REFEREED ARTICLE

DOI: 10.5836/ijam/2016-05-70

Planned intentions versus actual behaviour: assessing the reliability of intention surveys in predicting farmers' production levels post decoupling

THIA HENNESSY[1*], ANNE KINSELLA[1] and FIONA THORNE[2]

ABSTRACT

This paper assesses the reliability of intentions surveys in accurately predicting farmers' production decisions following decoupling. Two samples of Irish cattle and sheep farms that participated in intentions surveys in 2004 and 2006, asked about their intended production 3 years hence (2007 and 2009), are revisited and their subsequent production decisions examined. Farmers were questioned about their production plans post decoupling and their subsequent production decisions were also observed. The analysis reveals that on aggregate farmers' production intentions were more accurate in the first than the second survey, i.e. the one conducted before decoupling was introduced. The second survey tended to be characterised by optimism where farmers were more likely to overestimate their future production levels. At an individual level only about half of all respondents acted according to their earlier stated intentions. The majority of the remainder tended to be optimistic, i.e. over estimating their future production levels. Farms are classified into three groups; those that are accurate, those initially overestimating their future production (optimistic) and those underestimating their future production (pessimistic). The multinomial logit model suggests that for the most part the intention-behaviour gap relating to production intentions and behaviour post decoupling was influenced by very few farm and farmer characteristics that were available through the FADN database.

KEYWORDS: Decoupling; Intentions Surveys; Multinomial Logit model

1. Introduction

Since its inception, the Common Agricultural Policy (CAP) has been subject to almost continual reform, Hennessy et al (2014). Policy analysis at both the ex-ante and ex-post stages is an important part of this highly complex reform process. Indeed, on-going and ex-post policy evaluation is a key element of the latest 2013 reform of the CAP in the form of the Common Monitoring and Evaluation Framework, (European Union, 2015). Ex-ante policy evaluation, typically occurring at the policy proposal stage, is an important means of informing policy negotiators about the likely implications of a proposal. Such ex-ante analyses are usually based on statistical and economic models; these models and their use in CAP analysis are discussed in Ciaian et al (2013). However, when policy proposals represent a radical departure from the past, such models are less useful as they are based on data relating to a different policy regime as outlined in the seminal paper by Lucas (1976). In such cases, many policy studies, as reviewed below, have supplemented or substituted their economic models with farmer intention based surveys to assess how farmers may react to policy reform.

The 2005 reform of the Common Agricultural Policy introduced the decoupling of direct payments, meaning that farmers would receive direct income support regardless of their production levels. This was a radical departure from the previous regime which linked such support to the production of crops and livestock products and as such presented a significant challenge to those involved in policy analysis and the policy negotiation process. At this time a number of policy analysts used intentions surveys to assist in predictions of the impact of decoupling on production decisions. Bougherara and Latruffe (2010) provide a comprehensive review of such studies that were conducted across the EU around the time of the introduction of decoupling, these include; Latruffe and Davidova (2007), Douarin et al. (2007), Tranter et al. (2007) Genius et al. (2008) and Gallerani and Gomez y Paloma (2008), among others. Despite the widespread use of intentions survey data in predicting the impact of

Original submitted April 2014; revision received March 2016; accepted August 2016.

[1]Agricultural Economics and Farm Surveys Department, Rural Economy and Development Programme, Teagasc, Athenry, Co. Galway, Ireland.

*Corresponding author. Thia Hennessy, Department of Food Business and Development, Cork University Business School, University College Cork, College Road, Cork, Ireland.
E-mail: thia.hennessy@ucc.ie.

[2]Agricultural Economics and Farm Surveys Department, Rural Economy and Development Programme, Teagasc, Ashtown, Dublin 15. Ireland.

policy reform, relatively little empirical research has been conducted on the reliability of such data (Lobley and Butler, 2010). The objective of this paper is to review the use and assess the reliability of farmer intention surveys in correctly predicting the impact of a policy reform.

2. Background

Inconsistencies between intentions and behaviour

The theory of reasoned action (TRA) (Ajzen and Fishbein 1980) and the theory of planned behaviour (TBA) (Ajzen 1985) provide useful frameworks for predicting and understanding behaviour, which state that a person's intention to perform a behaviour is the most important predictor of performance. Furthermore, these theories state that constructs such as attitudes, subjective norms and perceived behavioural control all play important roles in formulating intentions. Sheeran (2002) cites examples as to how these constructs of attitudes, subjective norms and perceived behavioural control account for variability in intentions, yet there still appears to be '*less impressive*' (p. 724) predictive accuracy evident from these theories. A number of seminal agricultural economics papers explored this issue by looking at the accuracy of intentions surveys or the magnitude of the so called "intention-behaviour gap". Thomson and Tansey (1982) were among the first to point out the weaknesses of intentions surveys in farming and a recent, comprehensive review of the extensive literature that has emerged on this topic since then is available from Lefebvre et al (2014). The afore mentioned literature outlines various reasons as to why a discrepancy between intention and actual behaviour might exist:

Timing bias: occurs when the current economic environment may overly influence farmers' views of the future and/or too little information is available at the time of the survey to make an informed decision. Sheeran (2002) also refers to this as temporal stability and defines the same as '*…. the extent to which an attitude remains unchanged over time regardless of whether it is challenged*' (p. 725). Horowitz (1992) also referred to this issue as 'intertemporal inconsistency'.

Negligence bias: occurs when too little time is devoted to answering the questions or respondents feel obliged to provide a response to an issue they have not yet considered.

Manipulation bias: occurs when respondents are trying to influence an outcome through their answers, i.e. if they believe their views on a policy option may affect the final policy selected by government.

Sampling bias: this may arise where the sample only reflects larger or more efficient farms and where the sample fails to include potential new entrants. Vare et al., (2005) also refers to the issue of actual behaviour being attributed to a number of individuals rather than just the one individual answering the question who may not always have all the information.

The above issues may lead to some inconsistencies between intentions and actual behaviour, what has become known as the "intention-behaviour gap". There are two possible sources of this gap: errors of commission, when a respondent states they will do something but they fail to do so; and errors of omission, when a respondent does not state they will execute a particular action but they actually do so (Fujii and Garling, 2003). An important question is whether the intention-behaviour gap, which is not explained via the theories of TRA and TBA outlined above, can be further explained by some systematic factors (Wong and Sheth 1985). Vare et al., (2005) provided a rationale as to why an understanding of the relationship between systematic factors and intention-behaviour gap was of importance to the reliability of intentions surveys. Firstly, if the intention-behaviour gap happens randomly then the reliability of intention measures is reduced due to a random measurement error. Secondly, if a significant relationship is found between the intention behaviour gap and farm and family characteristics, the results of econometric models based on intentions would be biased if account of these systematic variables is not considered.

A number of studies have attempted to quantify the effectiveness of intentions surveys retrospectively. For example, Thomson and Tansey (1982) revisited an earlier intentions survey and their results showed that only between one-third and one-half of the respondents acted in accordance with their stated intentions. Further, they also observed that one fifth of the farmer's behaviour was in complete conflict with their stated intentions. Vare et al. (2005) revisited a sample of farms that had earlier revealed their succession plans. They found that the majority of farms had behaved in accordance with their plans but that the discrepancy between intention and actual behaviour, where it existed, was significantly related to very few farm and farmer variables, with age representing the most significant explanatory variable significantly related to the farm operator's age, with older farmers being less likely to behave as stated. Lefebvre et al. (2014) also revisited an earlier intentions survey to assess its accuracy. They found that nearly three quarters of farmers' behaved consistent with their intentions and concluded that stated intentions are a good predictor of actions even in a rapidly evolving context.

Possible Impacts of Decoupling

Economic theory suggests that if coupled subsidies are replaced with payments that are totally decoupled from production, then production should fall to a level that would exist without any subsidies. It follows that production on farms making a market-based loss should fall substantially post decoupling unless significant cost management or efficiency gains can be achieved and production can yield a market-based profit. With a significant number of Irish beef and cereal farmers making a market-based loss, we should expect to see aggregate production of beef and cereals in Ireland falling substantially as a result of decoupling.

As decoupling was an unprecedented policy change in the EU context, historical data provided little indication of the changes decoupling may have engendered. However, there was much literature at the time which debated whether or not the policy represented a fully decoupled one. Swinbank and Tranter (2005) concluded that the retention of the link between the payment and land farmed weakened the EU's argument that the payments were truly decoupled. Furthermore, Burfisher and Hopkins (2003), showed that even fully decoupled payments have a production inducing effect as they

Table 1: Stated Intentions and Actual Behaviour

Stated Intention	Behaviour	Label	No. farms (2004)	No. farms (2006)
Expand (2004 n=137)	Expand	Accurate	78	90
(2006 n= 247)	No Change*	Optimistic	23	34
	Contracted	Optimistic	36	123
No Change (2004 n=159)	Expand	Pessimistic	55	31
(2006 n=173)	No Change	Accurate	33	44
	Contracted	Optimistic	71	98
Contract (2004 n=230)	Expand	Pessimistic	63	42
33 (2006 n=259)	No Change	Pessimistic	27	20
	Contracted	Accurate	140	197

**production levels within 10% of the 2004 level are considered as "no change"*

impact on farmers' exposure to economic risk, their access to capital and their expectations about the criteria for future payments (i.e. that future payments could be related to current or future levels of production).

To provide some insight into farmers' production decisions in a decoupled environment in an Irish context, Hennessy and Thorne (2005) examined Irish farmers' intended production plans following the decoupling of direct payments from production. Using data from an intentions survey on farmers' production plans, they concluded that a considerable number of farmers planned to use their decoupled payments to continue or expand economically non-viable production post decoupling. Up to seven years of data are now available on the actual output on the majority of the farms that participated in the 2005 survey. In order to assess the reliability of intentions surveys, we revisit this data to compare the actual production decision to the intentions.

Data and Methods

Research on stated intentions-behaviour gap is made difficult from a practical perspective because it requires a constant sample. Most surveys protect the anonymity of respondents, which make it difficult to revisit and interview them a few years later, (Lefebvre et al. 2014). The Teagasc National Farm Survey (NFS) has been conducted annually by Teagasc since 1972, being operated as part of the Farm Accountancy Data Network (FADN), fulfilling Ireland's statutory obligation for the provision of data on farm output, costs and income to the European Commission. Each year a random stratified nationally representative sample of approximately 1,100 farms is selected and a weighting factor is assigned to each farm so that the results can be aggregated to be representative of the national population of farms by farm system and farm size. In addition to the FADN dataset, the NFS also occasionally collects additional data on farmers' intentions, like the data used in this paper and in Hennessy and Thorne (2005) and Vare et al. (2005). In 2004 a sample of 1,050 farmers completed a survey about their production intentions in 2007, i.e. post decoupling. 803 of these farms were still members of the survey in 2007 and hence it is possible to compare their actual production decisions with their intentions. Although this survey was conducted for all farm types, the analysis has been confined to cattle and sheep farms. Dairy farms were not examined as they lack the flexibility to substantially change their production levels because of the milk quota system, and crop farms were excluded because of the complexity of multiple crop mixes on farms.

Data are available on 526 cattle and sheep farms in both the 2004 intentions survey and the 2007 survey of actual production. In 2004 farmers indicated the number of suckler beef cows and ewes they intended to stock in 2007, while the 2007 NFS farm data records the actual number of animals stocked on the farm. A further production intentions survey was conducted in 2006 and farmers were questioned again about their future production plans for 2009. A sample of 679 cattle and sheep farmers participated in both the intentions survey in 2006 and the full NFS survey in 2009. Hence it is possible to compare their intentions and their actual behaviour across two time periods[3].

Table 1 contains data on the number of farmers indicating that they would expand, contract or maintain their animal numbers unchanged in both the 2004 and 2006 surveys. To examine accuracy at the individual farm level, farms are classified on the basis of how accurately their behaviour reflected their earlier stated intentions. In Table 1 farmers are classified as Accurate, Optimistic or Pessimistic. Farmers are (i) Accurate, if their animal numbers were within 10 percent of their stated intentions, (ii) Pessimistic if their actual animal numbers were at least 10 percent higher than their stated intentions and (iii) Optimistic, if their actual animal numbers were at least 10 percent lower than their stated intentions.

The largest distinct group of respondents stated intentions to contract production levels in both the 2004 and 2006 survey, with 44 percent and 38 percent of farmers interviewed in 2004 and 2006 respectively stating that they planned to decrease production. Twenty-six percent of respondents, 137 farmers, interviewed in 2004 indicated that they would expand production by 2007, while 36 percent (n = 247) interviewed in 2006 said they would expand production by 2009. It is interesting that even after decoupling was introduced, in effect reducing the economic return to stocking suckler cows and rams, that the percent of farmers planning to increase production increased and the number planning to contract production declined. These survey results were in conflict with the expected effects of a truly decoupled policy (as outlined in the literature review).

[3] It is important to note that both surveys of intentions and subsequent behaviours were examined independently of each other in subsequent analysis. Hence, the possible impact of inter-temporal inconsistency was dealt with separately in subsequent analysis.

Table 2: Farm Types based on intention-behaviour gap

	Accurate	Optimistic	Pessimistic
Number of Farms - 2004 (percentage)	251 48%	130 25%	145 28%
Number of Farms - 2006 (percentage)	331 49%	255 38%	93 14%

When the intentions data collected in 2004 are aggregated using the individual farm aggregation factors, the data suggests that the farmers surveyed in 2004 planned to increase suckler cow numbers by 3 percent over the subsequent three years up to 2007 but when the actual production data for 2007 are examined, the results show that numbers actually increased by just 1 percent, so while the direction of change was correct, the magnitude was slightly less than intentions predicted. In relation to ewe numbers, farmers stated that they would contract numbers by 6 percent on aggregate but numbers actually fell by 8 percent. For both ewe and suckler cow numbers it can be concluded that the intentions surveys were reasonably accurate predictors of production levels at an aggregate level. However, it also interesting, and probably more interesting, to consider how accurate the surveys were at the individual farmer level.

Of those indicating they would expand production, almost 57 percent, that is 78 farmers, were accurate in the 2004 survey but only 37 percent were accurate in the 2006 survey. Alternatively, of those indicating that they would contract production, almost 61 percent were accurate in the 2004 survey and 76 percent in the 2006 survey.

Table 2 presents the total number of farmers that were Accurate, Pessimistic or Optimistic across the two surveys. About half of all farmers are classified as Accurate in the two periods. In 2004 the remaining ''inaccurate'' farmers are split almost equally between Optimistic and Pessimistic. However, by 2006 farmers in this ''inaccurate'' category were more likely to be Optimistic. Given that the intentions survey was a reliable indicator of the future in about half of all cases this suggests quite a considerable intention-behaviour gap. It is interesting, and indeed possible with this dataset to address the question raised by Wong and Sheth (1985) as to whether this intention-behaviour gap is affected by some systematic factors. This is a hypothesis we can test by comparing the characteristics of the 3 farm groups (identified in Table 2) and subsequently examined in the econometric model outline in the results section.

Explanatory Variables

While the literature on the accuracy of farmer intentions is relatively thin, the few studies that do examine the topic suggest that a number of factors available from within the panel data might prove worthy of examination as potential explanatory variables for the intention-behaviour gap. Specific farm variables such as farm size, livestock units, farm system, labour units, the farmer's age and contact with extension agents are hypothesized to influence the intention–behaviour gap. For example, Bagozzi and Yi (1989) suggested that well-formed intentions exhibit greater temporal stability than poorly formed intentions. Hence, it is hypothesized that more educated farmers that are in contact with extension agents may have more informed intentions. Lefebvre et al. (2014) found that the probability of observing an intention-behaviour gap, specifically errors of commission relating to investment in land, significantly increased with farm size and debt to asset ratio. Furthermore, they also concluded that it is important to explore the impact of the farmer's life cycle stage (age and presence of a successor) on the intention-behaviour gap.

Vare et al. (2005) found farmer's age to be statistically significant in the specific example of the reliability of farmers' intentions in accurately predicting farm succession. Vare et al distinguish between what they call ''type II errors'' where succession was planned but did not occur and ''type I errors'' where succession was not planned but actually occurred. They found that the 'type II error' first increases with the farm operator's age, reaches a maximum and then decreases again. While ''type I errors'' increase with the farmer's age, i.e. the older the farmer gets the more likely an unplanned succession occurs.

Finally, economic variables, such as gross margin, intensity of production, farm income and reliance on subsidies are typically used to explain behaviour (Lefebvre et al. 2014). Based on the assumption that decoupled payments are viewed by the farm operator as truly decoupled from production, it is reasonable to expect that farm economic variables could potentially affect intentions and behaviour in the presence of a decoupled policy environment. It is important to remember the caveats surrounding whether or not the policy introduced by the EU was in fact a truly decoupled policy as outlined in the background section above. Furthermore, it is important to remember that expectations regarding the future financial situation of the farm, which is likely to vary from individual to individual is also very important. However, this is beyond the data available in the dataset[4].

Table 3 presents summary statistics for these 3 farm groups and compares them to the full sample. The summary statistics suggest that Optimistic farmers tend to be slightly smaller with lower farm income than the Accurate and Pessimistic farmers on average. The productivity levels of Optimistic farmers, as measured by gross output per hectare, are lower than the other two groups. The lower levels of profitability of the Optimistic farmers are also evident from the cattle gross margin per hectare statistic, but interestingly not the case for

[4] Many other factors other than those observed within the NFS dataset could potentially impact on the intentions-behaviour gap. However, it is not the intention of this study to empirically examine all the different explanations for the intentions-behaviour gap identified in this research. This would go beyond the scope of the paper and could not be done without much additional variables and experimental evidence. The final choice of variables to be included in the two multinomial logit models was made partly on the basis of log-likelihood comparisons between different models.

Table 3: Summary Statistics for Farm Groups for 2006

Variables	Accurate	Optimistic	Pessimistic	All
	Mean Values			
Farm Size – owned & rented (hectares)	50	43	59	49
Farm Income (€)	20,450	17,350	27,950	20,315
Livestock Numbers (in Livestock Units)	87	60	74	75
Specialist cattle rearing (% of farms)	45	42	12	39
Intensity (Gross output €/Ha)	1220	1110	1280	1,190
Cattle Gross Margin per hectare	240	200	215	220
Sheep Gross Margin per hectare	330	375	420	360
Reliance on Subsidies (% of output)	44	48	42	45
Farmer's Age	51	48	53	50
Farmer has off-farm job (% of farms)	31	35	25	32
Total Family Labour Units	1.12	0.97	1.20	1.07
Extension contact (% of farms)	54	51	63	54

Table 4: Multinomial Logit model of Intentions

Variable‡	Expanders	Contractors
Whole Farm Gross Margin per Hectare	0.0001 (0.33)	-0.001 (0.37)
Reliance on Subsidies	0.84 (1.3)	-0.76 (1.13)
Farmer's Age	-0.027 (3.27)***	-0.009 (1.08)
Farmer has an off-farm job	-0.03 (0.25)	0.002 (0.02)
Constant	0.812	0.398
LR chi2(8) = 13.99	Prob > chi2 = 0.0821	
Log likelihood = -526.46241	Pseudo R2 = 0.0131	

***Significant at the 1% level ‡ - t statistic in parentheses*

the sheep gross margin per hectare statistic. In general, Optimistic farmers tend to be younger and are more likely to have an off-farm job than the other two groups. The rate of off-farm employment is far lower for the Pessimistic farmers than the average. On average, Pessimistic farmers are more likely to have contact with an extension officer than either of the other two groups.

Two multinomial logit models are estimated. The first model is used to examine the characteristics of the farmers who said they would maintain, expand or contract animal numbers. The second model is used to test whether the intention-behaviour gap is a random error or whether it is systematically influenced by a limited number of factors for which data were collected. This is achieved by using the multinomial logit model to examine the characteristics of the Accurate, Pessimistic and Optimistic farmer groups. Appendix I provides further detail on the rationale for the choice and specification of the multinomial logit model approach.

3. Results

Table 4 presents the results of the multinomial logit model of farmers' intentions. Farmers that said they would expand or contract are compared to the reference category, i.e. those that said they would maintain animal numbers at current levels. Despite the rationale provided in the methods section above, as to hypothesized relationship between the specified variables and the intention-behaviour gap, very few variables available in the dataset are found to statistically significantly affect a farmer's plan to expand, contract or increase production in the next three years. All of the variables described in Table 3 are included in the initial model specifications and even following a stepwise approach the levels of significance are still very low[5].

Farmers' age is the only variable significantly affecting the intention to expand or contract animal numbers relative to the intention to maintain animal numbers at current levels. Farmers planning to expand animal numbers tend to be younger than those planning to maintain production levels, with each additional year reducing the probability of expanding, relative to maintaining numbers. The profitability indicators are not significant, although the gross margin per hectare coefficients do have the expected signs, positive for expanders and negative for contractors. The lack of significance suggests that a farmer's current profitability level has no statistically significant effect on the intention to maintain, increase or contract animal numbers.

Table 5 presents the results of the multinomial logit model of the accuracy of farmers' intentions. Farmers that were classified as Optimistic or Pessimistic are compared to those that were accurate in their intentions.

As can be seen not many of the variables are significantly associated with the probability of a farmer being Optimistic or Pessimistic relative to being Accurate. Farmers with a greater reliance on subsidies have a higher probability of being Optimistic than Accurate, i.e., those with a higher reliance on subsidies were more likely to overestimate their future production plans in the intentions survey. The profitability variable, gross margin per hectare, is significant and negative for the Pessimistic farmers, suggesting that a lower profit per hectare increases the probability of being Pessimistic

[5] Not all variables represented in Table 3 appear in the final specification of the multinomial logit models outlined in Table 4 and 5 due to the stepwise regression process.

Table 5: Multinomial Logit model of the Accuracy of Intentions: comparing optimistic and pessimistic farmers to those who were accurate

Variable‡	Optimistic	Pessimistic
Whole Farm Gross Margin per Hectare	-0.002 (0.54)	-0.001 (1.69)*
Reliance on Subsidies	1.31 (2.09)**	-0.38 (0.44)
Farmer's Age	0.007 (1.02)	0.005 (0.47)
Farmer has an off-farm job	-0.131 (1.15)	0.277 (1.55)
Contact with an extension officer	0.085 (0.45)	-0.049 (0.18)
Cattle Specialist	0.024 (0.12)	0.221 (0.73)
Constant	-0.82	-1.91
LR chi2(12) = 26.44	Prob > chi2 = 0.0093	
Log likelihood = -541.03151	Pseudo R2 = 0.0239	

*Significant at the 10% level, ** Significant at the 5% level. ‡ - t statistic in parentheses*

rather than Accurate. The fact that general farm and farmer characteristics such as farmer's age, farm size and system of production are not significant suggests that for the most part, the intention-behaviour gap is not explained by many variables available in the main NFS dataset. a random error.

4. Conclusions

Despite the literature on the weaknesses of intention surveys, many studies still revert to such survey methods to predict future farmer behaviour, given that better alternatives often do not exist. Intentions surveys are especially popular in times of unprecedented policy changes, as previous production data provide little insight into how farmers are likely to behave under a new policy regime. It was in this context that quite a number of agricultural economic studies used intention surveys data to predict how farmers might react to the decoupling of direct payments from production in the early to mid-2000s.

The aim of this paper was to revisit one such study, and with the benefit of hindsight and a balanced panel of farms, to ascertain the accuracy of the intentions survey on farmers' production plans post decoupling. The results suggest that the surveys were reasonably accurate in predicting the total change to animal numbers at an aggregate level. However, when individual farmer's responses were examined, the survey only proved accurate in about half of all cases. The results showed that a large proportion of farmers are likely to overestimate their future production plans, i.e. be optimistic. Given the wide range of results reported in the literature in relation to intention-behaviour gaps, with some references citing accuracy rates as low as one third and others citing accuracy rates as high as three quarters, the findings of this research with nearly 50 percent of farmers classified as Accurate, is not out of line with previous research.

A question that is frequently raised in such evaluations is whether the intention-behaviour gap can be explained by some personal or situational characteristics of the respondents. If so, then information about the effect of personal and situational characteristics could be used to improve the accuracy of intentions surveys either through better sample selection and/or some informed manipulation of the results. A detailed examination of the characteristics of the farmers participating in the survey did not reveal many statistically significant factors associated with the probability of being accurate/or not in the intentions survey. Therefore, the results of this study suggest that the intention-behaviour gap is not well explained by the set of variables currently available in the NFS dataset.

About the authors

Prof. Thia Hennessy is Chair of Agri-Food Business in Cork University Business School. Her research interests include the sustainable development of agriculture with a special interest in the impact of public policy on food production.

Dr. Fiona Thorne is a senior research officer at The Agricultural Economics and Farm Surveys Department, Teagasc. She specialises in farm level agricultural economics research related to policy analysis, competitiveness and productivity.

Ms. Anne Kinsella is a research officer at The Agricultural Economics and Farm Surveys Department, Teagasc. She specialises in farm level agricultural economics research.

REFERENCES

Ajzen, I. and Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs, NJ: Prentice-Hall.

Ajzen, I. (1985). From intentions to actions: A theory of planned behaviour. In Kuhl, J and Beckmann, J (Eds.), Action Control: From cognition to behaviour (pp. 11- 39). Heidelberg: Springer.

Burfisher, M.E. and Hopkins, J. (2003). Decoupled Payments: Household Income Transfers in Contemporary U.S. Agriculture Market and Trade Economics Division, ERS, U.SDA, Agricultural Economic Report No. 822.

Bagozzi, R. and Yi, Y. (1989). The Degree of Intention Formation as a Moderator of the Attitude-Behaviour Relationship. *Social Psychology Quarterly* 52: 266-279.

Bougherara, D. and Latruffe, L. (2010). Potential impact of the EU 2003 CAP reform on land idling decisions of French landowners: Results from a survey of intentions. *Land Use Policy.* Vol. 27 (4) 1153-1159. [doi:10.1016/j.landusepol.2010.03.005]

Ciaian, P., Espinosa, M., Gomez y Paloma, S., Heckelei, T., Langrell, S., Louhichi, K., Sckokai, P., Thomas, A. and Vard, T. (2013). Farm Level Modelling of CAP: a methodological overview European Commission, Joint Research Centre, Institute for Prospective Technological Studies.

Douarin, E., Bailey, A., S. Davidova, S., M. Gorton, M. and Latruffe, L. (2007). Structural Location and Human Capital Determinants of Farmers' Response to Decoupled Payments (2007) FP6 IDEMA (Impact of Decoupling and Modulation in the Enlarged EU), Deliverable 14, 256 pp.

European Union (2015). The Monitoring and Evaluation Framework for the Common Agricultural Policy2014–2020 - http://ec.europa.eu/agriculture/cap-2014-2020/monitoring-evaluation/leaflet-monitoring-evaluation-framework-cap-2014-2020_en.pdf

Fujii, S. and Gärling, T. (2003). Application of attitude theory for improved predictive accuracy of stated preference methods in travel demand analysis. *Transportation Research* A, 37, 389-402.

Gallerani, V. and Gomez y Paloma, S. (2008). Investment behaviour in conventional and emerging farming systems under different policy scenarios. JRC Scientific and Technical Report, Institute for Prospective and Technological Studies.

Genius, M., Karagiannis, G. and Tzouvelakas, V. (2008). Assessing European farmers' intentions in the light of the 2003 CAP reform, Paper Presented at the 109th European Association of Agricultural Economics, Seminar 'The CAP after the Fischler Reform: National Implementations, Impact Assessment and the Agenda for Future Reforms', Viterbo, Italy, 20–21 November. (2008).

Hennessy, T., Kinsella, A. and Dillon, E. (2014). Forty years of common agricultural policy: The Irish farming experience. *Administration*. Vol. 62 (2)

Hennessy, T. and Thorne, F. (2005). How Decoupled are Decoupled Payments? *Eurochoices, 4. No.1* [DOI: 10.1111/j.1746-692X.2005.00015.x]

Horowitz, J.K. (1992). A test of intertemporal inconsistency. *Journal of Economic Behaviour & Organization* 17: 171-182.

Latruffe, L. and Davidova, S. (2007). Common Agricultural Policy direct payments and distributional conflicts over rented land within corporate farms in the New Member States, *Land Use Policy*, 24 (2) (2007), pp. 451–457 [doi:10.1016/j.landusepol.2006.06.003]

Lefebvre, M., Raggi, M., Gomez Y Paloma, S. and Viaggi, D. (2014). An analysis of the intention-realisation discrepancy in EU farmers' land investment decisions. *Revue d'Études en Agriculture et Environnement*, 95, pp 51-75 doi:10.4074/S1966960714011047

Lobley, M. and Butler, A. (2010). The impact of CAP reform on farmers' plans for the future: Some evidence from South East England., *Food Policy, 35* (2010): 341-348. doi:10.1016/j.foodpol.2010.04.001

Long, J.S. (1997). Regression Models for Categorical and Limited Dependent Variables. Advanced Quantitative Techniques in the Social Sciences Number 7. Sage Publications: Thousand Oaks, CA.

Lucas, R.E. (1976). Econometric policy evaluation: a critique. In: Brunner, K and Meltzer, A.H. (Eds), The Phillips Curve and Labor Markets. Vol.1. Carnegie-Rochester Conference Series on Public Policy, Amsterdam, North-Holland.

Sheeran, P. (2002). Intention—Behavior Relations: A Conceptual and Empirical Review, European Review of Social Psychology, 12:1, 1-36, DOI: 10.1080/14792772143000003.

Swinbank, A. and Tranter, R. (2005). Decoupling EU Farm Support: Does the New Single Payment Scheme Fit within the Green Box.? *The Estey Centre Journal of International Law and Trade Policy*, 6 (1) (esteyjournal.com).

Thomson, K. and Tansey, A.W. (1982). Intentions surveys in farming. *Journal of Agricultural Economics* Vol 33. (1). 83-88

Tranter, R., Swinbank, A., Wooldridge, M., Costa, L. and Sottomayer, M. (2007). Implications for food production, land use and rural development of the European Union's Single Farm Payment: Indications from a survey of farmers' intentions in Germany, Portugal and the UK. *Food Policy*. Vol. 32 (5). 656-671 [http://dx.doi.org/10.1016/j.foodpol.2007.04.001].

Väre, M., Weiss, C.R. and Pietola, K. (2005). On the Intention-Behaviour Discrepancy: Empirical Evidence from Successions on Farms in Finland, SFB Discussion Paper no. 3, Vienna.

Wong, J.K. and Sheth, J. (1985). Explaining intention-behaviour discrepancy: a paradigm. in NA - Advances in Consumer Research Volume 12, eds. Elizabeth, C and Hirschman and Moris, B. Holbrook, Provo, UT: Association for Consumer Research, Pages: 378-384.

Appendix

Two multinomial logit models are estimated. The first model is used to examine the characteristics of the farmers who said they would maintain, expand or contract animal numbers. The second model is used to test whether the intention-behaviour gap is a random error or whether it is systematically influenced by certain factors. This is achieved by using the multinomial logit model to examine the characteristics of the Accurate, Pessimistic and Optimistic farm groups.

Since there are multiple choices and particular interest lies in the individual effects of explanatory variables on each outcome in the two models, the behaviour of farmers is modelled using a multinomial logit framework. This is an extension of the binary logit model where the unordered response variable has more than two responses.

The outcome variables y can take on the values j = 1, 2, … J with J being a positive integer. In particular, the models explain the probability of a base category, maintaining production (model 1) or accuracy of production intention (model 2) (j = 1), against other categories of responses (j =2) (j=3) i.e. expand or contract production (mode 1) and pessimistic or optimistic intention versus actual outcomes (model 2). The determinants associated with each category can be contrasted with the base category, which is maintaining production (model 1) or accuracy of production intention (model 2). The interest lies in how ceteris paribus changes in the elements of x affect the response probabilities, $P(y_i = j|x)$, j = 1,2,…J (Wooldridge, 2010). The probability of the categories is determined by the following equation:

$$P(y_i = k|x_i) = \frac{\exp(\beta_k x_i)}{\sum_{j=1}^{J} \exp(\beta_j x_i)}, j = 1, 2, \ldots, J, \quad (1)$$

where k is one of the j subgroups and $P(y_i = k)$ is the probability that the i^{th} farmer belongs to subgroup k and x_i describes farm and farmer characteristics. In order to identify the model, constraints must be imposed. A common approach is to assume that $\beta_1 = 0$ (Long, 1997). This normalization makes it possible to identify the coefficients relative to the base outcome. Applying the constraint, the model can be written as:

$$P(y_i = 1|x_i) = \frac{1}{1 + \sum_{j=2}^{J} \exp(\beta_j x_i)} \quad (2)$$

The multinomial logit model is estimated using maximum likelihood estimation techniques (Long, 1997).

Coefficients are interpreted using the relative risk ratios, which is the relative probability of $y_i = k$, for $k >$ 1 to the base category.

$$\frac{P(y=k)}{P(y=2)} = \exp(\beta_j x_i), \text{for } k > 1. \quad (3)$$