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# **The Impact on the Farm Sector and Wider Rural Economy of Switching from Historic to Regional Single Farm Payments in North-East Scotland**

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## **Abstract**

One of the key features of the CAP 2014 reforms is the requirement for Member States currently distributing direct payments to farmers on the basis of historic support levels to switch an area-based payment scheme. This paper explores effects of this shift for both the farm sector and the wider rural economy in North-East Scotland. Analysis is carried out in two stages: First, the changes in payments for individual farm businesses are estimated based on the integration of several agricultural datasets. Second, the wider economy impacts are estimated using an agriculture-focussed static regional CGE model. The farm-level analysis shows that the North-East Scotland region is likely to suffer a significant net payment loss from the change in payment basis; however, there are gainers as well as losers both between and within farm types. The CGE analysis suggests that the wider economic impacts of the change in payments will be limited, in part due to the relatively small size of the sector in the overall economy. Within the agricultural sector itself, real agricultural GDP falls by 0.55%. Small cropping farm households suffer the largest overall income drop (-9.18%), with output from large “other” farm types falling most (-23.59%). Land rents fall across all farm types, and land switches into forestry. In terms of the wider agri-food chain, demand for agricultural intermediate inputs falls by 3% while the impacts on the downstream food sectors are more limited with meat processing predicted to fall most in percentage terms (-1.47%) due to increased raw imports from other regions. The paper concludes by suggesting areas for further research.

**Keywords:** CAP reform, farm businesses, CGE, Agriculture

**JEL code:** Q1

## 1. Introduction and Background

The aim of this paper is to explore both the farm-level and economy-wide implications of impending changes to the CAP direct payment regime in North-East Scotland. In 2005, Scotland opted for the ‘historic’ system of decoupled Pillar 1 Single Farm Payments (SFPs), based on farm-level receipts in 2000-2002, with 10% (the maximum allowed) of the national envelope used for the headage-based Scottish Beef Calf Scheme. In order to increase convergence of direct payment rates both between and within member states (European Commission, 2013), the 2014 CAP reforms require Scotland to move to a regional system of direct payments (“Basic” and other). This involves a degree of flattening, i.e. reductions in differences in per-hectare payment rates across the country towards a more uniform Basic Payment level, based on “payment regions”. These regions can be physical, administrative (e.g. LFA), or virtual (e.g. identified by agronomic or socio-economic characteristics). While yet to be confirmed, Scotland is likely to have between two and four payment regions based on categories of Land Capability Assessment (LCA), Less Favoured Area (LFA) or “historic land type” (e.g. arable, grazing). With the overall Scottish Pillar 1 budget roughly unchanged (at around €642 million), the definitions of payment regions and the associated allocation of the budget between them determine which farmers and regions gain as a result of the redistribution, and which lose (Matthews *et al.*, 2013a and 2013b).

At time of writing (early spring 2014), the Scottish Government is completing a consultation on future CAP direct payments (Scottish Government, 2013); this focusses on two potential payment regions - 1.8 Mha of arable, temporary grass and permanent grassland, and 2.8 Mha of rough grazing. However, the consultation raises a large number of other possibilities and Pillar 1 issues, including:

- New recipients, with no historic entitlements: Scotland has a large amount of “naked acres” which are potentially eligible for future support but may be excluded by new rules for “active” rather than “slipper” or “sofa” farmers.<sup>1</sup>
- A simplified small farmer scheme
- Young farmer top-up payments (a mandatory requirement), which it is proposed be paid on the first 54 ha using “simple and proportionate” payments calculated at 25% of average entitlement value.
- “Voluntary Coupled Support” (VCS) via a new beef (and possibly sheep) payment scheme, probably with higher payments for the first 10 and the next 40 beef calves, to be financed by top-slicing all Basic Payments instead of (as until now) all beef payments only
- The rate of introduction of the changes, e.g. all in 2015, a “standard internal convergence” by 2017 or 2019, or the more complex “Irish tunnel” approach.

Several studies have considered the income distributional effects of the changed distribution of SFPs (e.g. Kilian and Salhofer, 2008; Ciaian, Kancs and Swinnen, 2008). However, fewer have considered the geographical distribution of gainers and losers within a particular Member State. Moreover, the change in the level of payments and shift between farm types may have implications that extend beyond the farm sector. These depend on how farmers adapt to the change in the level of payments they receive, and, in particular, the extent to which the changes are regarded as decoupled (affecting farm household consumption decisions only) or coupled (directly affecting farm production decisions).

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<sup>1</sup> The consultation suggests a minimum stocking density of 0.05 LU/ha, i.e. roughly 0.5 sheep per hectare, in order to be defined as an active farmer.

CGE models have been used previously to explore the economy-wide impacts of changes in agricultural policy including the impact of the introduction of SFPs in 2005 (Helming *et al.*, 2010; Philippidis, 2010; Törmä and Lehtonen, 2010). The choice of model specification and how the particular policy changes are simulated impose assumptions on farmer behaviour which, in turn, will influence the model results. Increasingly, dynamic CGE models (either recursive or forward-looking) are being used to simulate policy shocks, with attention focussed on adjustment paths from the initial equilibrium position to the final state (Vellinga *et al.*, 2014). In this paper, a simpler static model is used, with analysis focussed on impacts within the farm and the wider agri-food chain as well as across rural-urban space. Importantly, it is assumed that farmers react to changes in payment levels by adjusting output levels. That is, the changes in direct payments are assumed to lead to fully coupled responses. The results thus indicate the maximum potential impacts on the wider economy of the redistribution of payments.

In the remainder of this paper, Section 2 discusses the methods and results of the farm-level analysis and Section 3 those for the SAM/CGE analysis for North-East Scotland. Section 4 concludes with some discussion and ideas for further research.

## 2. Farm-Level Modelling

### 2.1. Farm-Level Modelling: Methods

The analysis of farm-level impacts of regionalisation was based on the integration of the following spatial and tabular datasets covering the whole population of businesses (see also Figure 1 at the end of the paper):

- Integrated Administration and Control System (IACS) tables of Ownership, Seasonal Renting and Land Use per field for all businesses making a SFP claim. The IACS database is also the source of the current Entitlement (SFP per business), LFASS Fragility (per Parish) and LFA Status data
- June Annual Census (JAC) data on land use and livestock numbers for all agricultural holdings (i.e. the whole population rather than just those in receipt of SFP and thus within IACS)
- Field Boundary Map, maintained by the Scottish Government for administrative purposes
- LFA Map, showing designations which combine natural handicap (termed Status, with values of none, disadvantaged and severely disadvantaged) and peripherality (termed Fragility, with values of standard, fragile and very fragile)
- Land Capability for Agriculture Map, distinguishing seven classes of land based on potential productivity and cropping flexibility determined by the extent to which physical characteristics (soil, climate and relief) impose long-term restrictions on agricultural use.

In order to calculate the effect of the switch in payment basis, a number of decisions were required in relation to eligibility for payments. These included, for example, the exclusion of woodland, and of businesses failing to achieve minimum stocking rates (for full details, see Buchan *et al.*, 2010). Throughout the process, the key unit of analysis is taken to be the farm business as the basis for gains and losses from CAP reform. This required recognition and understanding of the complexities of, amongst other things, the field-farm-business relationship. The latter, for example can be simple and direct, as in the case when a field is part of a business made up of a single holding, or complex and indirect, as when a field is rented seasonally as part of a sub-holding in a multi-holding business.

Further details of the methodology used to integrate the datasets are available in Matthews *et al.* (2013a).

## 2.2. Farm-Level Modelling: Results

For Scotland as a whole, businesses with SFP claims in 2009 had a total area of 5.4 Mha, of which 4.4 Mha were used to activate SFP entitlements. Based on land use eligibility criteria, the findings suggest that an estimated 5.0 Mha of land in existing businesses would be included in an area-based scheme. A further maximum area of 1.0 Mha could also be included in the scheme, to give a total maximum area for payment of 6.0 Mha. This additional area is likely to be made up of new entrants without historic entitlement, enterprises that have been unsupported to date, and businesses (such as sporting estates with census-registered agricultural land) that, for whatever reason, have chosen not to make SFP claims. The effect of maximum new claims is that the overall average payment would fall from the existing level of €149 per ha to €108 per ha.

A number of analyses have been carried out for the Scottish Government (Matthews *et al.*, 2013c) based on alternative policy scenarios, each highlighting potential redistribution of the available budget between regions and farms, compared to pre-2014 expenditures. For example, one option that has been analysed is a three-payment region “Olympic podium” scheme, with the highest rate (€350 per ha) awarded to permanent grassland, somewhat less (€292) to arable, and the lowest (€27) to rough grazing. Another scenario, on which this paper focusses, involves two payment regions: rough grazing paid at €27 per ha and all other (arable, temporary and permanent grass) paid at €319.74 per ha. This option results in transfers totalling £126M for Scotland as a whole, from 7,057 “losers” to 11,733 “gainers”. Table 1 shows the regional impacts from this two-region payment scheme. North-East Scotland is shown to have a strong concentration of farm businesses losing more than €250 per hectare. In particular, in the two-region payment scheme there are expected losses of some €29.7M for about 1,680 holdings in North East Scotland and gains of €12.3M to 1,495 holdings, i.e. a regional loss of €17.4M, compared to net gains to most other regions. Other net-loser regions are the Lothians (around Edinburgh), Fife, the Scottish Borders and Dumfries & Galloway, while net gainers are the Highland region, Argyll & Bute, Tayside and the Western and Shetland Isles (Matthews, 2013a).

A dominant feature of such calculations are the complex within-sector and within-“region” effects, which – at least politically – must be assessed together with the impact of parallel or impending changes in the SBCS, LFA payments (e.g. when altered to a scheme based on High Nature Value), and various rural development payments.

**Table 1: Distribution of losses and gains for all regions in Scotland**

Region	Total Decreases	Total Increases	Count Decreases	Count Increases	Net Change
North East Scotland	-29,739,736	12,325,060	1,680	1,495	-17,414,676
Dumfries & Galloway	-24,600,010	10,019,205	927	794	-14,580,806
Scottish Borders	-9,777,400	6,707,628	487	547	-3,069,772
Fife	-4,399,271	1,856,568	250	238	-2,542,703
Lothian	-3,441,463	2,562,421	229	249	-879,042
Orkney	-2,536,619	2,453,052	238	443	-83,567
East Central	-3,590,685	4,281,596	180	348	690,911
Ayrshire	-6,046,617	6,820,504	427	625	773,887
Clyde Valley	-5,442,448	6,843,731	355	609	1,401,283

Shetland	-344,736	4,819,934	147	813	4,475,198
Tayside	-9,647,819	14,527,919	638	885	4,880,100
Eileanan an Iar	-147,758	6,739,765	137	1,549	6,592,007
Argyll & Bute	-4,007,996	10,968,912	257	605	6,960,917
Highland	-22,725,202	35,520,814	1,105	2,533	12,795,612
Scotland	-126,447,761	126,447,110	7,057	11,733	-651

Table 2 shows the changes (gains and losses) in payments for North-East Scotland farms for the two-region direct payment reform option, with the results aggregated into six farm types<sup>2</sup>: “Small” and “Large” farms in the table are defined as having below or above 2 Standard Labour Requirements (SLRs), i.e. 3,800 imputed hours of farm work per year. Large farms are shown to face the biggest reduction in direct payments.

**Table 2: Changes in CAP Direct Payments for North-East Scotland, €M**

	Sum of Losses	Sum of Gains	Net Gain
Cropping Farms Large	-5.67	1.61	-4.06
Cropping Farms Small	-3.66	2.02	-1.64
Livestock Farms Large	-4.52	3.55	-0.97
Livestock Farms Small	-4.46	2.46	-2.00
Other Farms Large	-8.09	1.31	-6.78
Other Farms Small	-3.34	1.37	-1.97
Total	-29.74	12.33	-17.41

Historically, North-East Scotland has always been an important agricultural region, and employment in agriculture, hunting and forestry is about double the Scottish average (Aberdeen Consortium, 2008). Thus the potential net loss of direct payments for a large number of farm businesses, especially the larger farms, is a cause of concern to the farm lobby. In addition to the farm type and size redistribution, the results highlighted a shift from higher-intensity to more extensively managed land. Depending on the adaptive response of farmers, this has implications for the wider economic and in particular agri-food businesses in the region.

### 3. CGE Modelling

The analysis reported above illustrates the potential and likely redistribution of payments across Scotland and, in more detail, within a particular region. Wider impact assessment is also needed. This can be addressed through CGE modelling which uses the farm-type impacts reported above to simulate behavioural changes at farm level (e.g. changes in land and other on-farm resource use, and in farm household spending) and the associated upstream and downstream effects of farm-level changes on other sectors, e.g. food processing and rural services.

The CGE model used in the analysis is based on a standard IFPRI static framework (Lofgren *et al.*, 2002). Like many other CGE models, the model is not particularly sophisticated in agent behaviour

<sup>2</sup> “Cropping” farms comprise those classified as “cereals” or “general cropping” in the 10-fold Scottish classification; “Livestock” farms comprise “dairy”, and “cattle and sheep” farms (LFA or lowland); and “Other” farms comprise the rest (mixed, specialist pigs or poultry, horticulture and other).

(firms, households, governments), and uses “standard” parameter values (e.g. of substitution elasticities). However, it distinguishes between rural and urban businesses and households, and is thus able to identify the rural impacts of the change in policy.

Value-added is created using two types of labour (skilled and unskilled labour), capital, and four types of land based on the categories of the Land Capability Assessment. Together with intermediate inputs, the output produced for each of the activities is then converted into a series of commodities. One activity can provide more than one type of commodity. The resulting stream of commodities is either exported or used within the region. Exports are divided among two foreign agents (Rest of Scotland/UK, and Rest of the World), using a CET production function. The output that is used within the region is combined with a composite import good, consisting of imports from both other areas. As is typical in CGE models, the Armington assumption, captured by a CES function, is adopted whereby goods of the same type, but with different origins, are treated as imperfect substitutes. Output is consumed (by private households and the government), invested or used as intermediate inputs. The prices of imports and exports are exogenous as they are determined on foreign markets.

The model has a “combined” government which covers local authority, Scottish and UK government activities with behaviour assumed exogenous to the model. In other words, government consumption and the transfers to or from other agents are taken as given. The combined government finances its expenses, consisting of government consumption and transfers, with taxes (including income tax and taxes on output). Various other transfers among the agents are also treated as exogenous.

In relation to factor markets in the model, labour supply is not treated as fixed but as dependent on real wages, and can adjust accordingly. The factor market specifications allow labour and land to be mobile between activities, while capital is activity-specific. There are budget constraints for each of the agents (government and each type of household), and the surplus of income over spending equals the level of savings for that agent. Another equation specifies that the households together finance all deficits (or negative of savings) of all the other agents and investment. This corresponds to the “saving equals investment” equation. In terms of model closure, household investment is assumed fixed, while household savings are flexible. Reflecting the regional nature of the model, the combined Government account has fixed tax and subsidy rates, and consumption, while its saving is flexible. The exchange rate with the Rest of Scotland/UK is fixed, whose saving is flexible; the opposite is specified for the Rest of World account. As the model is homogenous of degree one in price, it is possible to choose one price as the numéraire. For the model at hand, no single price is taken as the numéraire, but a composite price, the consumer price index.

The model was calibrated using a 48-sector Social Accounting Matrix (SAM) which in turn was constructed from a mechanical regionalisation of the official 2004 Scottish Input-Output Tables (Scottish Government, 2009) using employment data and cross-entropy balancing methods (Robinson *et al.*, 2001). The database was originally constructed and used to appraise the economy-wide impacts of wind farm developments in North-East Scotland (Phimister and Roberts, 2012). For the analysis reported in this paper, the SAM was extended by disaggregating the farm sector into large and small livestock, cropping and other farm types, i.e. the six types described in Section 2 above. Land was disaggregated into four types (based on quality), and eight household types: in addition to urban and rural non-farm households, farm households were split to distinguish between large and small cropping, livestock and other farm households, mirroring the farm type disaggregation. The SAM was inflated to 2013 values by a factor based on the nominal GDP growth for North-East Scotland (ONS, 2013a).

The redistribution of payments between farm types was simulated as a reduction in subsidy rates for each of the six farm types from the level received in the base year 2013. Thus the analysis of economy-wide impacts ignores within-farm type differences in the redistribution of payments, and concentrates instead on the net loss of each farm type as predicted from the farm-level analysis.

Table 9 at the end of the paper shows the structure of the SAM in aggregate form, while Table 3 provides some summary economic information on the study region as derived from the SAM.

**Table 3: Summary information from North-East Scotland SAM, 2013 (£M)**

GDP		12,811
<i>Rural Share</i>		34%
<i>Urban Share</i>		67%
Sectoral Contributions to Value Added		
Rural Area	Agriculture	120.8 (2.8%)
	Forestry	13.1 (0.3%)
	Fishing	73.0 (1.7%)
	Other Primary	127.0 (2.9%)
	Food processing	205.1 (4.7%)
	Wood processing	95.8 (2.2%)
	Energy	70.6 (1.6%)
	Other Secondary	982.5 (22.7%)
	Tertiary	2648.7 (61.1%)
Urban Area	Primary (includes oil extraction)	871.1 (10.3%)
	Secondary	1288.9 (15.2%)
	Tertiary	6314.7 (74.5%)
Total Household Income		10,395
<i>Urban Households</i>		52.6%
<i>Rural Non-Farm Households</i>		45.9%
<i>Small Farm Households</i>		1.01%
	<i>Cropping</i>	0.26%
	<i>Livestock</i>	0.33%
	<i>Other</i>	0.43%
<i>Large Farm Households</i>		0.51%
	<i>Cropping</i>	0.23%
	<i>Livestock</i>	0.13%
	<i>Other</i>	0.15%
Total Exports		15,740
Total Imports		13,869

Table 3 confirms that, despite its historical significance, the agricultural sector itself is of relatively minor importance to the North-East Scotland economy. However, it is more important when the upstream and downstream sectors in the food chain are taken into consideration. More generally, North-East Scotland is an economically buoyant region of the UK, with worldwide links to the oil and gas sector. Between 2005 and 2011, nominal GVA grew by over 50%, always with the first or second highest growth rate out of the 37 UK NUTS2 regions<sup>3</sup>, and growth has continued to date (ONS, 2013b). Unemployment rates are extremely low, at 0.9% based on those claiming benefit (Mackay Consultants, 2013), and around 2.2% on a wider basis (including the economically inactive).

<sup>3</sup> In 2010, the region ranked 12<sup>th</sup> of all EU NUTS2 regions in terms of Purchasing Power Standard.



### 3.1. CGE Modelling: Results

The results of the CGE model simulation of the two-region change to CAP direct payments in North-East Scotland are shown in the following tables. As noted in the introduction, the changes in direct payments are simulated to lead to coupled responses, i.e. it is assumed that farmers react to changes in the payments levels by adjusting output levels. Thus, with the region overall and each individual farm type experiencing a net loss of payments, the results below indicate the maximum potential negative impacts on the wider economy of the redistribution of payments associated with CAP reform.

Normally, model results are based on a determinist CGE model in which it is assumed that both the model shock and parameter values are known with certainty. In reality, the values of the model parameters are uncertain, especially given the regional nature of the model. The value for the elasticity of substitution in the Armington function is perhaps the most uncertain among all the various parameter values. Therefore, a sensitivity analysis was carried out, with this particular parameter taken as a random variable drawn from a normal distribution with mean 2.0 and standard deviation 1.0 (see DeVuyst and Preckel (2007) and Preckel *et al.* (2010)). The number of runs used for the model was 54 as a result of the application of Stroud points. In the sequel, all model results are presented as the average value and the corresponding standard deviation from the sensitivity analysis. It should be understood that base-run results have zero standard deviation value, as these results do not depend on the value of this elasticity.

Table 4 indicates that at aggregate level the redistribution of payments has negligible effects on the North-East Scotland economy overall; however, the impact on the farm sector itself is more noticeable. In particular, while nominal GDP for the whole economy falls by -0.002%, value added in the agriculture sector altogether (aggregating across the six farm types) falls by almost 15.7% as a result of the net loss in payments and subsequent adjustments. Table 4 also indicates that the total value of intermediate inputs used by the farm sector falls by 3% from base-year levels, with consequent impacts on input suppliers.

**Table 4: Changes in aggregate variables (£m)**

	Base run result	Percentage change	Standard deviation
Real GDP	14,471	0.005%	0.001%
Nominal GDP	14,471	-0.002%	0.002%
Agric. value-added-nominal	126	-15.7%	0.2%
Urban value-added-nominal	8,475	-0.010%	0.001%
Rural value-added-nominal	4,337	-0.469%	0.004%
Total output	27,326	-0.051%	0.002%
Agriculture output	328	-3.1%	0.2%
Urban output	18,000	-0.010%	0.002%
Rural output	9,326	-0.13%	0.01%
Total intermediate use	14,427	-0.079%	0.003%
Agriculture intermediate use	305	-3.0%	0.2%
Urban intermediate use	9,413	-0.018%	0.002%
Rural intermediate use	5,014	-0.19%	0.01%
Total aggregate demand	27,027	0.048%	0.004%
Agriculture aggregate demand	525	-0.55%	0.07%
Total imports	13,869	0.074%	0.007%

Agriculture total imports	297	0.2%	0.1%
Total exports	15,740	-0.092%	0.003%
Agriculture total exports	126	-4.1%	0.1%
Total employment	26,225,500	-0.0071%	0.0002%

Table 2 in Section 2 above showed that the net losses of payments by farm type were highest for the largest farm types, with “other” large farms particularly badly affected. However the distribution of impacts on farm household incomes as a result of the change in payments is quite different as a result of the way in which farmers adapt to the policy shock. In particular, small cropping farm households face the largest percentage decrease in total household income following the redistribution of payments (Table 5). This is associated with the forms of income on which they rely, and in particular with the change in land rents and commodity prices that come about as a result of adjustments in the economy. The other two types of small farm households are less badly affected. As a result of the reduction in farm income, farm household consumption falls. Because of the relatively small number of farm households in the North-East Scotland economy as a whole, this is not significant at aggregate level but may be more noticeable at a more local level within the region.

**Table 5: Changes in total household incomes, by six farm household types**

	Base run value (£m)	Change in total household income	Standard deviation
Cropping Farms Large	24	-5.27%	0.09%
Cropping Farms Small	27	-9.18%	0.15%
Livestock Farms Large	14	-4.63%	0.08%
Livestock Farms Small	34	-3.31%	0.06%
Other Farms Large	16	-7.03%	0.12%
Other Farms Small	44	-2.85%	0.05%

The effect on production of the change in payments is shown in Table 6. Concentrating first on the farm sector itself, there are significant differences in impacts between farm types, with small cropping farms increasing output, the other farm types, in particular “other” large farms, reducing output levels. The downstream food processing sectors, as expected, have a fall in output, with meat processing output most affected.

**Table 6: Percentage changes in output, by selected activities**

	Base run value	Change in output	Standard deviation
Cropping Farms Large	46	-5.13%	0.05%
Cropping Farms Small	49	5.28%	0.14%
Livestock Farms Large	102	-2.43%	0.21%
Livestock Farms Small	62	-2.46%	0.11%
Other Farms Large	34	-23.59%	0.37%
Other Farms Small	24	-1.41%	0.35%
Food processing	33	-0.26%	0.08%
Meat processing	211	-1.47%	0.33%
Other food	416	-1.26%	0.24%

Drink	66	0.01%	0.002%
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As land is mobile between activities, and is a major agricultural factor, land use and land rent levels alter considerably as a result of the net loss and redistribution of payments in the region. The impact however varies significantly across the four land classes as shown in Table 7 and Table 8. As noted above, the model is specified such that land is mobile across farm types and forestry. In other words, individual farm types can use more or less of each of the land classes that they use in the base situation. Table 8 shows the changes in land class areas used by the six farm types and by forestry:

**Table 7: Percentage changes in land rent, by land capability class**

	% Change in land rent	Standard deviation
Arable	-13.1%	0.3%
Mixed	-21.0%	0.4%
Improved Grassland	-22.1%	0.4%
Poor Rough Grazing	-32.9%	0.6%

**Table 8: Percentage changes in land use, by land class and by farm type and forestry**

	Arable			Mixed		
	Base run value	Percentage change	Standard deviation	Base run value	Percentage change	Standard deviation
Cropping Farms Large	2.68	-6.11%	0.02%	2.88	-3.39%	0.12%
Cropping Farms Small	5.53	6.07%	0.10%	5.96	9.15%	0.22%
Livestock Farms Large	0.17	0.84%	0.25%	1.58	3.76%	0.21%
Livestock Farms Small	0.30	-1.76%	0.30%	2.84	1.09%	0.19%
Other Farms Large	0.65	-27.15%	0.43%	2.59	-25.04%	0.37%
Other Farms Small	0.72	-1.53%	0.47%	2.89	1.33%	0.39%
Forestry	0.08	9.47%	0.21%	0.43	12.65%	0.27%
	Improved Grassland			Poor Rough Grazing		
Cropping Farms Large	0.97	-2.99%	0.16%	0.01	1.47%	0.30%
Cropping Farms Small	2.00	9.60%	0.26%	0.03	14.64%	0.42%
Livestock Farms Large	1.14	4.19%	0.20%	0.04	8.98%	0.28%
Livestock Farms Small	2.05	1.50%	0.21%	0.06	6.16%	0.34%
Other Farms Large	1.93	-24.73%	0.35%	0.08	-21.27%	0.26%
Other Farms Small	2.16	1.74%	0.36%	0.09	6.42%	0.24%
Forestry	1.45	13.11%	0.29%	0.00	18.31%	0.46%

The largest decrease in rents is for the lowest-quality land (Poor Rough Grazing), with much of this land moving into forestry production. Other large farms reduce their use across all land classes, while small cropping farms do the opposite, and all the other farm types increase their use of some land classes, and decrease others.

#### 4. Discussion and Conclusions

One of the most significant aspects of the 2014 CAP reforms is the requirement for Member States to replace historic entitlements for Single Farm Payments with area-based payment entitlements from 2015 onwards. This is particularly challenging in Member States where there are large differences in land types and management systems, as is the case in Scotland. This paper has explored, first at farm level and then at regional economy level, the potential impacts of the switch in entitlements, focusing on a scenario where a two-payment region is adopted by the Scottish Government. The two regions analysed are defined as rough grazing (receiving €27 per ha) and all other land (arable, temporary and permanent grass) paid at €319.74 per ha.

The impact of this scenario at farm business level was estimated based on the integration and analysis of a number of key spatial agricultural datasets. The analysis revealed North-East Scotland as the region of Scotland most affected by the redistribution of payments, estimated to suffer a net reduction of €17.4M, compared to net gains in most other regions. However, even within this region, there were gainers as well as losers, with the outcome depending on farm type, size and intensity of production.

A static regional CGE model of North East Scotland was then used to estimate the potential wider economic impacts of the net loss and redistribution of payments across farm types. Importantly, the simulations were such that they assume the change in payments to lead to a change in production levels (i.e. a coupled response), and thus indicate the maximum potential impacts on the wider economy. At aggregate level, due to the relatively small size of the farm sector in the region, the effects are minimal, even for the overall rural economy. However, more noticeable effects were found for the farm sector itself and for upstream and downstream sectors in the region. Moreover, as upstream and downstream businesses tend to be spatially concentrated within certain rural towns (Pangbourne and Roberts, 2014), there may be more significant local effects than the CGE model results imply.

The analysis at this stage is preliminary, and there are several ways in which the research could be extended. These include modelling the behaviour of gainers and losers from the redistribution separately, thereby allowing for different behavioural responses, and also drawing on the nonlinear nature of the model. The treatment of land within the model and, in particular, the extent to which it is modelled differently from the other factors also deserves closer attention. However, the results to date are useful in highlighting those types of farm households and agri-food sectors most likely to be affected by the change basis for payments in a key agricultural region of Scotland, and this information can be used to help inform policy decisions.

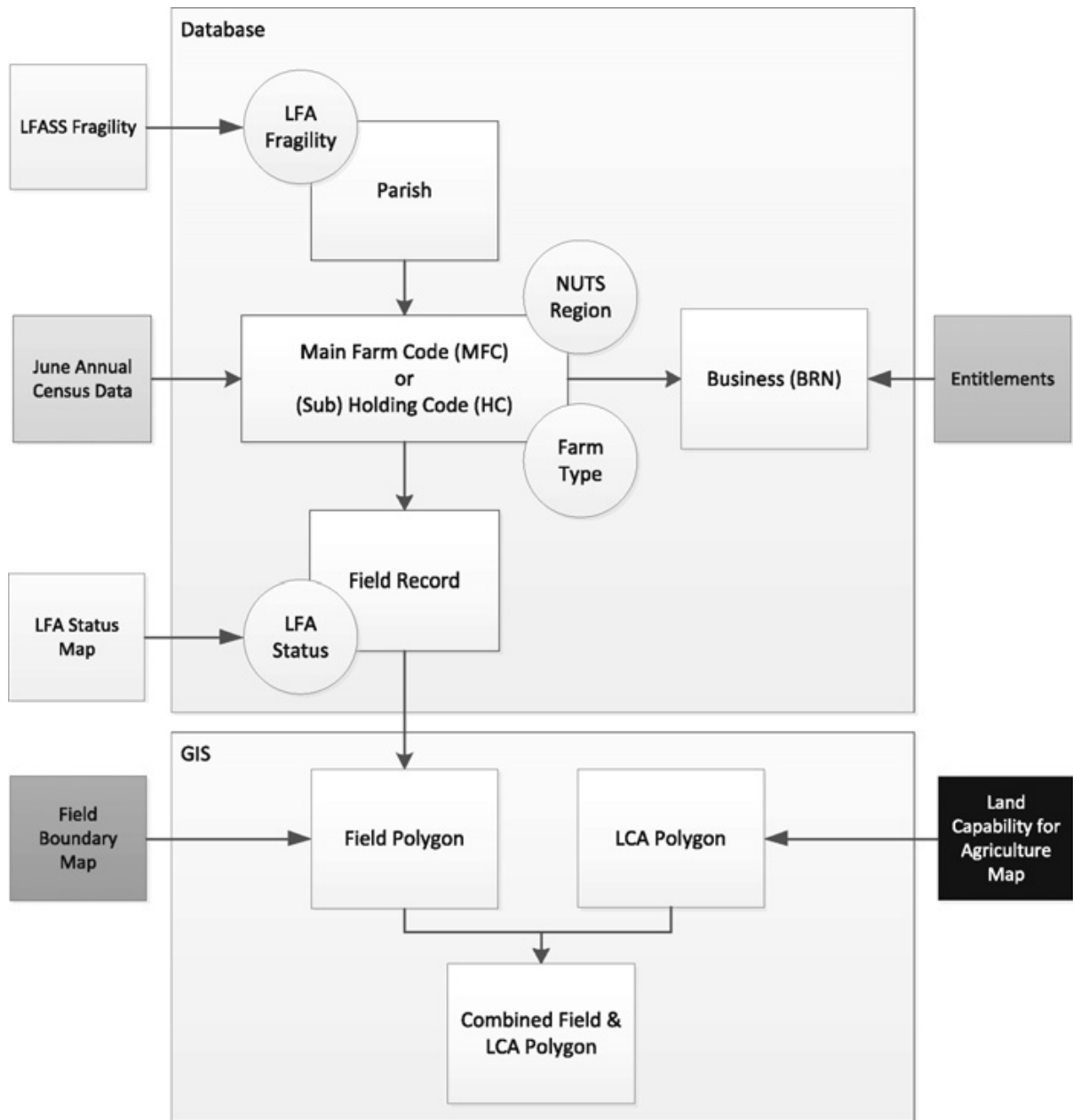
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**Figure 1: IACS and other datasets used within the analytical framework**



Source: Matthews *et al.* (2013b)

**Table 9: Macro SAM for North-East Scotland Economy, 2013 (£m)**

In £m	Activities	Rural activities	Urban activities	Commodities	Factors	Households	Government	Capital	ROS-ROW	total
<b>Activities</b>				Sales 27,326						Total domestic production 27,326
- Rural activities				18,000						18,000
- Urban activities				9,326						9,326
<b>Commodities</b>	Intermediate inputs					Private consumption 7,943	Government consumption 3,038	Investment 1,619	RUK-ROW Exports 15,740	42,767
	14,427	9,413	5,014							
<b>Factors</b>	Value-added									12,811
	12,811	8,475	4,337							
<b>Households</b>					Factor income 8,707	Transfers 227	Government transfers 1,748		RUK-ROW Remittances 428	11,110
<b>Government</b>	Indirect taxes			Import tariffs 1,572	Government factor income 1,075	Income tax 1,538	Other taxes 3,197		RUK-ROW Transfers 128	7,597
	87	112	-25							
<b>Capital</b>						Households' savings 1,402	Government saving -386		Foreign saving 603	1,619
<b>RUK-ROW</b>				RUK-ROW Imports 13,869	RUK-ROW factor income 3,030					16,899
<b>total</b>	Total cost of production			Total absorption						
	27,326	18,000	9,326	42,767	12,811	11,110	7,597	1,619	16,899	