage of the product or factor by the tax/tariff or subsidy wedge.

net allocative efficiency falls. As the unit price ratio of exchange between exports and imports, the terms of trade (ToT) impact within the EU is the net result of (i) increasing agri-food prices from partial elimination of agricultural support and (ii) falls in the real exchange rate (i.e., factor prices).[9] The endowment effect (Endw) measures incremental real income impacts through changes in factor usage. This value is reported as negative within the EU due to the idling of agricultural land under the CAP budget cuts and is an explanatory factor for the fall in EU28 EV.

The technology measure (Tech) captures the money metric equivalent from improvements in output or input augmenting technical change. Under the budget cuts, reductions in pillar 2 investments in human and physical capital in agriculture; as well as wider rural development payments; generate further productivity losses in agricultural and (to a lesser extent) non-agricultural sectors. This negative effect is particularly pronounced in Poland. In contrast, the UK and Austria witness small positive technological EV gains at the margin with agricultural support reductions. This is because approximately 60 per cent of UK and Austrian pillar 2 expenditure (including co-financed support) fund agri-environmental extensification measures i.e. imply a negative land productivity effect.

Outside the EU, per capita real income impacts are negligible due to the largely non-distortionary nature of EU agricultural policy, Notwithstanding, the results clearly show that agricultural net exporters (e.g., USA, MERC, AUSNZ) gain, with concurrent reductions in net importing regions (EFTA, China, India, Japan). This reflects the slight increase in agricultural export prices which has a beneficial (detrimental) ToT impact for agricultural net exporters (importers). Interestingly, there is (limited) scope for less developed country (LDC) welfare gains from the budget cuts, although this result masks the heterogeneity of relative agricultural trade competitiveness within this regional aggregate.

3.3 Trade impacts

Table 3 presents the changes in the trade balances for a selection of EU and non-EU regions. In policy terms, for net CAP budget contributors, real income rises are accompanied by rises in the marginal propensity to import, resulting in trade balance deteriorations. The opposite effect applies in the case of the net beneficiary EU member states with falling EV under the budget cuts.

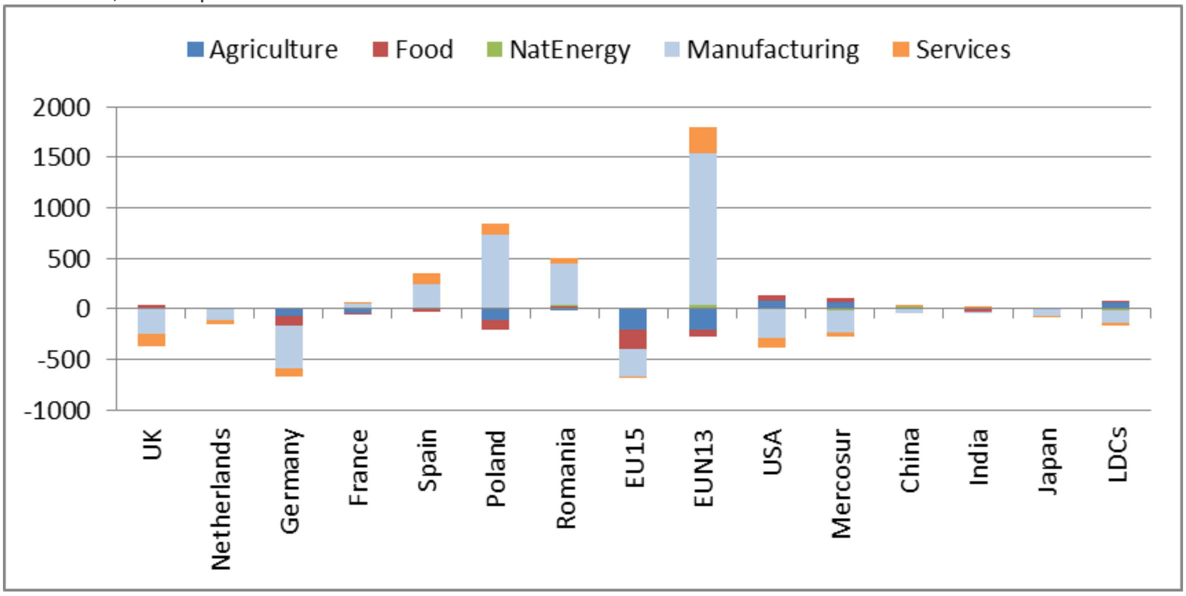
The EU28 agriculture and food trade balances deteriorate -€410 million and -€260 million, respectively. As expected, non-EU28 agri-food trade balances undergo small improvements in the agricultural net exporting regions (e.g., USA, MERC & AUSNZ). It is worth noting, however, that since

[9] In the UK and the Netherlands, real macro growth rises slightly leading to small *increases* in wages and capital rents compared to the baseline. This result is discussed in subsection 3.3.

most CAP budget support is decoupled, it is assumed production neutral such that the distortive impacts on trade and world prices are minimal.[10]

Under the current political agreement for CAP budget reform, the EU15 trade balance deteriorates by -€681 million, whilst the EUN13 trade balance improves €1,528 million. Since the EV loss for the EUN13 exceeds the EU15 EV gain, the EU28 trade balance consequently improves €847 million. Under the general closed system of global accounting equations, an improved EU28 net trade balance is accompanied by a corresponding (minor) deterioration in non-EU region trade balances.

Figure 3. Net trade balances effects in 2020
€millions, 2007 prices



Across the EU's non agri-food sectors, the trend follows that of the macro trade balance. Thus, in the EU15, with a rising propensity to import (and higher income elasticities for non-food products), the trade balances deteriorate in manufacturing and services by -€278 million and -€12 million, respectively. In the EUN13, the reverse occurs leading to corresponding estimates of €1,501 million and €269 million (Figure 3).

3.4 Impacts on factor and product markets

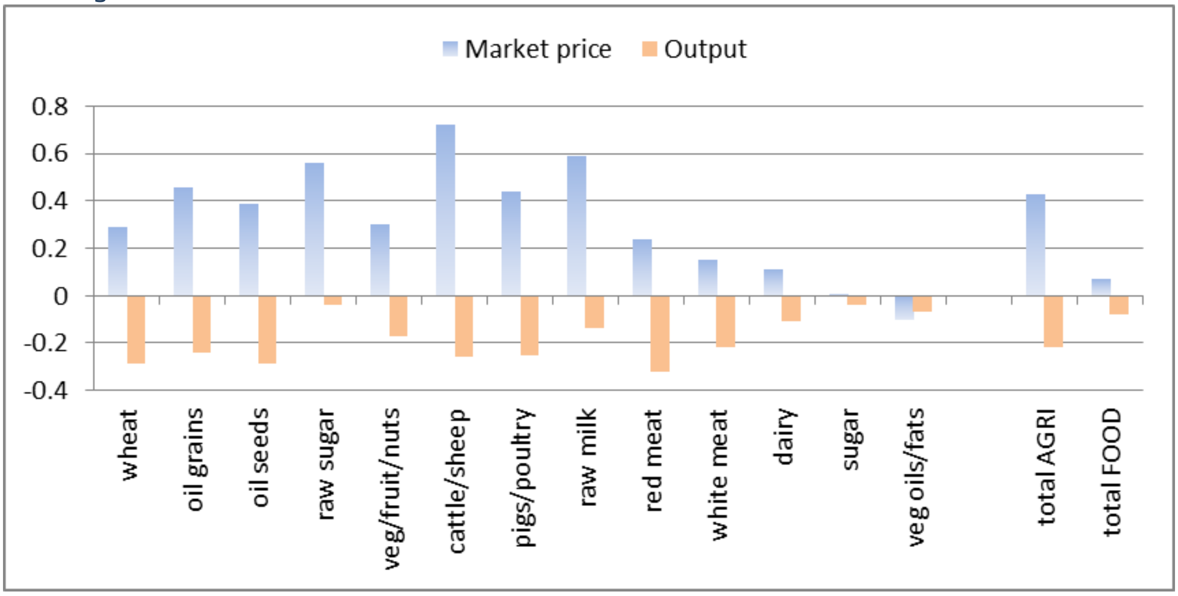
In Table 4 are shown output and price impacts in selected member states, while Figure 4 focuses on aggregated EU28.[11] As expected the rise in agricultural market prices, which is driven in large part by marginal cost increases in land rents paid by the farmer (row 2, Table 4), is positively related to the magnitude of the CAP support cuts.[12]

[10] Although not shown, agricultural world price rises are no greater than 0.6% even under conditions of a 50% CAP budget cut. This muted price effect also, in part, reflects the relatively high armington elasticities employed within the GTAP database.

[11] Corresponding simulation estimates in the non-EU regions are not shown since the results are negligible

[12] Decoupled payments (i.e., land subsidy) are calibrated to the land factor and therefore drive a wedge between the rent that the landowner receives (who may, or may not be the farmer) and the lower rental price of land paid by the user (i.e., farmer). Removing *partially* this support

Figure 4. Market price and output effects in 2020
% changes



Rising agricultural prices are transmitted to downstream processors, whose prices are also positively related to the size of support cuts. Given this loss of competitiveness, agriculture and food production falls in the EU, although the relative impact is less than 1% for the EU28. On the one hand, this is because most agricultural support is production neutral. Indeed, even in those member states (e.g., France, Spain) which employ recoupling policies under the auspices of article 68, decoupled support still constitutes the majority of pillar 1 (90% and 85%, respectively). Moreover, given the medium run modelling assumption regarding the restricted movement of capital and labour to, and from agriculture, as well as the restrictions on land use changes, agricultural supply responsiveness is expected to be inelastic. The larger price rises and production falls in Polish agriculture reflect the observation above regarding the loss of relatively greater productivity inducing pillar 2 investment payments. Applying a similar logic, UK agricultural activity increases slightly from CAP budget cuts since the reduction in its relatively large agri-environmental payments implies that UK agriculture becomes less extensive.

In the EU28 land market, falls in aggregate demand result in (marginal) land abandonment of about -0.5%. Due to the inelastic nature of the land supply curves, EU28 landowner rents (row 1, Table 4) fall more sharply, averaging -4%. In policy terms, this represents the lost capitalisation of land rents from reductions in the single farm payment.

In the services sector, there is a greater intensity of 'skilled labour' so it is less affected by sectorally trapped agricultural unskilled labour. Moreover, the import dependency ratio for services

(or land subsidy) implies that the seller's rental rate falls relative to the users rental rate – or in other words, there is a lost capitalization of the land rental price to the landowner.

within the EU is considerably below that for manufacturing (i.e., less import competition). Thus, in those member states where real income improves from CAP budget cuts (e.g., UK, Germany, France), services output rises slightly due to real income induced domestic demand increases. Using a similar logic, in member states where real income falls (e.g., Poland), services output also contracts. In the UK, since the services industry is relatively prominent as a proportion of GDP, real income rises, leading to real growth improvement and concomitant real exchange rate rises in labour and capital factors (not shown).

The manufacturing sectors are relatively more 'unskilled labour' intensive, whilst also face greater import competition. In those member states which undergo real income increases, demand rises lead to relatively stronger import substitution effects accompanied by a lower domestic supply response. In those member states which are relatively worse off, manufacturing output improves slightly. For the EU28 the overall impact on manufacturing and services is minimal given that general equilibrium (i.e., resource reallocation) ripple effects from a 'small' sector such as agriculture are muted.

4. Concluding remarks

This JRC report presents methodological improvement of MAGNET, a sophisticated agricultural variant of the well-known GTAP computable general equilibrium (CGE) model for representing the Common Agricultural Policy (CAP). Using original data on EU domestic support, it examines the potential trade and welfare implications arising from a reform to the CAP budget. A main finding is that the cuts in the CAP budget have relatively limited impacts on third countries, or indeed EU agricultural output. To a large extent, this is to be expected owing to the modelling representation of the decoupled payments. In the literature, there are a number of possible channels *coupling* farmer production decision's to *decoupled* payments (Moro and Sckokai, 2013). Owing to the degree of empirical uncertainty regarding the appropriate 'coupling factor', this analysis only contemplates production neutral behaviour. Consequently, the main production effects arise from changes in pillar 2 expenditures and their associated productivity effects in EU member states. This observation sheds some light on the need to further investigate coupling channels of domestic support, and to undertake sensitivity analysis with alternative allocation of support to factors.

As a further remark, the complex system of intra-community transfers via the budget mechanism implies that policy induced changes to CAP support have, at the margin, real income and trade balance implications. Compared to the aforementioned production impacts these income induced effects have a relatively greater outcome on resource reallocations across all sectors within the EU and, to a lesser extent, third country trade effects. Indeed EU budget net beneficiaries (e.g., Poland) will experience EV losses, whereas net contributors will benefit (e.g., Germany).

Notwithstanding, as is the case in all empirical studies, a number of caveats should be observed. Firstly, no assumption is made regarding how, for example, potential taxpayer savings (losses) from CAP budget reductions are allocated within national economies. In the current analysis, this is manifested as a rise (fall) in savings and domestic demand. Other possibilities that could be explored, however, are the diversion of funds to research and development activities, or perhaps as a subsidy to labour. Alternative assumptions will clearly have different implications on economic performance. Secondly, the elasticity between pillar 2 expenditure changes and productivity changes is currently subject to informed qualitative expectation based on Nowicki et al. (2009). Although further literature is emerging (Mary, 2013), additional research is necessary.

Related to this is the potential reverse 'crowding out effect' from withdrawal of EU pillar 2 investments. In other words, to what extent could substitute private investment mitigate lost productivity reductions, particularly those observed in the newer member states. Finally, the EU28 losses reported here are biased by the interpretation of the endowment effect. The productivity loss from removal of more marginal land is overstated since it is currently assumed that all land units have equal productivity. Additionally, whilst agricultural land which falls out of production registers as a loss to the economy, there is no mitigating mechanism for its possible uptake in non-agricultural uses (e.g., forestry).

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6. Supporting Tables

Table 1: The CAP Budget in 2013 and 2020

€millions, 2007 prices

CAP budget in 2013	**UK**	**NL**	**SE**	**DK**	**DE**	**AT**	**FR**	**IT**	**ES**	**Rof15**	**PL**	**RO**	**Rof12**	**HR**	**EU28**
1. CAP receipts	3671	1228	930	964	6410	1242	8390	5084	6096	6708	4359	1816	5443	0	52340
Pillar I: decoupled support	3013	1115	654	888	5177	622	6888	3752	4352	4633	2744	1018	3579	0	38435
Pillar I: coupled support	62	43	10	21	88	80	728	250	761	510	27	43	61	0	2684
Pillar 2: LFAs	54	1	41	1	157	126	292	105	72	419	243	109	289	0	1909
Pillar 2: agri-environmental	348	22	149	27	364	272	218	341	392	510	241	112	524	0	3521
Pillar 2: physical capital	73	12	26	5	288	56	120	413	303	340	278	135	475	0	2526
Pillar 2: human capital	20	1	12	8	4	15	71	103	90	157	403	53	105	0	1044
Pillar 2: wider rural dev.	96	34	37	14	332	70	73	123	127	138	423	346	409	0	2222
2. CAP contribution	8458	2537	1487	953	10822	1152	7708	5933	4055	4925	1635	605	2070	0	52340
3. Rebates	3054	431	89	-96	-325	-37	-932	-697	-471	-532	-190	-70	-224	0	0
4. Net position	-1733	-878	-468	-85	-4737	53	-250	-1546	1571	1251	2534	1141	3149	0	0
% of GDP	-0.08	-0.15	-0.12	-0.04	-0.18	0.02	-0.01	-0.10	0.16	0.11	0.63	0.76	0.66	0.00	
CAP budget cut vs. baseline in 2020															
1. CAP receipts	-507	-163	-134	-128	-891	-188	-1129	-716	-842	-950	-646	-253	-574	-65	-7187
2. CAP contribution	-1199	-336	-204	-132	-1439	-157	-1050	-760	-539	-674	-260	-96	-312	-28	-7187
3. Rebates	-445	-36	-6	6	40	5	128	90	64	75	31	11	35	3	0
4. Net position	246	137	64	10	589	-26	49	135	-239	-202	-356	-146	-228	-33	0

Notes: 4 = 1-2+3. 'Rebate' includes UK rebate and lump sum corrective payments. CAP contribution includes both tariff and GDP payments.
The budget reduction in the 2007 and 2013 accession member states is below 50% compared with 2013, since these are still receiving additional payments in the 2013-2020 period.

Table 2: Equivalent variation (EV) impacts vs. baseline in 2020

€millions, 2007 prices

	UK	**NL**	**DE**	**FR**	**ES**	**PL**	**RO**	**EU15**	**EUN13**	**EFTA**	**USA**	**MERC**	**AUSNZ**	**CHN**	**IND**	**JAP**	**LDC**
EV	299	182	593	14	-346	-723	-321	482	-1525	-11	103	141	26	-30	-4	-8	54
per cap U (%)	0.01	0.03	0.02	0.00	-0.03	-0.15	-0.20	0.00	-0.12	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Decomposition:																	
ALLOC	19	14	91	32	-11	-39	-34	241	-63	-9	1	23	2	-11	36	-3	6
TOT	24	41	53	20	-39	-77	-95	27	-218	-5	72	89	19	-19	-16	-6	27
ENDW	3	-7	-89	-61	-12	-65	-13	-323	-149	3	16	17	1	-25	-22	1	8
TECH	4	-4	-42	-28	-38	-194	-42	-213	-352	0	8	7	2	23	-3	0	8
POP	6	3	-4	1	-8	4	3	-4	11	0	6	5	1	2	1	0	4
CAP	243	135	585	49	-238	-353	-141	754	-753	0	0	0	0	0	0	0	0

Note: see body of the text for acronyms' specification (section 3.2).

Table 3: Net trade balance effects vs. baseline in 2020

€millions, 2007 prices

	UK	NL	DE	FR	ES	PL	RO	EU15	EUN13	EFTA	USA	MERC	AUSNZ	CHN	IND	JAP	LDC
Agriculture	-3	5	-66	-35	1	-103	-10	-201	-210	-3	87	74	8	-3	12	-2	71
Food	34	6	-92	-20	-24	-107	28	-191	-69	12	45	37	28	10	-27	6	17
Nat. Energy	-4	0	-6	2	3	15	10	0	36	-2	0	-17	-4	12	6	6	-9
Manufacturing	-238	-104	-424	47	241	716	405	-278	1501	-23	-293	-211	-39	-32	-13	-71	-125
Services	-125	-53	-75	10	107	115	60	-12	269	-9	-87	-48	-18	15	8	-10	-33
MACRO	**-335**	**-146**	**-663**	**3**	**327**	**637**	**493**	**-681**	**1528**	**-24**	**-248**	**-165**	**-26**	**2**	**-13**	**-72**	**-79**

Table 4: Market price and output effect vs. baseline in 2020

% changes

	Market price effect					Output effects				
	UK	**DE**	**FR**	**PL**	**EU28**	**UK**	**DE**	**FR**	**PL**	**EU28**
Land (owner)	-5.80	-3.76	-4.97	-3.15	-4.06	-0.07	-0.82	-0.54	-0.45	-0.51
Land (farmer)	2.35	6.91	4.98	2.81	4.34	-0.07	-0.82	-0.54	-0.45	-0.51
Wheat	0.17	0.33	0.24	1.01	0.29	0.06	-0.24	-0.18	-1.42	-0.29
Oil grains	0.08	0.38	0.26	1.45	0.46	0.22	-0.18	-0.07	-0.87	-0.24
Oil seeds	0.20	0.39	0.35	1.02	0.39	0.00	-0.23	-0.18	-1.41	-0.29
Raw sugar	0.01	0.54	0.45	3.08	0.56	0.08	-0.12	-0.07	-0.10	-0.04
Vegetables, fruits and nuts	0.10	0.23	0.21	1.13	0.30	0.06	-0.09	-0.15	-1.43	-0.17
Cattle, sheep and goats	0.23	0.31	0.97	1.22	0.72	0.12	-0.01	-0.35	-0.98	-0.26
Pigs and poultry	0.11	0.33	0.28	1.24	0.44	0.14	-0.21	-0.11	-1.04	-0.25
Raw milk	0.01	0.60	0.37	2.54	0.59	0.11	-0.26	-0.03	-0.34	-0.14
AGRICULTURE	**0.12**	**0.38**	**0.36**	**1.32**	**0.43**	**0.12**	**-0.21**	**-0.15**	**-1.06**	**-0.22**
Red meat	0.11	0.17	0.32	0.27	0.24	0.00	-0.11	-0.39	-0.53	-0.32
White meat	0.08	0.20	0.15	0.46	0.15	0.18	-0.28	-0.12	-0.98	-0.22
Dairy	0.01	0.19	0.09	0.06	0.11	0.12	-0.31	-0.03	-0.11	-0.11
Sugar	-0.01	0.09	0.04	-0.01	0.01	0.09	-0.16	-0.08	-0.08	-0.04
Vegetable oils and fats	0.01	0.06	0.16	-0.12	-0.10	0.06	-0.32	-0.45	0.36	-0.07
FOOD	**0.02**	**0.09**	**0.07**	**0.15**	**0.07**	**0.03**	**-0.10**	**-0.05**	**-0.36**	**-0.08**
NAT. ENERGY	**0.00**	**0.00**	**0.00**	**-0.06**	**-0.01**	**0.00**	**0.00**	**0.00**	**-0.01**	**0.00**
MANUFACTURING	**0.00**	**0.00**	**-0.01**	**-0.09**	**-0.01**	**-0.02**	**-0.02**	**0.00**	**0.17**	**0.01**
SERVICES	**0.01**	**0.00**	**-0.01**	**-0.12**	**-0.01**	**0.00**	**0.01**	**0.00**	**-0.07**	**0.00**

Note: Output effects on land do not differentiate owner and farmer.

7. Appendix: CAP database preparation and recalibration

A first step is to calculate a fully detailed categorisation of all of the agricultural domestic support payments which are allocated across the tax wedges corresponding to the factors of production, output and intermediate inputs. In this way, it is possible to impose a shock to any specific (group of) policy payment(s) for the scenario of interest.

In the GTAP documentation, Jensen (2010) splits agricultural support payments for each of the EU27 members following the OECD classification of single commodity transfers (SCT); all commodity transfers (ACT); group commodity transfers (GCT) and other transfer payments (OTP). Within each of these 4 classifications, one can find a rich array of different support payments (i.e., 'decoupled'; 'coupled direct payments'; 'market measures'; 'additional direct transfers'; 'other EAGF payments'; 'agri-monetary transfers'; 'rural development Axis 1 and 2 payments' and 'national payments') as presented in Table 5.

Table 5: Allocation of EU domestic support in the GTAP database
€millions, 2007 prices

GTAP database v8, € millions, reference year 2007					
	SCT	GCT	ACT	OTP	TOTAL
Market measures (05_02)	492.92	236.57	0.0	0.0	729.49
Decoupled direct payments (05_03_01)	0.00	0.00	0.0	31,527.0	31,526.96
Coupled direct payments (05_03_02)	3,539.10	1,971.59	0.0	0.0	5,510.70
Additional direct payments (05_03_03)	0.00	0.00	90.7	443.2	533.95
Other EAGF	0.00	228.95	16.9	0.0	245.89
Agri-monetary	-14.45	0.00	0.0	0.0	-14.45
RD Axis 1 - EU	0.00	14.65	1,355.5	0.0	1,370.12
RD Axis 1 - MS	0.00	195.67	2,872.1	0.0	3,067.76
RD Axis 2 - EU	9.61	324.09	2,410.4	0.0	2,744.09
RD Axis 2 - MS	16.66	547.44	3,763.9	0.0	4,327.98
Other National Payments	933.70	2,223.42	7,285.4	0.0	10,442.56
TOTAL	4,977.55	5,742.38	17,794.94	31,970.18	60,485.05

Source: Authors' compilation from GTAP database v8.

Since by their very nature, SCTs are commodity specific support payments, an examination of the excel sheet allows one to see the exact amount of each type of payment which corresponds to each agricultural activity in each EU region in the GTAP database. Notwithstanding, in the case of GCTs or ACTs, the excel sheets provide no direct value for the proportion of, for example, a specific GCT coupled direct payment which corresponds to oilseeds. Consequently, to disentangle these values, we follow the approach of Jensen (2010) by employing detailed output share data for 2007 from Eurostat's economic accounts for agriculture. This gives us a full classification of agricultural domestic support payments by type and respective GTAP support wedge (i.e., factor subsidy; output subsidy; or intermediate input subsidy). It is important to note that none of the national payments present in version 8.1 GTAP data should pass through the CAP budget accounting structure. These payments sum to €10,446 million (in 2007 prices at the 2007 €:$ exchange rate (0.7305)).

A second data step is then performed involving a recalibration (Malcolm, 1998) of the existing data flows in the GTAP database. When classifying GTAP payments, it was observed that 'rural development Axis 1 and 2 payments' are incomplete when compared with official European Commission (DG Agri) data sources ('CATS' data on EAGF and EAFRD expenditures). Thus, one part of the recalibration procedure involved the removal of existing Axis 1 and 2 payments by sector and region and the insertion of a fuller representation of pillar 2 payments including actual co-financed national expenditures by member state (based on data from CATS). Thus 'Less favoured area' (LFA) and 'agri-environmental' payments are calibrated as uniform payments to the land factor across all agricultural activities (Nowicki et al., 2009). Additional pillar 2 investment support measures by member state are mapped to a further three broad behavioural aggregates (i.e., 'physical capital investment'; 'human capital investment'; 'wider rural development schemes'). Rural development measures are then aggregated to five categories as presented in Table 6.

All five pillar 2 categories feed into the CAP budget accounting equations (although not including nationally sourced pillar 2 payments), whilst all pillar 2 payments (except for LFAs) induce output- and input-augmenting technical change (Nowicki et al., 2009). In addition, further lump sum rebate payments for Sweden and the Netherlands of €695 million and €185 million, respectively, are calibrated into the CAP accounting equations in the 2007 benchmark data.

In the standard GTAP database, decoupled support is allocated across capital, labour and land by factor shares, and then across sectors as a uniform payment. In the current study, a second part of the recalibration procedure involved the shifting of all decoupled support to the land factor as a uniform land subsidy rate. In effect, this representation of decoupled support assumes that the single farm payment (SFP) is production neutral, excludes cross commodity effects and capitalises the entire SFP into the value of land. This modelling assumption has important implications when reducing decoupled support payments. A sensitivity analysis on support allocations would be required to better capture potential market distorting effects of domestic support, especially SFPs. Urban et al (2012) stresses this point and proposes alternative allocation of support related either on (i) factor usage, (ii) 50% on land, 25% on labour, 25% on capital, or (iii) 100% on land. The paper concludes on the need to test econometrically degrees and modes of coupling if one wants to model accurately SFPs.

Table 6: Rural development measure aggregates

Axes	#	Measure title	investment in physical capital	investment in human capital	wider rural development schemes	Support to LFAs	Agri-environ. measures
1	111	Vocational training and information actions		X			
	112	Setting up of young farmers		X			
	113	Early retirement		X			
	114	Use of advisory services		X			
	115	Setting up of management, relief and advisory services		X			
	121	Modernisation of agricultural holdings	X				
	122	Improvement of the economic value of forests	X				
	123	Adding value to agricultural and forestry products	X				
	124	Cooperation for development of new products	X				
	125	Infrastructure related to the development and adaptation…	X				
	126	Restoring agricultural production potential	X				
	131	Meeting standards based on Community legislation		X			
	132	Participation of farmers in food quality schemes		X			
	133	Information and promotion activities		X			
	141	Semi-subsistence farming		X			
	142	Producer groups		X			
	143	Provision of farm advisory and extension services in BG and		X			
2	211	Natural handicap payments to farmers in mountain areas				X	
	212	Payments to farmers in areas with h., other than mountain…				X	
	213	Natura 2000 AND Directive 2000/60/EC payments					X
	214	Agri-environment payments					X
	215	Animal welfare payments					X
	216	Non-productive investments					X
	221	First afforestation of agricultural land					X
	222	First establishment of agroforestry systems on…					X
	223	First afforestation of non-agricultural land					X
	224	Natura 2000 payments					X
	225	Forest-environment payments					X
	226	Restoring forestry potential and introducing prevention…					X
	227	Non-productive investments					X
3	311	Diversification into non-agricultural activities			X		
	312	Support for business creation and development			X		
	313	Encouragement of tourism activities			X		
	321	Basic services for the economy and rural population			X		
	322	Village renewal and development			X		
	323	Conservation and upgrading of the rural heritage			X		
	331	Training and information			X		
	341	Skills acquisition, animation and implementation of …			X		
4	411	Implementing local development strategies. Competitiveness	X				
	412	Implementing local development strategies. Environment/land					X
	413	Implementing local development strategies. Quality of life			X		
	421	Implementing cooperation projects			X		
	431	Running the local action group, acquiring skills and …			X		
5	511	Technical Assistance			X		

Source: Authors compilation.

Thirdly, in the absence of detailed documentation, 'commodity intermediate input subsidies' in the GCT and ACT categories are recalibrated as a single uniform subsidy rate for domestic and imported inputs 'i' to the agricultural sector 'j', whilst intermediate service input subsidies are all inserted on agricultural usage of the 'other business services' sector. Energy intermediate input subsidy rates are left unchanged in the GTAP database.

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