The Field: Land mobility measures as seen through the eyes of Irish farmers

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Abstract

Ireland's agriculture is characterised by an ageing farmer population and small average farm sizes. Past policy schemes developed to address these issues have been targeted at accelerating succession and retirement processes in agriculture. Their success however was limited. The process of succession, inheritance and retirement is complex and the decision-making of farm families in these situations is influenced by many factors. In order to develop more successful policies to encourage the early transfer of land and to increase farm sizes a better understanding of these factors is necessary. The paper addresses this question by employing a Neural Network Analysis with data collected through a survey of Irish farmers' perception on succession and land mobility measures in 2012. The analysis shows that while many farmers in general are in favour of various land mobility measures, they would not consider taking advantage of any of them, which in part could be explained by a large number of farmers being unwilling to totally retire from farming.

Introduction

Ireland's agriculture is characterised by an ageing farmer population and small average farm sizes, structural issues shared by a number of other European countries (Bika, 2007; CSO, 2012; European Commission, 2012, 2013; Mazorra, 2000). Additionally, land mobility in Ireland can be considered as low in an international context (Ciaian et al., 2010). The literature suggests that the structure of Irish agriculture is a barrier to agricultural innovation and growth (Davis et al., 2009; Giannakis and Bruggeman, 2015; Laepple and Hennessy, 2012). Ireland's government has outlined ambitious targets to grow the agri-food sector in its Food Harvest 2020 programme. Achieving those targets will in part depend on overcoming the barriers to land mobility and supporting the younger generation entering farming. In the past, the Irish Government has employed tax breaks and support schemes such as the Early Retirement Scheme and the Young Farmer Installation Scheme to improve the land mobility situation. However, up to now their success in increasing the level of land mobility in general and the transfer of land to the younger generation has been limited (Bika, 2007; Davis et al., 2013; Gillmor, 1999). Furthermore, the schemes have been criticized for supporting family succession that would have taken place anyway rather than attracting new entrants to farming (ibid). For example, the Young Farmer Installation scheme that was initiated as part of the 2007-13 Rural Development Plan was discontinued due to a concern it was not offering value for money (DAFF, 2009). Thus, the objective of this study is to develop a deeper understanding of the barriers to land mobility as perceived by Irish farmers as well as Irish farmers' perception of the potential that various land mobility measures might have in alleviating these barriers.

Factors influencing succession, retirement and land transfer

A number of studies have been conducted researching the processes of succession, retirement and land transfer. They investigated economic and socio-demographic as well as personal factors such as values, attitudes, identity and family relationships. The findings from the literature are discussed in the following paragraphs, whilst Figure 1 presents an overview of the key factors in the form of a network diagram.

The economic viability of the farm plays a central role in the succession process (Davis et al., 2009; Glauben et al., 2009; Glauben et al., 2002; Hennessy and Rehman, 2007; Kennedy, 1991; Stiglbauer and Weiss, 2000; Zagata and Sutherland, 2015). The larger the farm (in terms of hectares or livestock units) the more likely it is to attract a successor. Calus et al. (2008) and Harris et al. (2012) found that farm output and performance are higher where a potential successor is present. Other economic factors that influence succession and retirement decisions are pension planning and debt repayments (Ingram and Kirwan, 2011; Pietola et al., 2003). High land prices can be a barrier for potential successors becoming interested in a farming career as they can inhibit expansion and growth of the farm (Gillmor, 1999). Furthermore there is evidence that, due to its impact on the economic viability of the farm, policy can play a key role in determining the trajectory of farm businesses. For example, the introduction of the Single Payment Scheme under the Common Agricultural Policy was shown to constrain farm exit and increase part-time farming (Ciaian et al., 2010).

In terms of socio-demographic factors, succession has been related to education levels, gender of the successor and farmer age. In terms of level of education, both that of the current holder and the potential successor are relevant; the higher the educational level the less likely succession is to occur (Aldanondo Ochoa et al., 2007; Corsi, 2004). Looking at gender, traditionally farm inheritance in most European countries is patrilineal and the farm is more

likely to be taken over when male children are present (Grubbstroem and Soovaelli-Sepping, 2012; Rossier and Wyss, 2008). Regarding the age of the holder, Glauben (2002) demonstrated that the likelihood of succession first increases with the age of the farm holder, then after reaching a peak decreases (see also Pietola 2003). Thus, if a farm has not been taken over at a certain point intra-family succession is postponed or might not happen at all.

When looking at personal factors such as values, attitudes and identity, the complex process of succession is influenced by the views and feelings of both sides – the retiree and the successor. Farming has been described as providing the farmer with identity, occupation, control, and status in the community as well as social and cultural capital (Bika, 2007; Burton, 2004; Burton et al., 2008; Errington, 2002; Gillmor, 1999; Ingram and Kirwan, 2011; Kuehne, 2013; Riley, 2012). Retirement or abandonment of farming activities is hence associated with a loss of these values. Attachment to the farm, the farm animals and the way of farming can also be a barrier to handing over the reins (Barcley et al., 2005; Gillmor, 1999; Mann, 2007; Riley, 2011). There is evidence that retirement from farming is easier for farmers' spouses, as they are typically more involved in activities outside the farm (Riley, 2012). The relationship between farmer and potential successor can influence whether the farm will be taken over as can the level of involvement of children in farm work from an early stage, which is also important in forming 'farmer identities' (Fischer and Burton, 2014). Among farmers in general – retirees as well as successors – strong views exist on continuing the family tradition in farming, with a sense of duty and custody to keep the farm together and operational for future generations (Crockett, 2004; Fischer and Burton, 2014). These attitudes can be a barrier to transferring the land or the farm to non-family members.

Studies conducted in Ireland highlight regional differences in structural problems and related issues. In an Irish context dairy and tillage farms produce the highest gross margins and operate on larger than average farm sizes.[1] Those farms are concentrated in the East and South of the country, while in the North and West beef and sheep farms prevail on smaller than average farm sizes. Policies such as the Early Retirement Scheme have attracted higher response rates in thriving farming regions (Bika, 2007; DAFF, 2009); the lower uptake of such schemes in marginal farming areas probably being due to the fact that less prosperous farms do not attract a successor and cannot support two generations during a transition period (Zagata and Sutherland, 2015). On these farms potential successors are likely to seek job opportunities elsewhere, making succession susceptible to the general labour market situation (Aldanondo Ochoa et al., 2007). Farms in the North-Western counties tend to be smaller, more often passed on by inheritance upon death rather than lifetime gifts. In addition, farmers on average are older and less likely to be married or have children (Davis et al., 2009; Gillmor, 1999; NN, 1992). Children from small farms are more likely to enter third level education outside agriculture and establish lives outside farming (Hennessy and Rehman, 2007). Land mobility measures such as the Early Retirement Scheme and Young Farmers' Installation aid tended to be taken up less in North-Western counties and if so on the larger than average farms (DAFF, 2009). Farmers from small farms, from cattle and sheep farms and unmarried farmers are less likely to consider retirement from farming, with farmers from small farms expecting lower levels of retirement income (Davis et al., 2009).

On the other hand farmers on larger farms in the South and East tend to have better agricultural training. In addition, their heirs are less likely to have third level education and are more likely to enter full-time farming (Gillmor, 1999; Hennessy and Rehman, 2007; NN, 1992). An interesting finding made by Davis et al. (2009) is that age is not related to farm

[1] Average farm size in Ireland is 48 ha; in the BMW areas it is 37 ha (NFS 2013).

output, however, farm size is. Davis et al. (2009) argued that this questions the assumption that installing younger farmers will increase profitability of farms. The literature on effects of age on farm productivity highlights that productivity is increasing over the lifetime of a farmer up until he reaches a certain age and decreases afterwards (O'Neill et al., 2001; Tauer, 1995; Zhengfei and Oude Lansink, 2006).

A study on farm transfer (Hennessy and Rehmann 2007), showed that while about 23 per cent of the current owners were part-time farming, of the prospective successors around 50 per cent intended to farm part-time. Only 5 per cent in this sample indicated that farming would be exited after the retirement of the current generation, a trend confirmed by a study conducted by DAFF (2009). Kinsella et al. (2000) found that the main reasons for continuing farming on farms that were not viable without off-farm jobs were of a socio-cultural, non-monetary nature. The main reasons given were 'keeping the family farm going', 'staying home because of the parents', and having an 'affinity with the nature of farm work'.

While a number of studies have been conducted in the Irish context looking at various factors influencing succession and land transfer none of them have so far employed an approach modelling socio-demographic and farm structure factors together with personal factors such as values, views and perceptions of succession, land transfer and land mobility measures. Such an approach, however, could establish the relative importance of these latter factors when compared to the quantitative factors, which could be valuable in the development of future land mobility measures. Thus, the objective of this study was to develop a holistic model describing farmers' perceptions on land mobility measures including quantitative as well as qualitative factors.

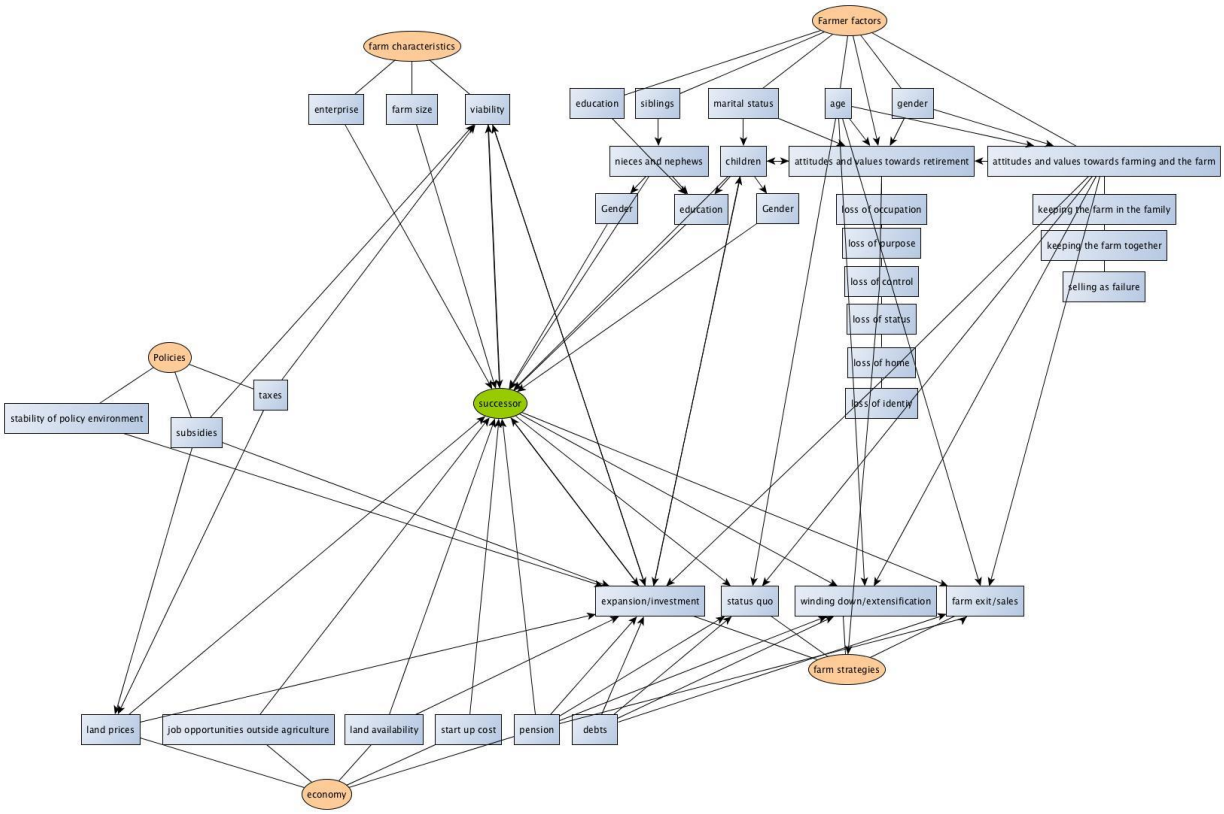

Figure 1: Factors influencing the succession process

Methodology

A survey was conducted in 2012 to determine Irish farmers' perceptions related to succession and land mobility measures. For the survey semi-structured interviews were carried out by telephone with a random sample of 421 farmers. The sample was geographically balanced across the country and consisted of farmers who had identified themselves as active in farming. The questionnaire covered areas such as farm type and environment; family structure; farmers' behavioural characteristics regarding retirement and land tenure; farmers' perceptions regarding land transfers and land mobility measures. A screening question separated the sample into two groups: farmers who already had identified a successor and farmers who had not yet identified a successor. For this study we analyzed the answers given by the group without an identified successor, as they were assumed to be more likely to have land to offer and be affected by land mobility measures. Their perceptions of potential land mobility measures and barriers to land transfers are crucial to better understand the reasons underlying low land mobility in Ireland. The selection resulted in a subset of 201 farmers.

The collected data (N=201) was analysed by using *Interactive Activation and Competition* (IAC) neural network models (McClelland, 2013; McClelland and Rumelhart, 1988). Such models are useful for examining complex problem domains, as they take into account the interaction of relevant factors and the feedback between them. IAC models have been employed to analyse data describing individuals' memories, learning and perceptions. Here the model was applied to farmers' perceptions on land transfer and land mobility measures, taking into account a number of relevant socio-demographic factors, farm structure variables and behavioural characteristics. An IAC network model consists of a collection of nodes (or units) representing factors in a problem domain (e.g. farmers' perception on a mobility measure; farmer age and gender; location of the farm etc.), which are *interactive* in that they send excitatory and inhibitory signals to each other. The strength of these signals can be adjusted during processing. Nodes which are mutually exclusive are organized into pools where they *compete* with each other for activation, e.g. the gender pool has two mutually exclusive nodes, male and female. The higher the activation level of a node in a network the more relevant it is. If one node is set to a high activation level – or in other words is clamped – the network is activated and creates links that attribute activation levels to each node. The relative value of these activation levels with regard to each other is an indication of the importance of their influence on the clamped node.

In this study the network model represents the perceptions of farmers regarding land transfer and land mobility measures as well as the factors relevant to these perceptions and the excitatory and inhibitory connections between them. Several nodes (e.g. land transfer options) were clamped (i.e., activation was fixed at a high level) to determine how the factors represented by these nodes affected other nodes (factors) in the network. In essence, the nodes that end up receiving high activations from the clamped nodes are those factors most strongly related/supported/causally-related to the clamped factors. As such, clamping tells us something about the dynamics of the dependencies between different variables in our model.

In this study the IAC model was run by clamping six different land mobility measures:

i) A reduction of costs and taxes (related to inheritance, sales, lettings etc.);
ii) General incentives;
iii) Early retirement;
iv) Incentives for young farmers;

v) Partnerships and acquiring more land, and
vi) More information or advice on land mobility.

These six probes were chosen to allow more detailed analysis as to whether there were differences within the networks between those proposing alternative land mobility measures. All the neural networks models were run by using the *Parallel Distributed Processing* (PDP) tool (McClelland, 2013). A Matlab integrated environment for scientific modelling was used as the platform for the PDP tool. The PDP tool represents a graphical neural network simulator that can implement and run IAC neural network models.

The final IAC neural network model had 111 nodes, organized into 42 categories. We probed the IAC neural network models with four different options. At first we activated nodes through combining two options of land mobility measures into a single category. In the first probe we looked at the category 'reduction of costs and taxes' and 'general incentives'. The second probe looked at 'early retirement' and 'incentives for young farmers'. The third probe looked at 'partnerships and acquiring more land' and 'more information or advice on land mobility'.[2] An additional category has been created to take account of farmers' views regarding the potential success of the suggested land mobility measures in Ireland (measure will 'work' or 'will not work'). The fourth probe was therefore run looking at the 'work' or 'will not work' category. All of these four probes were combined with the category 'respondents mentioning land mobility measures' and 'respondents not mentioning land mobility measures. This enabled us to analyse how dependencies changed with different combinations of other factors.

Results

The developed neural network models show the complexity of farmers' perceptions of land transfer and land mobility measures and that their perception is affected by the interaction of a number of factors. Important factors in all four models turned out to be the behavioural characteristics such as the wish for the farm to stay in family ownership or to stay farmed by the family, but also the fact that no advice on land transfer had been sought so far. Also having a male heir stands out as a key factor in all models, which is confirmed by data collected from participants in the Early Retirement Scheme, where in 76 per cent of all cases the farm was passed on to the son and in only 3 per cent to the daughters – with rest being made up by nieces and nephews (4 per cent) and non-family members (11 per cent) (DAFF 2009). The models also reveal an inconsistency between the farmers' perceptions of land transfer and land mobility measures and their actual decisions with regard to these issues. While in general they favour particular categories of measures, when it comes to decision-making with regard to their own farm they are unlikely to take up the measures.

Figure 2 shows the network resulting from probing the model with the first category of land mobility measures – 'a reduction of costs and taxes' and 'general incentives'. As it is the model with the highest values for the clamped categories, these land mobility measures can be seen as those most favoured by farmers. The model in Figure 2 represents those farmers who see the probed measures positively. This group consists of both cattle and dairy farmers, however farmers with above average farm size prevail.[3] The model demonstrates the significant influence of family values such as wish for the land to stay farmed and owned by the family (as highlighted within the 'farmer's behavioural characteristics' category in Figure

[2] The probes were grouped this way in part to make the analysis tractable but in the main because there were generally strong relationships between them. For example early retirement and incentives for young farmers were often seen as opposite sides of the same coin by respondents

[3] The farm size in the models is indicated in acres; 100 acres ≈ 40 hectares

2). In terms of succession a decision has not been made and farmers in this group are inclined towards retiring from farming, typically with a 'state pension' (also highlighted within the 'farmer's behavioural characteristics' category in Figure 2)

Nevertheless, even though farmers see the 'reduction of costs and taxes' and 'general incentives' as favourable measures to increase land mobility, they are not inclined to rent or lease out land themselves (highlighted in the 'farmer's perception on land transfer' category in Figure 2). Farmers in this group would tend to not encourage family members or neighbours to help out once they get unable to farm themselves, however they would consider employing a manager.

Furthermore, these farmers would prefer to sell the land than to rent (short-term) or lease (long-term) it out. Farmers who regard the reduction of costs and taxes as well as general incentives as 'good' land mobility measures do not favour other land mobility measures such as 'partnerships' and 'early retirement'.

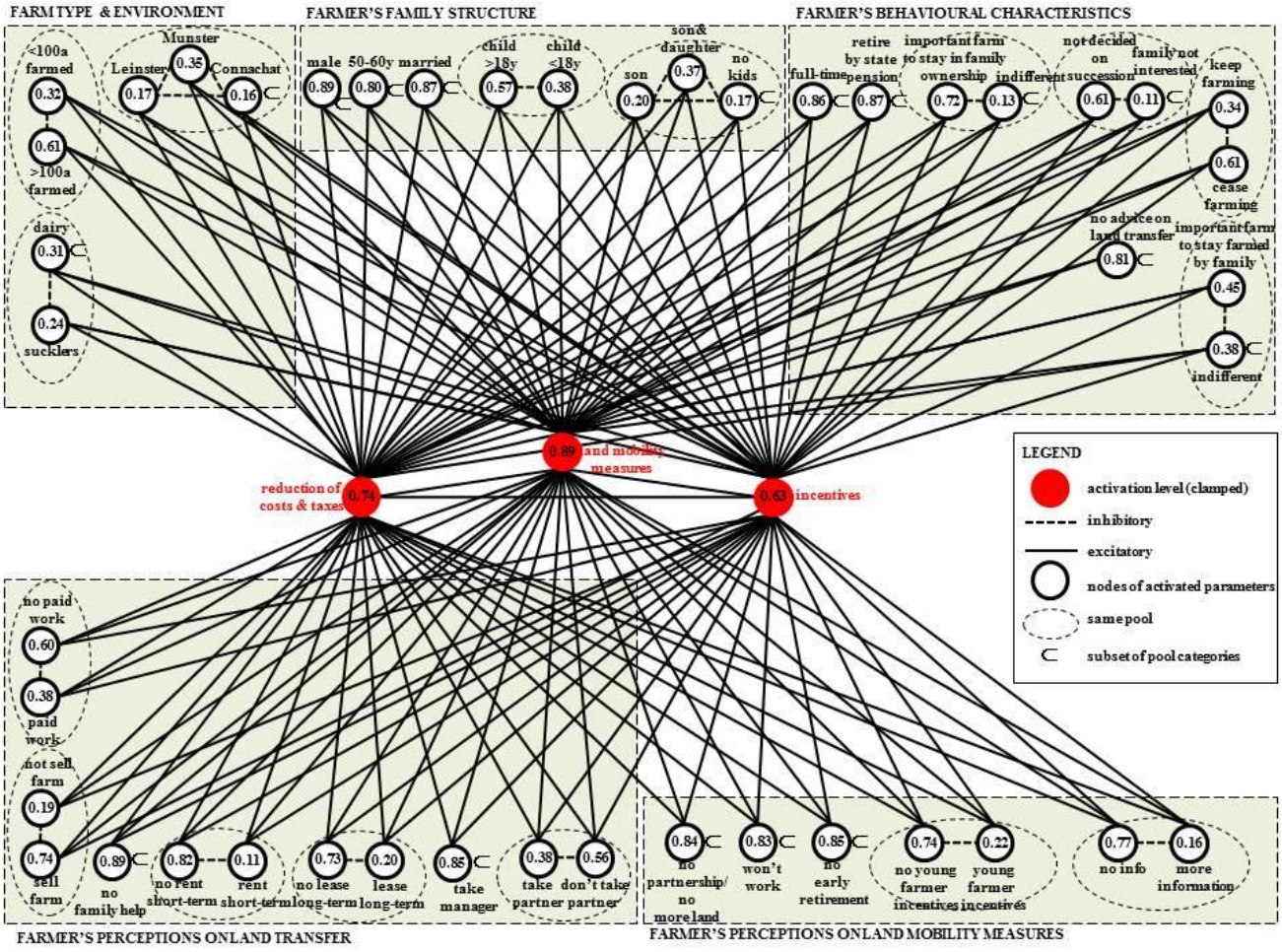

Figure 2. Network of nodes influencing farmers' perceptions of 'reduction of costs and taxes' and 'general incentives' as measures of land mobility.

Figure 3 shows the network of nodes influencing farmers' perceptions of 'Early Retirement' and 'Incentives for Young Farmers'. This group consists mainly of dairy farmers. They favour these measures over those considered in the previous model, however in general the level of support for these measures is not as strong. While farmers in this network want the farm to stay in family ownership it is not as important for the farm to stay farmed by the family. Succession is not yet decided and current farmers are inclined to keep on farming in one way or another rather than totally retiring. As in the previous model farmers had typically not sought advice on land transfer options to date. Farmers in this group again would not want to encourage family members or neighbours to help once they are unable to farm themselves, neither would they consider taking a partner or a manger nor leasing or renting the land (see section 'farmers perceptions on land transfer' in Figure 3). However, selling the farm is considered as an option once they are unable to farm themselves.

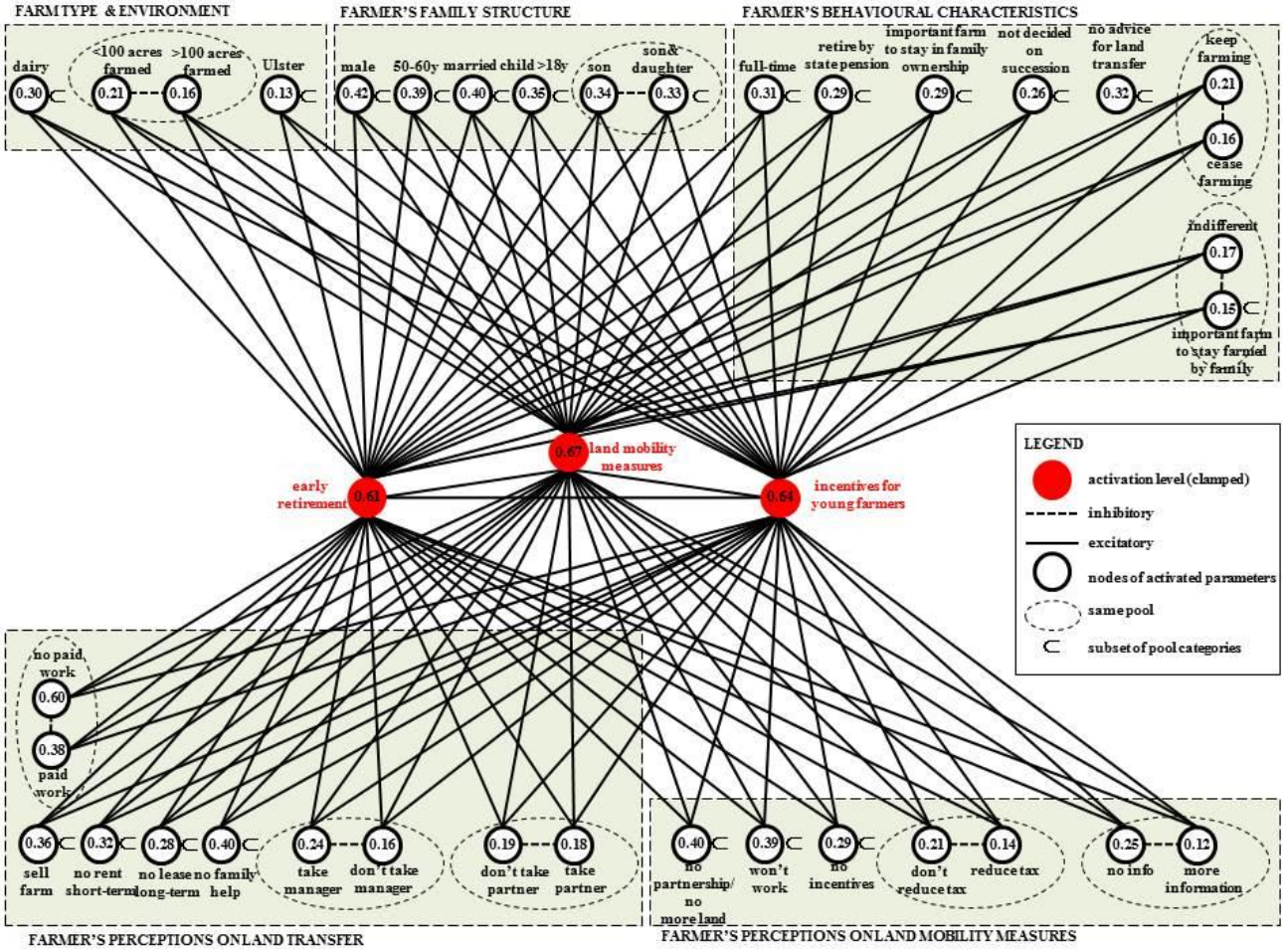

Figure 3. Network of nodes influencing farmers' perceptions of early retirement and incentives for young farmers as measures of land mobility.

From Figure 4 we can see that farmers perceive land mobility measures related to ‘partnerships and acquiring more land’ as well as ‘more information and advice’ as least favourable. The related network shows the lowest activation levels when compared to the land mobility measures that have already been considered. In this group cattle farmers prevail. For farmers, who do see these measures positively, it is quite important that the farm stays in their ownership and keeps being farmed by the family (highlighted in the ‘farmers’ behavioural characteristics’ category in Figure 4). They are inclined to keep farming to a certain extent after retiring on a state pension rather than totally retiring. Typically no advice had been sought so far regarding the transfer of the farm. As in the previous models they do not want to encourage family or neighbours to help out after they become unable to farm themselves, but would consider taking a manager or a partner (see the ‘farmer’s perceptions on land transfer’ category in Figure 4). They also are not inclined to rent or lease out land.

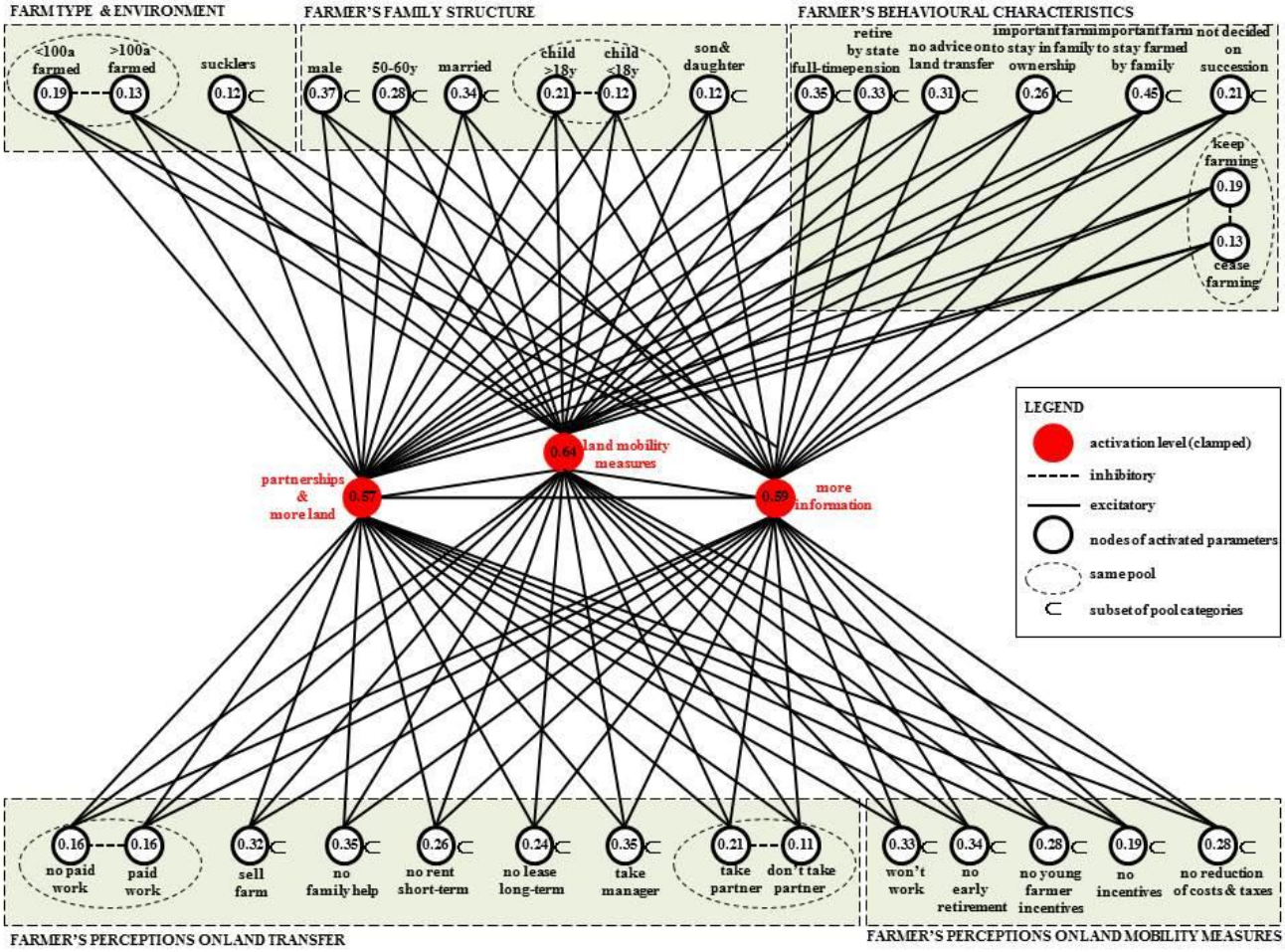

Figure 4. Network of nodes influencing farmers’ perceptions of partnerships and more land and more information and advice as measures of land mobility.

The final network model (Figure 5) shows farmers' perceptions on whether the proposed land mobility measures will or will not work in Ireland (labelled 'work' and 'won't work', respectively). Farmers who think the measures will not work in Ireland are more likely to have larger than average farm sizes and have dairy farms. They are inclined to totally retire, although the issue of succession has not yet been decided on. Advice on farm transfer has also not been sought yet. They could imagine taking a manager or partner, but are not inclined to ask for family help, rent or lease land after they become unable to farm themselves. Even though they regard land mobility measures in general as necessary, they actually do not feel that any of the proposed measures is likely to 'work'.

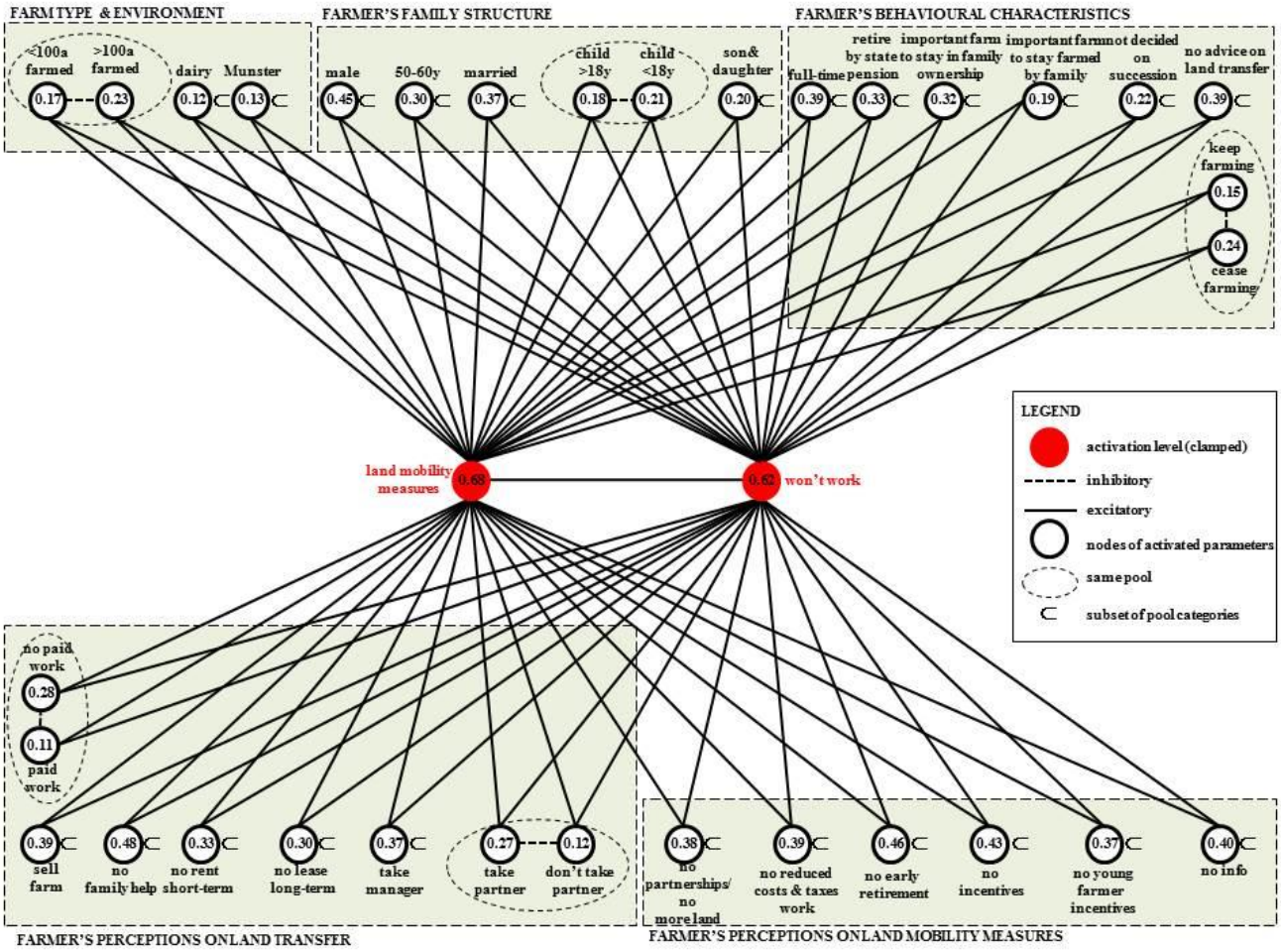

Figure 5. Network of nodes influencing farmers' perceptions of the outcome of land mobility measures.

Discussion and Conclusion

Despite the strong support for improving land mobility in Ireland from a wide range of stakeholders (who see the possibility of significant economic gains from structural change), previous land mobility measures have not been as successful as expected. The results of this study, which has analysed Irish farmers' perceptions of land mobility measures, point to possible reasons for this lack of success. In particular their perceptions seem to be entrenched in traditional values and attitudes towards farming. Our results show that, in all four models, the continuation of family ownership and management of the farm was pivotal, in particular the presence of a male heir is important in continuing the family farm. A finding confirmed by Cassidy and McGrath (2015) who found that a view still dominates today that sons and daughters take on traditional, gender typical roles on the farm.

There is a general reluctance to short- or long-term let land, which according to Bogue (2012) could be due to the fact that at the time of the study the 2014 CAP reforms were pending and farmers wanted to position themselves best in terms of securing future support. However, long-term leasing is seen as a much bigger barrier as there is a high level of scepticism and mistrust towards it among farmers, despite increased tax benefits (Bogue 2012). This could be rooted in the Irish past with its traumatic famine history and related to this the experience of a defective landlord-tenant system. Because of fears of a return of this system the long-term letting of land had been discouraged by Irish governments until the 1980s (Gillmor, 1999).

According to this study another barrier to increased land mobility could be due to a lack of information about schemes and measures, their terms and conditions as well as benefits. Bogue (2012) also points out that there is an amount of uncertainty among farmers as 'things change every year' (e.g. in schemes taxation) and that farmers feel they do not to have enough information on leasing options and the tax and cost implications. As farmers' perceive their knowledge about land transfer benefits as limited, there is demand for specific communication to help close this gap. The provision of appropriate information can therefore be seen as crucial in overcoming land mobility barriers. It should be noted that there has been recent activity in Ireland in this regard. For example, a land mobility information service has been developed by Macra na Feirme (the young farmers organisation) and also Teagasc (the Irish Food Authority) have been operating a number of succession planning workshops across the Country in conjunction with farm advisors, accountants and solicitors.

Our results have shown that a number of farmers are reluctant to totally retire and would like to stay involved in farming after retirement. As Davis et al. (2009) have shown this is especially the case on small farms, where farmers tend to have poorer pension incomes. The reluctance to retire can also be related to an attachment to farming. Duesberg et al. (2013) found that the majority of farmers pursue farming out of intrinsic values rather than for profit maximisation. Also Bogue (2012) highlighted that farmers would 'rather die with their boots on', one reason being that they 'do not know what to do' after retiring. Additionally he pointed out that farmers – similar to the rest of the population – nowadays stay fit and active for longer. This reluctance to fully retire might also explain the inconsistency between supporting land mobility measures in general and not wanting to adopt them on their own farm. In order to make retirement more attractive, solutions with regard to financial security, activities and social inclusion would need to be found.

Our results show that new land mobility measures not only need to take into account economic and socio-demographic factors but also farmers' attitudes and perceptions with regard to retirement, land ownership and family traditions. These factors need to be further explored in order to develop a farmer-focused campaign addressing barriers to land mobility and succession.

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