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The effect of decoupling on farming in Ireland: A regional analysis

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Data from the Irish National Farm Survey and Census of Agriculture were used to analyse the regional implications of the decoupling of direct payments for farmers in Ireland. A mathematical programming model was used to estimate the regional effects of decoupling while a micro-simulation model was exploited to map the geographic distribution of decoupled payments. The results show that under the historical decoupling scheme, milk quota will shift from less efficient to larger more efficient farms in all regions. Beef cattle numbers are projected to decrease on all farms, with the exception of the Mideast and Southeast regions where numbers are projected to increase. The regional effect of decoupling on sheep farming was marginal with all regions projected to benefit from the policy change. The analysis also shows, using a static micro-simulation model that a shift to a flat rate national calculation of the decoupled payment would result in a significant movement of revenues from the southern regions to the northwestern regions of the country. In particular, large beef and dairy farmers in the southern regions would lose out while small dairy and sheep farmers in the western and northern regions would be most likely to gain.

Keywords: decoupling; Irish farms; linear programming model; regional analysis; spatial micro-simulation

Introduction

The 2003 Mid Term Review (MTR) of the Common Agricultural Policy (CAP) has been perhaps one of the most far-reaching reforms of EU agricultural policy and is likely to be the most significant driving force for change in Irish farming in the coming decades. To date, a number of economic analyses of the implications of decoupling for the future of farming in Ireland have been produced. For example, the FAPRI-Ireland model (Binfield *et al.,* 2003) was used to examine the implications of the policy reform for agricultural markets

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in Ireland. Breen, Hennessy and Thorne (2005) considered the farm level effects and modelled the impact of decoupling on farm incomes and the viability of farming. Hennessy (2004) investigated how decoupling may affect farm numbers while Shalloo *et al.* (2004) explored the consequences for dairy farming systems. Notwithstanding the recent proliferation of analyses of decoupling, there has been relatively little research conducted on the regional implications of decoupling for Irish farming. This paper aims to fill this gap in the literature.

The MTR made provision for member states to decouple all direct payments from production or to choose one of a number of partial decoupling options (EU, 2003). In Ireland, all payments were decoupled from production from 1 January 2005 and each farmer's payment was based on the number of premium claims made in a historical reference period. The future of the decoupled payment system beyond 2012 is still uncertain and many political commentators and academic papers suggest that decoupled payments in their current form will be increasingly difficult to defend within the World Trade Organisation (Swinbank and Tranter, 2005; Hennessy and Thorne, 2005). Apart from world trade concerns, it is argued that it will be increasingly difficult to defend payments made to farmers in 2013 based on production decisions taken more than 10 years earlier. Decoupled payments, if they are sustained into the next decade, are more likely to be presented within political circles as payments made to farmers for the provision of public goods in order to support the multifunctional nature of agriculture (Beard and Swinbank, 2001; Tangerman, 2006). If this is the case, it is more likely that such payments will be made on a flat rate basis rather than being linked to production decisions taken 10 years earlier. For this reason, we also consider the regional implications for farming in Ireland of a switch to a "flat rate payment per hectare" scheme.

This paper is based on a regionally representative economic model that has been developed using Irish National Farm Survey (NFS) and FAPRI-Ireland data. This model is regionally representative and was designed to estimate the regional effects of decoupling on agricultural production and farm income on Irish farms. Following on from this we exploit a statistical matching procedure that has been used for the first time to match the NFS dataset to the Census of Agriculture (CoA) dataset. Combining these two datasets substantially enriches our knowledge of farming activity at a much more disaggregated and regional level. This larger matched dataset is used to analyse the regional distribution of decoupled payments and to examine the implications of switching to a national flat rate form of decoupling. The micro-simulation matching technique employed in this paper allows us to map the regional distribution of decoupled payments and the economic effects of different forms of decoupling.

Materials and Methods

The National Farm Survey and the Census of Agriculture are the two main sources of data on farming in Ireland. The NFS is part of the Farm Accountancy Data Network of the European Union (FADN). In line with FADN, the main objectives of the NFS are to determine the financial situation on Irish farms by measuring the level of gross output, costs, income, investment and indebtedness across the spectrum of farming systems and sizes and to provide data on Irish farm income to the EU Commission. The information for the sample of farms contained in the NFS comes from the Central Statistics Office of Ireland (CSO). While both the NFS and the CoA provide a comprehensive coverage of Irish agriculture, individually they both have limitations. The CoA differs from the NFS in that all farms in the country are recorded by the census compared to a sample of approximately 1,200 in the NFS. The NFS contains a large amount of detailed information on farming activity but is only nationally representative and cannot be used for analysis at a sub-national level. On the other hand, the CoA has limited individual farm information on a small number of key farm variables at a very local level known as electoral division (ED). In this paper we exploit the advantages of both datasets to analyse the regional implications of decoupling.

Regionally representative farm models

The 2002 NFS dataset (Connolly, Kinsella and Quinlan, 2002) was used to develop a regionally representative model of Irish farming. The regional disparity among farms is highlighted by Hennessy, Shrestha and Farrell (2007) who state that despite the relative importance of agriculture on farms in the Border and West regions, the majority of the farms in these regions are small, and are economically and agronomically disadvantaged compared to the farms in the Southeast and Southwest regions. In addition to this regional disparity, farms within a region can be further grouped into different types depending upon their production systems and economic and physical characteristics. Hence, a cluster analysis was used to select farm types that are representative of different farming systems in each of the regions. Cluster analysis is a multivariate analysis technique that sorts cases into groups, so that the degree of association is strong between members of the same group and weak between members of different groups (Romesburg, 1984). The basic criterion used for cluster analysis is distance, with observations close together falling into the same group while observations far apart are in different groups. For the purposes of this paper, the cluster analysis and the agglomerative hierarchical cluster technique was applied using SPSS (2005). Hierarchical analysis begins by placing every observation in a separate cluster and, using the squared euclidean distance method, observations are continually grouped into common clusters until only one cluster remains, or until the researcher chooses a number of clusters to retain. Hierarchical cluster analysis has been used in previous farm level analyses. For examples and a full description of the methodology see Rey and Das (1997), Kirke and Moss (1987) and Solano *et al*. (2001). In our analysis, farms were first classified by region, NUTSIII (Nomenclature of Territorial Units for Statistics - 3), and then in order to group similar farms together the cluster analysis was conducted. The details of NUTSIII classification is provided in Europa (2005). When the clusters were selected, the average values from each farm group were taken and a representative farm was simulated.

A dynamic linear programming model was developed for these representative farms in each region to estimate the economic effects of decoupling. A linear programming (LP) model operates by maximising or minimising an objective function subject to a number of constraints.

The general form of a farm level LP model is:

$$\text{Max } z = (p * x) - (c * x)$$
$$\text{Subject to } A * x \leq R \text{ and } x \geq 0$$

where

- z is farm gross margin,
- x is farm activity
- p is a measure of the returns and
- c are the costs procured for x activity
- A is an input–output coefficient for activity x, while
- R is a limiting resource such as land, labour or milk quota.

For this study, the LP model maximised accumulated farm gross margins within a region subject to the total land and milk quota (to reflect ring-fencing) constraints that are binding at the regional level. In other words, the model allowed the transfer of land and milk quota between farms in the same region but not between regions. For example, a farm within a region could only rent land (rland) if other farms in the region let out land (lland), such as:

$$\sum_{f=1}^{n} \text{rland}(f,y) \leq \sum_{ff=1}^{n} \text{lland}(ff,y);\ \forall\ y, ff \neq f$$

where
f is the number (n) of farm types
y is the number of years and ff is an alias of f.

For equilibrium, total rented land is made equal to total land let out in a region:

$$\sum_{f=1}^{n} \text{rland}(f,y) = \sum_{f=1}^{n} \text{lland}(f,y);\ \forall\ y$$

The LP model was written in the mathematical programming software, GAMS (2004) and was solved using the Xpress solver in GAMS. The initial output prices and input costs used in the model were those recorded by the NFS in the base year. These prices and costs were then projected forward using estimates produced by the FAPRI-Ireland model. The FAPRI-Ireland model is a partial equilibrium model that comprises a set of individual econometrically estimated commodity models that are linked and solved simultaneously. The individual commodity models for Ireland are linked to the FAPRI-EU and world models as operated by the University of Missouri and Iowa Sate University, USA. For a full description of the models and the price and cost projections used in this study see Binfield *et al.* (2003). The price and cost projections emanating from the econometric model are used in the LP model to estimate farmers' likely response to policy change. The output of the farm level model aids our understanding of how decoupling might affect resource allocation at the farm level and allows us to infer what may happen to the aggregate volume of production. Hence, the farm level model also acts as a form of validation for the aggregate model and facilitates the cross-checking of projections of aggregate supply. Ideally, the output of the two models would be formally linked, but this methodological development has not been achieved to date.

The input-output coefficients were taken from the NFS and were assumed to remain constant despite policy changes, in other words, for any given production process only one combination of the factors of production was assumed. Hence the scope of the models was confined to the analysis of resource allocation decisions, enterprise mix and production decisions and the resulting impact of these decisions on income. All activities that existed on the farms in the base data year (2002) were included in the LP choice set as well as all likely activity options, although the models were structured such that start-up investment costs were incurred if new enterprises were selected. For some activities, input-output coefficients were not available from the NFS, in such cases values were taken from the literature. Such variables included calving rates, labour requirements and feed requirements in terms of energy, protein and dry matter intake. Profit was maximised over 16 years in a multi-period framework where financial and livestock transfer activities linked each year.

The Single Farm Payment (SFP) was calculated as the sum of the eligible payments that were previously linked to production and the dairy compensation payment where applicable; the previously coupled payments were Suckler Cow Premium, Special Beef Premium, Slaughter Premium, Extensification Premium, Cattle Head Premium, Sheep Premium, Set Aside Premium and Cereal-aid Premium. The SFP was included in the LP model as an addition to the farm gross margin. To claim the SFP land is required and, therefore, in the model the SFP was expressed as a land using activity, i.e., a unit of land was required to claim a SFP entitlement; however, the claiming of the SFP is independent of any other production decision. The activity of claiming the SFP also incurs a compliance cost. The compliance cost was estimated as being the equivalent of the variable costs per hectare required to maintain grassland, and was approximately €94 per hectare (Teagasc, 2002). For a full description of the model structure see Shrestha and Hennessy (2005).

Farm level spatial micro-simulation model

Micro-datasets are primarily either official census publications or individual/household survey data. In general, census data include a variety of socio-economic variables, such as age, marital status and education level and a geographical component. However, variables such as income level, personal pension information, health status, and information on farming activity are not included due to data confidentiality. Consequently, the use of census of population or census of agriculture data for explanatory research is restricted due to data limitations. In contrast, individual/household datasets often contain more income-related and socio-related variables. However, due to the cost and administrative difficulties in collecting survey data, surveys are usually small in scale and are (usually) misrepresentative of the general population. A solution to limitations and data unavailability was first provided by Orcutt (1957). This solution was a micro-simulation modelling approach. Orcutt *et al.* (1961) proposed building large-scale, attribute rich datasets from simulated data, using re-weighting algorithms.

A micro-simulation model uses micro-data on individuals (e.g., persons, farms, firms, etc.) to build large-scale data sets based on the real-life attributes of individual agents and then simulates the effect of changes in policy on each of these units. By permitting analysis at the individual level, micro-simulation methods allow one to assess variations in the distributional effects of different policies across space (Holm *et al.*, 1996). Spatial micro-simulation is an extension of the basic micro-simulation process as it contains geographic information that links micro-units with location and therefore allows for a regional or local approaches to policy analysis (Ballas and Clarke, 2000).

SMILE (Simulated Model for the Irish Local Economy) is an object-orientated spatial micro-simulation model developed by the Rural Economy Research Centre, Teagasc, which aims to simulate statically the population of Ireland. The SMILE model also contains a farm-level module that creates a base farm population and assigns census attributes to individual farms, which can then be assigned to a geographically referenced area. The simulated farm dataset created by SMILE is constructed using a combinational optimisation technique called simulated annealing. There are many algorithms one can use to create a synthetic dataset, such as iterative proportional fitting (IPF) and genetic algorithms (Norman, 1999; Wong, 1992; Kelly, 2004). However, IPF and various other matching algorithms generate small area population data based on probabilities when real micro-data are unavailable. In contrast, the objective of SMILE is to merge 'real' datasets (the CoA to NFS) together through a re-weighting and iteration process. Simulated annealing only reproduces households from the survey data to match the census data that exist in the survey dataset.

There are three important elements to creating the micro-data farm population in SMILE. The first key part of the programme is the micro-data filtering process. This process needs to go through the entire NFS micro-data base and check whether an individual farm in the NFS fits the column constraints of the census tables (for example, does the farm fit the column of tillage in the system constraint, could it be one of the two farms in the 20 to 30 hectare column in the Size constraint table, etc.). Through this process, we gain all the farms that fit each of the column constraint in all tables for each ED. The second key part is the simulated annealing process itself, which searches for the best combinations of individuals based on the result of the filtering process. The process is repeated with the aim of gradually improving fit between the observed farms in the census and the selected combination of individuals from the NFS. The third and final key part in creating the micro-data population is the merge process which involves the merging of the farm level variables into the micro-simulated farm population dataset using the farm code variable that is common to both the NFS and the output file from the simulating annealing process. This final step completes the spatial micro-simulation process, resulting in a large scale micro-data set with information on every farmer in the country.

The simulated annealing process (SAPS) selects a set of farms from the 1,177 records of the NFS that best fits the census small-area constraints. These small-area constraints are the following SAPS tables: Farm Size in hectares; Farm System and Soil Class. The first two of these tables were adapted so that category definitions from the NFS matched those used in the CoA. For further discussion in relation to the simulated annealing methodology used in the creation of the SMILE base farm population see Hynes, Morrissey and O'Donoghue (2006).

Results

Spatial Distribution of SFP in Ireland

The map in Figure 1 shows the geographic distribution of the SFP across the country. The imaginary line first mentioned by Commins (2001), which divides the supposedly agriculturally and economically advantaged Southeast, Mideast and Southwest of Ireland from the Border, Midlands, West and Midwest is evident from this figure. It is apparent that the larger more intensively operated farms in the Southeast region have higher SFP per holding than the smaller more extensive farms in the West and Border regions.

Regional Impact of Decoupling in Ireland

The magnitude of the decoupled payment is only one aspect of the impact of decoupling. To analyse the effects of decoupling on total farm income the regional linear programming model was implemented. The results from the model for 2012 are presented in Table 1. The results are available for representative

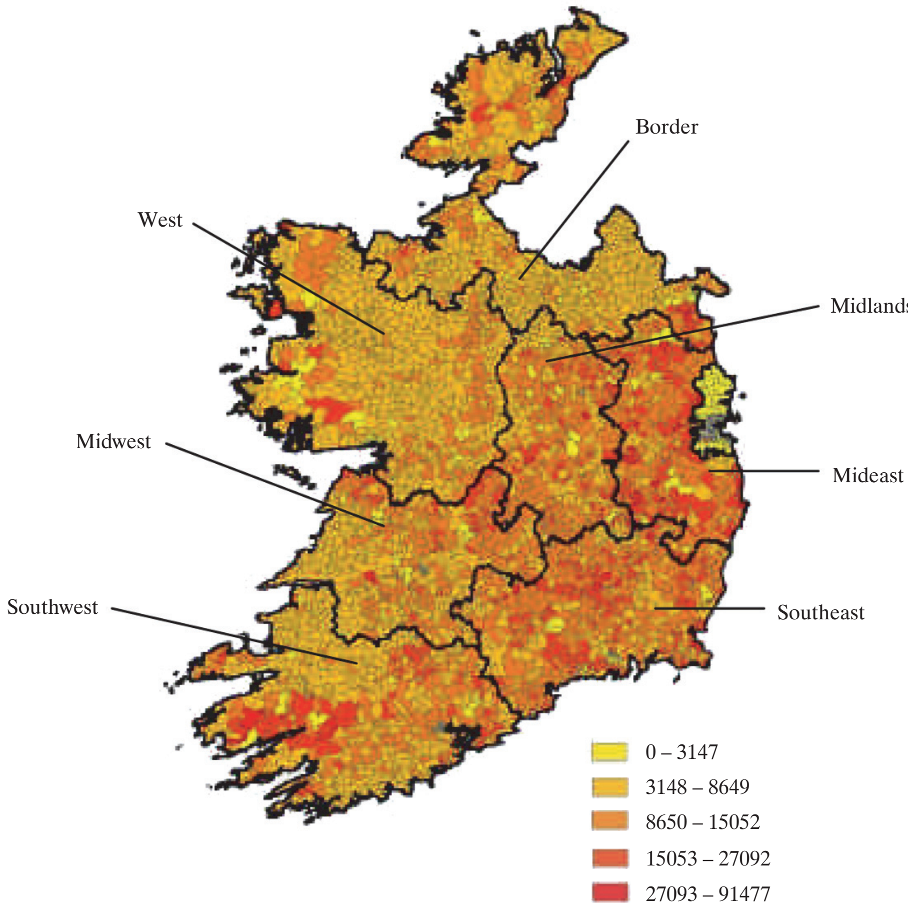

Figure 1: Geographic Distribution of the Single Farm Payment (Historical Scheme).

farms only and thus cannot be mapped using the simulated annealing process. The regional implications of the results, however, are discussed in the following sections of the paper. The analysis assumes that the regional ring-fencing of milk quota is still in place in 2012 and, therefore, the total amount of milk produced in each region remains the same. However, restructuring of milk quota is projected to occur within regions, where quota is moving from small to medium sized farms to larger farms.

The effect of decoupling on beef farms was regionally differentiated. The results generally show a de-stocking of beef animals in the three western regions and an increase in the number of beef animals farmed in the Mideast and Southeast of the country. Beef farmers in the Border and Midland regions are projected to reduce cattle numbers by up to 66% whereas beef farmers in the Midwest and West are projected to completely de-stock their beef animals. These farmers are projected to use their land only to claim the SFP and

Table 1: The impact of decoupling in 2012 relative to 2002

Region	Farm type	Single farm payment (€)	Farm gross margin (€)		Livestock units		Grassland area (ha)		Arable area (ha)	
			2002	2012	2002	2012	2002	2012	2002	2012
Border	Small dairy	7,597	33,036	41,890	28.0	37.0	40.4	40.4	0	0
	Medium dairy	10,462	68,398	65,920	50.0	46.0	67.6	67.6	0	0
	Small beef	13,125	12,468	13,196	28.1	10.7	28.1	28.1	0	0
	Medium beef	20,250	29,349	27,344	72.6	28.8	68.5	68.5	0	0
	Sheep	4,548	10,407	10,927	30.1	28.6	7.1	7.1	0	0
	Tillage	32,243	62,806	56,152	66.7	101.3	22.7	52.4	49.1	19.4
Mideast	Medium dairy	10,172	55,106	54,002	37.0	36.0	45.4	45.4	0	0
	Large dairy	29,551	131,370	144,013	94.0	101.0	119.3	119.3	0	0
	Large beef	21,991	36,207	48,229	52.9	63.3	51.8	58.2	0	0
	Sheep	13,515	33,721	32,690	100.6	103.6	57.9	57.9	0	0
	Tillage	34,259	55,799	60,278	122.6	161.1	84.2	122.6	38.4	0
Midlands	Medium dairy	17,990	39,769	45,033	22.0	16.0	52.6	52.6	0	0
	Large dairy	18,675	73,860	88,461	45.0	50.0	74.1	74.1	0	0
	Small beef	14,426	11,428	13,118	36.3	18.0	35.2	35.2	0	0
	Large beef	24,794	38,254	38,322	59.5	61.8	54.9	54.9	0	0
Midwest	Medium dairy	5,183	33,563	39,415	29.0	39.0	33.9	44.6	0	0
	Large dairy	13,049	75,105	62,495	64.0	62.0	66.6	60.0	0	0
	Small beef	4,713	2,863	3,490	12.3	0	13.0	13.0	0	0
	Medium beef	26,351	21,913	20,880	65.6	0	92.3	92.3	0	0
Southeast	Large dairy	17,561	50,136	67,870	33.0	37.0	48.4	48.4	0	0
	Specialist dairy	15,648	80,112	70,097	56.0	37.0	51.3	51.3	0	0
	Large beef	30,142	52,465	55,795	77.7	82.0	54.7	54.7	0	0
	Small tillage	10,131	17,147	15,798	21.7	6.8	24.9	24.9	7.9	0
	Large tillage	40,764	65,730	63,658	121.7	70.6	60.2	60.2	32.8	0
Southwest	Medium dairy	8,073	44,376	43,621	34.0	34.0	39.0	39.0	0	0
	Small dairy	8,430	69,426	70,738	52.0	52.0	38.6	38.6	0	0
	Large dairy	25,111	112,858	121,569	70.0	77.0	93.3	93.3	0	0
	Small beef	6,948	7,042	4,993	18.7	0	23.1	23.1	0	0
	Medium beef	11,833	13,670	11,422	30.9	17.5	41.1	41.1	0	0
West	Medium dairy	9,683	34,964	34,018	27.0	27.0	37.7	29.8	0	0
	Small beef	5,662	5,710	4,141	14.8	0	16.4	16.4	0	0
	Medium beef	14,175	10,980	13,302	36.6	0	44.3	44.3	0	0
	Sheep	4,294	11,351	14,180	38.4	81.5	18.2	28.6	0	0

are not expected to produce any tangible agricultural products. The results from the land transfer component of the model suggests that there will be insufficient demand for rental land in these regions and so this unprofitable beef grassland will not shift into any other farm activity. It should be noted that this analysis assumes a continuation of milk quota ring-fencing and, therefore, the total amount of milk produced in any region cannot increase. This may result in a dampening of the demand for grassland in certain regions and inflate the demand in other regions. In contrast to the two Western regions, beef farms in the Mideast and Southeast are projected to remain profitable post decoupling and an increase in total cattle numbers is expected. The beef farms in these regions typically tend to be larger in size and tend to operate more commercial beef enterprises compared to farms in the West.

Interestingly, the results show that for the majority of beef farms, including some of those projected to de-stock their farms, decoupling is likely to result in a higher farm income than that prevailing in 2002. This result is in keeping with the findings of other studies of decoupling, for example Breen *et al*. (2005), Revell and Oglethorpe (2003) and Colman and Harvey (2003). The results for the tillage sector are also interesting. It is projected that all of the tillage farms modelled will reduce their arable area. Some farms are projected to convert arable land to grassland and to increase the number of livestock units on their farm, while others are projected to allow part of their land to go fallow and to retain it only to claim their decoupled payment. Even in the Southeast region, the traditional stronghold of tillage farming, arable land area is projected to decline. The results show that the projected strong price for sheep meat post decoupling means that almost all sheep farms would benefit from decoupling. It is projected that sheep farms would de-stock beef animals and avail of the projected increase in sheep prices by increasing the number of sheep on farms.

Impact of a flat rate payment scheme

The implications of shifting to a flat rate decoupled payment were also considered. In the analysis, the flat rate payment was calculated as the sum of all payments paid to the weighted farm population across all eligible land in the country. This method of calculation provided an estimate of €270 per hectare in SFP across the country. Figure 2 shows the regional implications of shifting from the historical scheme that is currently used to a national flat rate scheme. It is clear from Figure 2 that a shift to a flat rate scheme would result in the movement of payments from the eastern seaboard and surrounding areas to farms located along the western seaboard. Farmers that received higher than average SFPs under the historical scheme would lose in terms of the size of their "cheque in the post" if a flat rate payment scheme was implemented.

When the regionally representative farm models were simulated using the flat rate payment scheme rather than the historical scheme the results showed that the shift in payment schemes would have little effect on farmers' production plans with most farmers making similar production decisions under both forms of decoupling. There would, however, be significant implications for total farm income. The results show that very few farms in the Southeast would benefit from a shift to a flat rate payment scheme. However, all dairy and sheep farms and some beef farms in the Border and West regions would experience financial gains from shifting to a flat rate scheme. Tillage farms in general, regardless of their geographic location, would lose from a shift to the flat rate scheme; this is due to the typically higher than average SFP per hectare along with their larger farm size.

Discussion

While there have been many analyses of the economic effects of decoupling for faming in Ireland, to date there has been no comprehensive analysis of the regional implications of decoupling. Two modelling tools that were developed to address this gap in the literature are presented in this paper. The matching of the National Farm Survey and the Census of Agriculture data allows us to map, for the first time, the geographic distribution of the Single Farm Payment in Ireland. The results show that the Irish Government's decision to opt

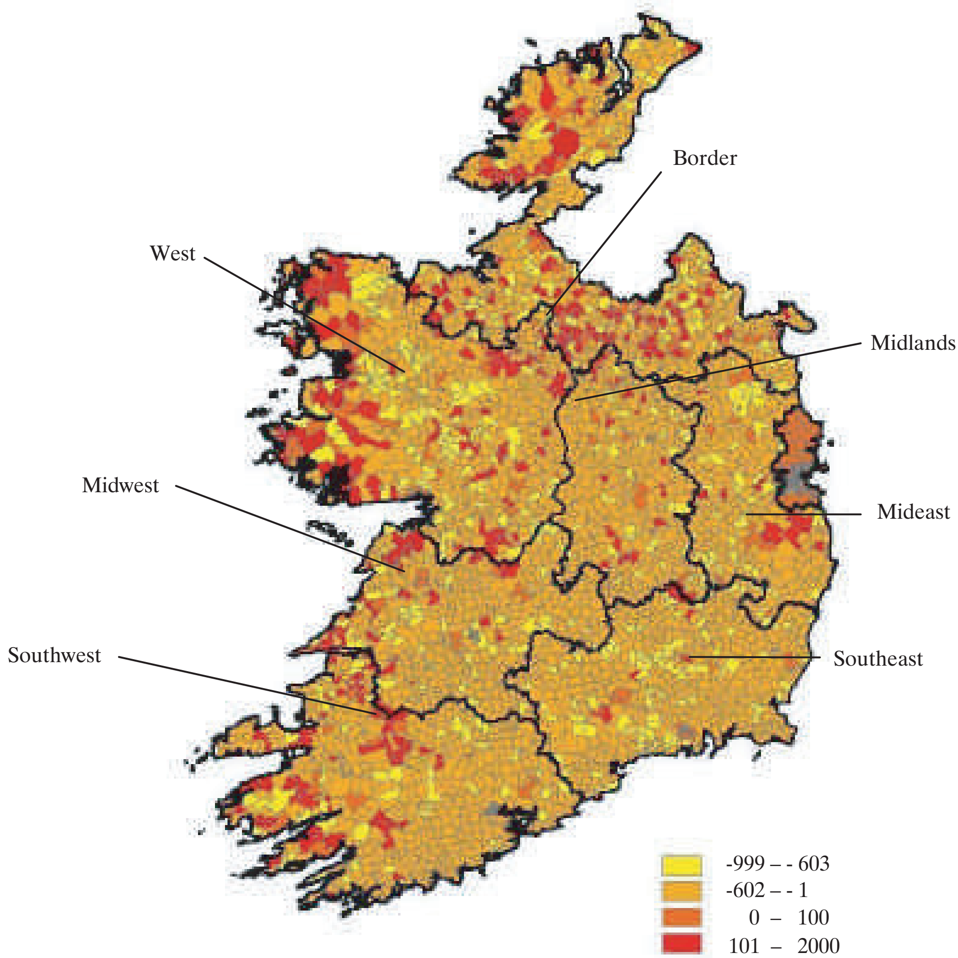

Figure 2: Change in the SFP under a Flat Rate Payment scheme compared to the Historical Decoupling Scheme.

for the fully decoupled historical scheme means that the prosperity of the south-eastern half of the country relative to the traditionally more disadvantaged north-western half is preserved under this policy. If the national flat rate payment system had been implemented there would have been a transfer of revenue from the south eastern half of the country mostly to farms on the western sea board. The results also show that a shift from a historical to a flat rate scheme would have almost no impact on farmers' production decisions. If future reviews of the decoupled payment scheme lead to the payment becoming more of a reward for the provision of public goods or the "stewardship of the land" rather than a compensation for price reductions, then it is most likely that such a payment would be made on a flat rate area basis. It is clear from the maps presented in this paper that such a policy change would result in very clear winners and losers.

The model results show that beef production in Ireland is likely to decline in all regions except the Mideast and Southeast. The results suggest that the majority of cattle farmers in all other regions would maximise their income by reducing or even removing completely beef animals from their farms. If such results transpire, beef farming in Ireland would be almost entirely concentrated in the east of the country. However, it should be noted that this result assumes that all farmers are profit maximisers and will de-stock cattle if it is profitable to do so. It is possible that in the short-term, farmers may not react to market signals and may continue to farm beef animals for the non-pecuniary rewards that they attach to this activity. Nevertheless, the results presented in this paper raise a number of interesting questions for both policy makers and the private sector. For policy makers, the decoupling policy seems at face value to be a good one, in that the majority of cattle farmers have higher incomes; however, with a large number of them in the western regions of Ireland likely to de-stock their farms, this raises the question of alternative employment opportunities and land use opportunities for the farmers that can no longer run a profitable beef business. Additionally, one would have to question the long-term survival of farm businesses that are completely reliant on decoupled payments as their sole source of farm income, especially given the uncertainty about the longevity of such payments. There are also issues for the food processing sector in terms of the long-term sustainability of beef processing plants in the west of Ireland and the ramifications of the closure of such plants for rural labour markets. All of these issues are beyond the scope of the current modelling exercise, but would be interesting areas for further research.

The results highlight the very vulnerable position of the Irish tillage farming sector. It is clear that tillage farmers in the past were very reliant on direct payments as a source of income and once these payments were decoupled, the vast majority of farmers find it difficult to cultivate crops profitably. If farmers act to maximise profit, as has been assumed here, then we can expect to see significant changes in land use across all regions of the country. The results show that even in the Southeast, traditionally a favourable crop growing region, it is more profitable for the typical tillage farmer to convert arable land to grassland or to allow the land go fallow rather than cultivate crops. Again, these results raise questions about the future of the cereals sector in Ireland and the implications for the downstream industries such as milling and food processing. It also raises a number of policy questions about land use and, in particular, it points to the very topical issue of the opportunity of using this land for the cultivation of energy crops.

In relation to the dairy farming sector, there are no startling results from the analysis but this is mostly driven by the assumption that ring-fencing will remain and therefore milk quota cannot be moved between regions. Preliminary research suggests that if ring-fencing was abolished, then quota would also shift within the country and become geographically more concentrated. Further research is ongoing in this area and is likely to yield interesting results.

Conclusions

The results highlight the regional differentiation in the impact of the policy reform. In relation to the beef farming sector there are two definite conclusions. First, the majority of beef farmers will experience higher incomes under decoupling and second the impact of decoupling on beef production is likely to be regionally differentiated with most farmers de-stocking, with the exception of those in the Mideast and Southeast. The results show that a large number of tillage farmers, irrespective of location, will find it difficult to grow crops profitably when payments are no longer linked to production. Finally, if the national flat rate payment system of decoupling was implemented rather than the historical one, then farms located along the western seaboard would have benefited at the expense of those in the east.

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