

## Does the single farm payment affect farmers' behaviour? A macro and micro analysis

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### ABSTRACT

Using Ireland as a case study, the overall aim of this paper is to determine if decoupled payments affect farmers' behaviour. Using a dynamic, multi product, partial equilibrium model of the EU agricultural sector, this paper first compares levels of production that would be expected if decoupled payments had no impact on farmers' activity with actual observed outcomes. Second this paper compares cereal and cattle farmers' profitability prior to decoupling with that observed after the introduction of decoupled payments. The analysis presented here would suggest that decoupled payments do still maintain a significant effect on agricultural activity with farmers using this new form of support to partly subsidise unprofitable farm production.

**KEYWORDS:** single farm payment; CAP; farming attitudes; farmers' behaviour

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### 1. Introduction

European agricultural policy underwent significant changes with the Mid-Term Review (MTR) of the Common Agricultural Policy (CAP) in 2003, where with some exceptions, member states agreed to implement a system of single farm payments (SFP) which were decoupled from production. Decoupled payments were introduced in order to curb over-production and to reduce the trade-distorting and inefficiency effects of the CAP (Falconer and Ward, 2000; Swinbank and Daugbjerg, 2006). These payments were defined in the Uruguay Round Agreement on Agriculture (URAA) as payments that are financed by taxpayers rather than by consumers, are not related to current production, factor use or prices and for which the eligibility criteria are defined by a fixed historical base period, whereby actual production is not needed to receive payments. Decoupled payments are in the World Trade Organisations (WTO) 'green box' of agriculture related subsidies and thus must adhere to the fundamental requirement that the policy has no, or at most minimal, trade-distorting effects (Swinbank and Tranter, 2005). That said, it is often argued that decoupled payments could still have an impact on farmers' behaviour due to factors such as risk aversion, wealth effects and also the presence of non-pecuniary benefits associated with farm work (Bhaskar and Beghin, 2009 and O Donoghue and Whitaker, 2010).

To determine if decoupled payments do in fact affect farmers behaviour, this paper using a dynamic, multi product, partial equilibrium model of the EU agricultural sector will first compare projections of agricultural

activity that we would expect to observe if decoupled payments did not affect farm activity with what was actually observed since the introduction of full decoupling in Ireland in 2005. With the introduction of full decoupling in Ireland a single farm payment is made to farmers based on payments they received in a historical reference period (2000–2002 inclusive). Second, this paper uses data from a National Farm Survey (NFS) collected as part of the Farm Accountancy Data Network of Europe (FADN) to examine the profitability of cattle and cereal farms as these were the sectors that were most reliant on coupled payments in Ireland. Specifically we examine the level of production on cattle and cereal farms that earns a positive market-based net margin.

In a European context, previous research (such as Hennessy and Thorne, 2005; Gorton et al., 2006 and Lobley and Butler, (2010)) examined future farmer intentions in the light of changes in policy such as the move towards decoupling. This research highlighted that farmers planned to make very little change to their farming activities post decoupling. However, as Tranter et al. (2007) notes there might be a difference in how farmers say they will react to a hypothetical change in policy as opposed to how they act in reality when that policy measure is in force. This paper should, therefore, provide a more reliable guide to short term decision making in the wake of the 2003 CAP reform by comparing levels of production that would be expected if decoupled payments had no impact on production with actual observed behaviour. In terms of overall structure this paper will in the following section explore

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previous literature relating to the impact of decoupling of farm support measures on agricultural activity. Next a description of the modelling framework used in this analysis is provided. This is followed with a discussion of the empirical results. Finally this paper concludes with a discussion of its major findings and their implications for agricultural policy.

## 2. Background: The effect of decoupled payments on production

The European Commission has declared that decoupled payments fall under the World Trade Organisations (WTO) category of 'green box' subsidies that result in none, or at most, minimal trade distortions of agricultural markets. Previous research has shown that the new CAP mechanisms will result in a significant reduction of gross profit margins in comparison to the previous support system and an associated risk of activity cessation (Onate et al., 2007). As production is not needed to receive subsidies, the recent policy reform could therefore potentially lead to land abandonment particularly in marginal rural areas (Osterburg and van Horn, 2006). However, it has also been reported that the actual effect is unlikely to be as drastic as farmers engage in production for non-economic as well as economic motivations. That is, in contrast to 'homo-economicus' strategies which assume that farmers behave absolutely rationally and only have profit-maximisation in mind, there are likely to be a variety of non-monetary benefits from farming that can influence their activities (Kantelhardt, 2006; Key and Roberts, 2009).

Increasingly research, for instance, has demonstrated that farming may be a vocation that may be valued in itself (Ackerman, et al., 1989; Herrmann and Uttitz, 1990; Willock et al. 1999a; 1999b). Vanclay (2004) asserts that farmers seek to make a reasonable income with each farmer defining what is reasonable for themselves and that the additional lifestyle factors associated with farming compensate farmers for those times when income may be less than what they could achieve in other endeavours. Key and Roberts (2009) and Key (2005) describe how attributes associated with farming such as independence and pride associated with business ownership are valuable to farmers and these attributes may not be observable in other types of employment. Outside of agriculture it has been widely reported that the self employed, all things being equal, report much greater levels of satisfaction with their jobs (Hamilton, 2000). The variety of non-pecuniary benefits associated with farming mean that farmers may have an incentive to use decoupled payments as a means of maintaining a farming lifestyle irrespective of any financial returns.

A number of other arguments for the supply inducing effect of decoupled payments have also been advanced. For example Tielu and Roberts (1998) and Hennessy (1998) assert that decoupled payments distort production by increasing a farm operator's overall wealth. The argument here is that with increased income from these risk free decoupled payments, farmers can more easily invest in their farm operation as their overall risk exposure is decreased thus increasing production.

Furthermore, farmers with higher guaranteed incomes are more likely to be granted access to capital and this increase in capital availability may also facilitate agricultural production. One additional reported potential impact of decoupled payments is that the increase in wealth may decrease a farmer's risk aversion, consequently making farmers more likely to engage in certain production activities that otherwise they may not have made. Finally farmers may use decoupled payments to increase production as a result of expectations that future payments will be reassessed and based on current production levels (Coble et al., 2008; O Donoghue and Whitaker, 2010).

To date, previous research at least from a European perspective, concerned with determining if decoupled payments affect farmers' behaviour has been limited. This is because the recent reform represents such a new and radical policy shift that no previous experience exists with its application and, in addition, its application in the EU has been gradual. The work that does exist in this area has generally examined farmers' intentions in the light of the introduction of decoupled payments. Hennessy and Thorne (2005) compared survey data on farmers production plans post decoupling with outputs predicted by a farm-level profit maximisation model. In this study it was shown that a significant number of farmers plan to use their decoupled payments to continue or expand non-viable production. Similarly in a study of the UK dairy sector, Colman and Harvey (2004) outline how many farmers are determined to remain in farming despite low returns. They report that given the stated commitment of a majority of dairy producers to continue and even expand production, it seems likely that they will treat their direct payments as coupled in order to achieve their ambitions. Likewise Tranter et al. (2007) in a survey of farmers in Germany, Portugal and the UK found that only 30% stated they would alter their mix of activities in response to decoupling.

Gorton et al. (2008) examined farmers' attitudes towards agricultural production and policy support in the context of the 2003 CAP reform among five Member States in the EU. They note that while agricultural policy has shifted from one focused on maximizing production to more decoupled forms of payment, there is little evidence that farmers' attitudes have also adjusted. The study highlighted how farmers still overwhelmingly retain a productivist mindset and reject the idea that they can be competitive without the aid of policy support. In addition, farmers expressed preferences for the full utilization of agricultural land for agricultural production and wished to concentrate on farming. Similarly, Lobley and Butler (2010) examined farmers' intentions following the implementation of the 2003 CAP reforms. The study which was based on a large sample survey of farmers in the South West of England found that CAP reform is not stimulating rapid agricultural restructuring. Lobley and Butler (2010) notes that while the 2003 CAP reform agreement may have radically alerted the policy environment within which farmers operate there is little evidence that farmers are reacting in an equally radical manner. This mirrors earlier findings by Walford (2003) and Burton and Wilson (2006) who found that productivist tendencies prevail amongst English farmers.

### 3. Research Design

Twenty three teams from EU Member States as part of project called AGMEMOD funded under the European Commission 6th framework and by contributions from the partners institutes throughout the EU have built country level models that reflect the specific situation of the agricultural sectors in their individual country. The maintenance of analytical consistency is achieved via adherence to a common model template across all the partners involved in the model. In all country models, agricultural supply and use data as well as policy data for the years 1973–2005 have been collected. The CAP budget and national ceilings remain at the levels set out in Regulation EC 1782/2003. For each commodity modelled, and in each country, agricultural production as well as supply, demand, trade, stocks and domestic prices are derived by econometrically estimated equations.

The national level models have been combined into a composite EU model. Each country model contains the behavioural responses of economic agents to changes in prices, policy instruments and other exogenous variables. One element of the supply and demand balance (usually exports), for each commodity modelled, is derived as a closure variable to ensure that the supply and use identity holds for all EU markets throughout the projection period. This condition implies that production plus beginning stocks plus imports will always equal domestic use plus ending stocks plus exports (see figure 1 and figure 2 for a visual illustration of the structure of the AGMEMOD model).

A commodity country model is linked to the other countries through a price transmission relationship, where an EU key-price drives price formation in any domestic market. The EU key-price is usually set as the price observed in the most important national market within the EU for that commodity. In the key price country, the commodity model includes a price formation equation. This equation aims at capturing all exogenous variables affecting price formation within the EU and, in particular, the world market price, price policies (intervention prices, for instance), trade agreements, etc. In addition, the lagged EU self-sufficiency rate is also included as an explanatory variable, thus making the key-price recursively respond to the previous year's outcome. The key-price is then transmitted into any other domestic market such as Ireland, through a price transmission (or price linkage) equation that makes the domestic price a function of the EU key-price and other possible explanatory variables, e.g., the own country self sufficiency rate (or net exports) for that commodity.

Projections of exogenous data relating to macroeconomic series such as exchange rates and GDP taken from research institutions within each individual Member State have been incorporated into the model. In addition, projections of world prices from the Food and Agricultural Policy Research Institute (FAPRI) have been incorporated into the model structure. The development of specific country models has allowed for the capture of the inherent heterogeneity of agricultural systems existing within the EU, while simultaneously maintaining analytical consistency across the estimated country models. Within this

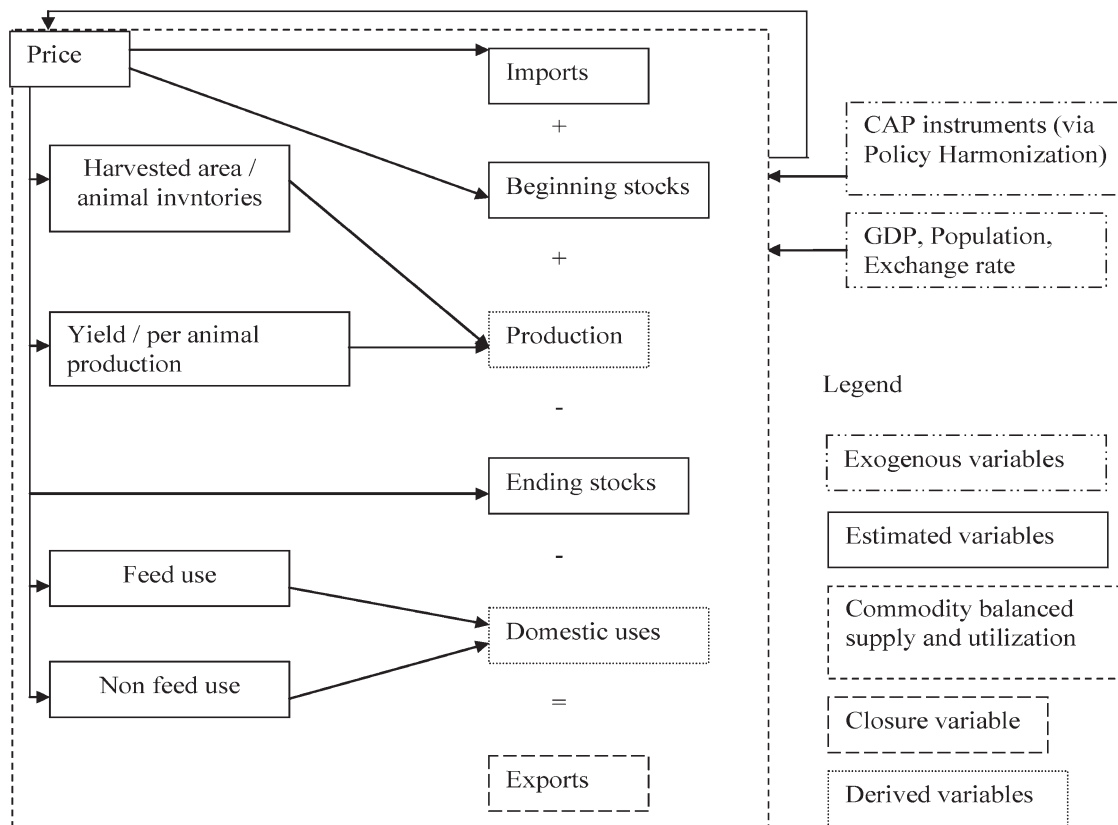


Figure 1: Commodity modelling structure

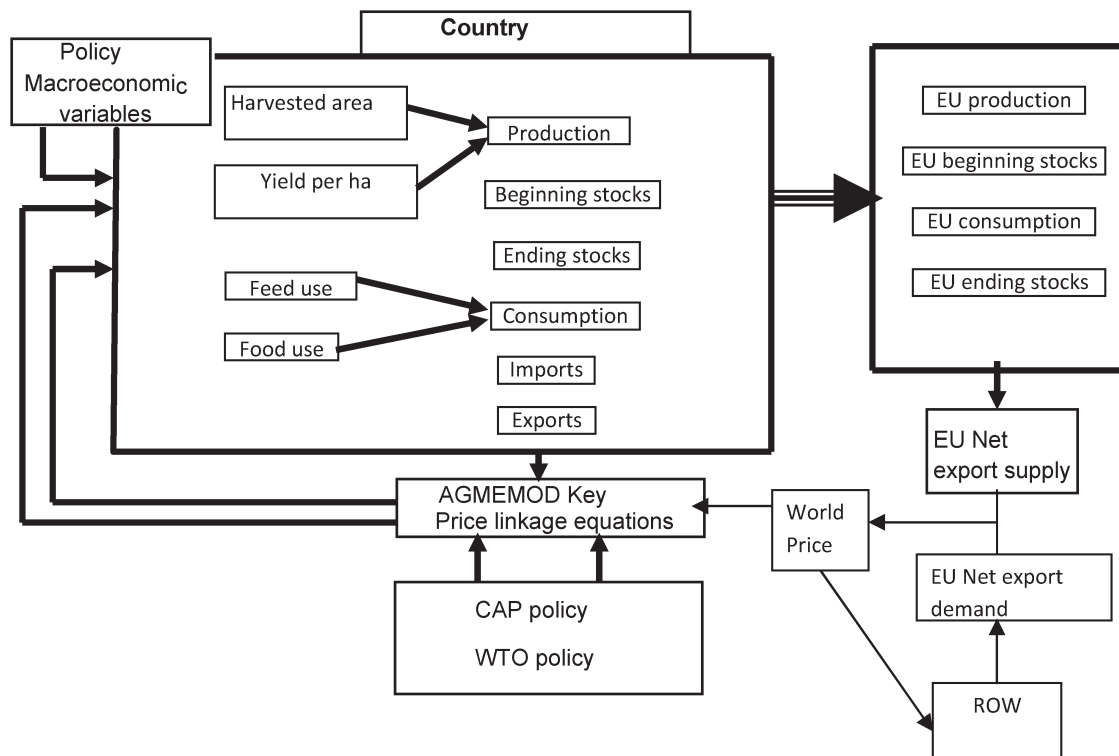


Figure 2: AGMEMOD combined model

combined model environment all EU prices, as well as all elements of agricultural commodity supply and demand in each member state, are modelled endogenously. Hence, the final dynamic, multi-market, multi-country, composite model developed, allows us to generate projections for each Member State, under the assumption of exogenous world prices<sup>4</sup>.

In order to analyse the impact of policy reform, data on all of the different types of direct payments that are and were part of the CAP were collected for each member state. This was used to create a database which in a coherent manner across all the member states incorporated the total budgetary envelopes, the different types of the EU CAP direct support elements, and their allocation from the total budgetary envelopes. Using this policy data a set of country specific variables were developed which calculated the impact of policy instruments on the supply and use of various agricultural commodities. In particular, in the case of Ireland an adjusted gross return figure for grains and a reaction price for beef were calculated. In other words in the AGMEMOD modelling approach, all direct payments are recalculated as a policy price add-on to the relevant producer price to form a reaction price or expected gross returns. Thus, when entered into the model structure these variables will lead to responses by farmers that are analogous to farmers' responses to changes in agricultural output prices.

As discussed earlier, there are a variety of reasons why decoupled payments could still influence agricultural activity. The actual supply inducing effect of the reaction price for beef and adjusted gross return for grains can be altered in the model structure by

multiplying them by a multiplier between 0 and 1. The closer the multiplier is to one then the greater are the assumed impacts of decoupled payments on production. For instance, setting the multiplier as equal to 1 assumes that the reaction price for beef which captures the effect of policy instruments on the beef sector has the same impact as output prices. Setting the multiplier as equal to 0 assumes that the reaction price does not have any impact on production (i.e. fully decoupled from production) which would be in keeping with its status as a green box policy.

Data from the NFS was also examined in order to ascertain the prevalence of loss-making cereal and cattle production amongst Irish farmers. The NFS is collected annually as part of the Farm Accountancy Data Network requirements of the European Union (Farm Accountancy Data Network (FADN), 2005). It determines 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 provides data on Irish farm income to the EU Commission in Brussels and a database for economic and rural development research and policy analysis. The sample is weighted to be representative of farming nationally across Ireland. In the 2006 NFS survey, 1,159 farmers were surveyed representing 113,068 farmers nationally.

#### 4. Results

The following analysis aims to provide some guidance as to the actual impact of decoupled payments by comparing actual observed market data (CSO, 2009) with projections from the partial equilibrium (PE) model under the two different assumptions relating to

<sup>4</sup> For more details in relation to the structure of this model the reader is referred to Erjavec et al. (2006; 2011)

**Table 1:** Impact of decoupled payments 2005–2009

	2005	2006	2007	2008	2009	% change
<b>Grain area harvested (1,000 ha)</b>						
Zero coupling		258	247	244	244	-12
Actual area harvested	276	280	279	314	293	6
Full coupling		308	327	341	351	27
<b>Suckler cows (1,000 head)</b>						
Zero coupling		1132	1102	1060	1020	-11
Actual numbers	1150	1129	1117	1115	1069	-7
Full coupling		1168	1160	1136	1112	-3

the supply inducing impact of decoupled payments between 2005 and 2009. As can be seen in Table 1, the projected levels of grain area harvested for the years 2005–2009 under the zero coupling assumption are significantly below what was actually observed over this period. Under the assumption that decoupled payments maintain the same effect on farm behaviour as output prices the projections are significantly above that observed. With the exception of 2006 which was the first year post decoupling a similar situation is evident in relation to suckler cow numbers. In the model results, the extent to which the real figure for suckler cow numbers and grain area harvested is closer to the projected figure for full coupling or zero coupling depends in part on external developments in agricultural markets. For instance, a larger than expected increase in cereal prices in 2007 due to, among other things, an increase in biofuel demand and diminished supplies as a result of drought from major grain exporters such as Australia led to a larger than expected market return for the production of cereals. This resulted in a significant jump in the area harvested in 2008 to the extent that the actual area harvested in 2008 was closer to the full coupling scenario. By 2009 the actual figure for grain area harvested was much closer to the midpoint of these two scenarios as cereal prices had fallen back to pre 2007 levels. Therefore while we can see a clear path emerging whereby production is significantly above what would be expected if payments were in fact truly decoupled, suggesting that decoupled payments affect farm behaviour, it is not possible to precisely quantify this impact.

To provide a further illustration of the impact of decoupled payments on farmer's activity table 2 outlines the proportion of production in the cattle and cereal sectors that make a positive market based net margin post decoupling. The market based net margin is calculated as market based gross output less direct costs (such as concentrate feed costs and outside hired labour (farmers own labour is not included as a cost)) and the share of overhead costs attributable to the sector under

examination. Market based gross output is simply sales less purchases plus any coupled premia payments that were in existence. It does not include decoupled payments. Focusing on the market based net margin allows us to examine the profitability of suckler cow and cereal production.

As shown in Table 2 even after assuming zero labour costs on the part of the principal farm operator less than 30 percent of suckler cows within the NFS for the five years examined are raised on farms, which earned a positive market-based net margin from cattle production. In relation to cereal production the proportion showing a positive market based net margin increased from 54 percent in 2006 to 88 percent in 2007. The proportion showing a positive market based net margin declined substantially in 2008 and 2009 and finally increased again in 2010. This variability is due to the considerable variation in cereal prices and the cost of cereal inputs, most notably the high prices recorded in 2007 and 2010 for cereals compared with the very low cereal prices of 2009. As we saw in table 1 the number of suckler cows fell by 7 percent between 2005 and 2009 whereas total cereal production increased by 6 percent during this period. If farmers treated decoupled payments as being 'truly' decoupled, then given the negative market farm incomes observed in table 2 it seems reasonable to expect much larger reductions in agricultural activity.

Table 2 also reports the proportion of cereal and suckler cow production that occurs on farms with a positive family farm income which includes all decoupled payments in its calculation. It can be seen that when decoupled payments and the returns to other farm activities are considered there would be a significant increase in the proportion of cereal and cattle production that would be on farms earning a positive family farm income. More specifically, under this scenario a total of 87 percent of suckler cow production in 2008 would be on farms earning a positive family farm income. A similar situation would be observable in relation to cereal production as 94 percent

**Table 2:** Proportion of production with a positive market based net margin 2006–2008

	2006	2007	2008	2009	2010
Suckler cows (%)	29.2	25.6	27.2	20.7	23.5
Suckler cows (% with a positive family farm income – includes the SFP as a component of farm income)	92	91.6	87	87.3	87.0
Grain area (%)	54.2	88.3	25.5	14.7	70.3
Grain area (% with a positive family farm income – includes the SFP as a component of farm income)	98.3	99.7	94.2	84.6	97.7

Source: National farm survey

**Table 3:** Proportion of cattle production with a positive market based net margin 2004 (Euro per hectare)

Adjusted Farm GM Quintile	Family farm income	Market Net Margin	Production FC	Other FC	Adjusted Farm Market GM	Subsidies	Has part time Job
1	-25	-500	100	276	-224	475	0.58
2	158	-269	77	262	-7	427	0.56
3	241	-136	64	202	66	377	0.44
4	380	-46	70	214	168	425	0.44
5	530	108	80	315	423	423	0.37
Total	253	-174	79	256	82	427	0.48

Source: National Farm Survey

Note: in late September 2012 €1 was approximately equivalent to US\$1.29 and GB£0.80

of cereal production would be generating a positive family farm income, with figures of 98.3 and 99.7 percent in 2006 and 2007 respectively.

In table 3 and 4 we categorise cattle farms and cereal farms by quintile in the year just before the introduction of decoupling. Here farms are broken into groups according to their level of adjusted gross margin which is simply market net margin less all coupled and decoupled payments and any non production related fixed costs such as depreciation, maintenance costs and interest payments etc. First it can be seen that farms within each quintile group in the cereal sector had on average positive family farm incomes (market net margin plus subsidy payments). Interestingly, cattle farmers in the bottom quintile had on average negative family farm incomes. We can see, therefore, that even prior to the introduction of decoupled payments a significant proportion of cattle farmers albeit to a much smaller extent than presently were using non-farm income to subsidise loss making agricultural production.

When we calculate market net margin which excludes subsidy payments such as the special beef premium, only the top two quintiles in relation to the cereal sector and the top quintile in relation to the cattle systems make an average positive market return. This highlights the large dependency of farmers on subsidy payments to make profits prior to the introduction of decoupling. As illustrated in table 2 even though these payments are since 2005 not linked to production (save for some cross compliance obligations) farmers still rely on these supports in order to subsidise what would otherwise be loss making agricultural activity. Table 3 and 4 also reports the proportion of farmers with an off-farm job in each quintile. We can see a trend whereby the farms in the lowest quintiles have the largest proportion of farmers with off-farm jobs. For instance, 58 and 72 percent of cattle and cereal farmers respectively in the bottom quintile have off-farm jobs. These farmers may

not be dependent on farming to make a living and therefore profit maximising behaviour may be very different to that which would maximise their utility in that they may wish to maintain a farming lifestyle irrespective of any financial rewards.

## 5. Discussion

Traditionally, direct payments in Europe and elsewhere have linked payments to production. This has had the effect of substantially altering the market for particular agricultural commodities as farmers could receive more payments simply by producing more of the supported commodity irrespective of any consumer needs (Ackrill, 2008; Swinbank and Daugbjerg, 2006). In addition to a large budgetary cost, the policy of price support in the EU created significant tensions between the EU and other agricultural exporters. As a result, since the MacSharry reforms in 1992 the EU has moved from a policy of price support towards measures that are decoupled from production. The most significant move in this regard was the Mid Term Review (MTR) of the CAP in 2003 where member states agreed to implement a system of payments which were not related to actual production. Decoupled payments are in the 'green box' of domestic support defined by the World Trade Organisation (WTO) and thus are assumed to have none, or at most, minimal trade distorting effects. Decoupled payments have, however, generated considerable international debate as to whether they do in fact alter the behaviour of farm operators.

In order to provide some guidance as to the actual effect of decoupled payments, this paper compared projections from a PE model under the alternate assumptions of full and zero coupling with observed market outcomes between 2005 and 2009. The results suggest that decoupled payments do still maintain a positive impact on farmers' production levels, albeit less

**Table 4:** Proportion of cereal production with a positive market based net margin 2004 (€ per hectare)

Adjusted Farm GM Quintile	Family farm income	Market Net Margin	Production FC	Other FC	Adjusted Farm Gross Margin	Subsidies	Has part time Job
1	153	-358	167	234	-124	511	0.72
2	220	-200	140	338	138	420	0.37
3	248	-202	113	510	308	450	0.41
4	554	97	99	328	425	457	0.47
5	631	148	126	662	810	483	0.31
Total	358	-108	130	403	295	466	0.47

Source: National Farm Survey

than what would be expected if payments were still fully coupled to production. This viewpoint was supported by the analysis of a National Farm Survey which showed that a large proportion of cattle and cereal farms are operating at a market loss and appear to be using decoupled payments to subsidise unprofitable production.

Traditional economic theory suggests that individuals make decisions based on the expected change in their level of 'well-being', where the technical term used for well-being or welfare is utility (Edwards-Jones, 2006). Given that utility is a difficult concept to measure economists have often made the simplifying assumption that money can act as a substitute for utility. This has led to the situation observed in many agricultural economic models where it is assumed that all farmers are rational profit maximisers (Edwards-Jones, 2006). This approach may not account adequately for the farming behaviour of individuals as it fails to recognise the large and increasing literature which suggests farmers' behaviours result from complex processes influenced by a range of socio-economic and psychological variables (see Willock et al., 1999a; 1999b and Howley and Dillon, 2012 for a review of this literature). It could be that farmers are perhaps not just driven by financial goals but are also influenced by goals in relation to the satisfaction associated with farming. In other words, as a result of non-pecuniary benefits associated with farm relative to non-farm work, many farm operators may be using decoupled payments to subsidise what would otherwise be unprofitable farm production in order to maintain a farming lifestyle. Farmers may fear a possible diminution in the lifestyle and social benefits associated with traditional farm work if they make significant reductions on their level of farm activity.

There have also been a number of other reported potential influences of decoupled payments on farm activity. This includes issues such as risk aversion, wealth effects and increase in accessibility to loans from lenders that could also result in decoupled payments having a positive impact on farm activity (see Bhaskar and Beghin, 2009 and O Donoghue and Whitaker, 2010 for a review of this literature). Furthermore, through cross compliance obligations, farmers are required to maintain their land in good agricultural and environmental condition in order to receive their full payment. This is likely to result in some compliance costs and may make it optimal for certain farmers to keep land in agricultural use where without this requirement it would otherwise be left idle or converted to non-agricultural use.

## 6. Conclusion

The results presented in this paper would suggest that cereal and cattle farmers in Ireland do not treat the new single farm payment as being 'truly' decoupled from production. Decoupled payments appears to still elicit a behavioural response from farmers in that it encourages production at levels above that which would be optimal from a market perspective. In effect many farmers are using decoupled payments to at least partly subsidise what would otherwise be unprofitable farm activity. It could be that for many farmers maximising income may

not be the most important objective with benefits such as social interaction with other farmers or simply the enjoyment of farming also important considerations. Also, the single farm payment despite being decoupled from production might still affect farmers' behaviour via wealth or risk reducing incentives. It is also important to note that the presence of a large amount of sunk costs that exist regardless of production levels can mean that it may be optimal for some marginally unproductive farmers to maintain production (O Donoghue and Howley, 2012)

While decoupled payments still appear to influence agricultural production, this impact is less than what would be expected if these payments were still coupled to production. From this perspective, the move towards decoupled payments is a step in the direction of a less trade distorting policy. Moreover decoupling is both a new and radical shift in the CAP and it is conceivable that farmers may get closer to treating these payments as truly decoupled in time. For example, it may take some time before the breeding stock of cows can be adjusted. Additionally, multiple generations of farmers have adapted and become used to payments being coupled to production and therefore it may take time for farmers to realise that they are both losing money and that actual production is not needed to receive payments. In relation to future work, further micro-econometric and behavioural analysis will be needed at the farm level to ascertain the differential impact of decoupled payments. In addition, a better understanding of the motivational profiles of farmers could aid efforts to understand and predict farmers' response to policy changes as it seems likely that farmers will consider a wide variety of factors in addition to financial considerations in determining their levels of farm production.

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