Economic and Social Drivers of Farm Succession in Ireland

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Abstract

A decreasing number of young farmers and the ageing of the farmer population is a matter of concern for the Irish and European agricultural sectors. The process of generational renewal, or farm succession takes place gradually over the lifecycle and is not only based on rational economic choice, but is also dependent on relevant social factors. To understand the process of farm succession, we seek to identify relevant drivers and barriers through quantitative analysis with panel data containing information about both the economic and social characteristics of Irish farms and farm holders. Preliminary results show a positive relationship between farm size and the probability of succession in the case of dairy farms. Farm investment also has a strong association with succession, reflecting optimism with regard to the future of the farm business. Demographic factors, particularly the absence of younger household members and instances of farmers living alone are identified as potential barriers to succession. Workload is also confirmed as being negatively related to farm succession. The results confirm the importance of social factors in the succession process and suggest the necessity to mitigate social hardship and to take measures that assist both older and younger farmers in solving the farm succession problem.

Keywords Farm Succession, Social factors, Farmer Ageing, Probit Model, Endogenous succession cycle

JEL code J10, Q12, Q18

1 INTRODUCTION

Improving the sustainability of agriculture, across economic, environmental, and social dimensions, is recognised as central to delivering the key objectives of the Common Agricultural Policy (CAP). One such objective is to support generational renewal. An ageing of the farm population is evident in Ireland (Meredith and Crowley 2017) and across Europe (Bertolozzi-Caredio et al., 2020, May et al 2019). The share of farm holders aged 65 or over is now almost one-third in Ireland compared to one-fifth in 1991 (CSO 2021), underlining the extent of the challenge in an Irish context. Farm succession, the transfer of managerial control of the farm, is critical to continued farm sustainability (Leonard et al., 2017, Russell, et al., 2020) with previous literature highlighting its importance from both the farm household and rural community perspectives, as well as its importance for the uptake of innovation as well as efficient and effective farm management (Leonard et al., 2016 and Nuthall and Old, 2017).

The complex nature of farmer decision making around succession and inheritance is complex and multifaceted, with a broad range of economic, personal and social factors at play (Conway et al., 2016, Leonard, et al., 2017, Góngora et al., 2019). Previous research has highlighted the significance of individual farm circumstances, and the unique impact of same (Rech et al, 2021, Conway et al., 2016). An improved understanding of these influential factors is vital for the design of effective policy to support generational renewal in the context of the new CAP. This paper seeks to further explore the drivers and barriers to farm succession in an Irish context, with a particular emphasis on relevant social and economic aspects.

With regard to the relationship between sucession and sustainability, Potter and Lobley (1996) have coined the terms *'succession, successor and retirement effects'* to describe the processes whereby an identified successor or lack thereof can significantly influence the original holder's level of interest and investment in the farm when approaching what should be their own retirement from farming. Similarly, Bradfield et al., (2020) and Rech et al., (2021) report an important relationship between the presence of an identified successor and the economic potential of the farm business.

Environmental performance is now recognised as being integral to the sustainability of agriculture. Much recent research points to the environmental awareness of younger farmers across Europe. Perez et al (2020) conclude that younger farm owners possess a greater awareness of agriculture-related environmental issues, are faster to adopt new eco-compatible technologies and adapt more easily to changes in agriculture and rural policy. In Ireland, there is evidence that younger farmers are more likely to participate in organic farming (Läpple and Kelley 2015). Thus, the adoption of sustainable farming practice appears inversely related with the age of the farm holder. As farm household demography is widely recognised as one of the most significant factors in land use (Potter and Lobley 1996), environmental performance of farms (Lobley et al., 2010) and farm succession (Conway et al., 2016, Bertolozzi-Caredio et al., 2020), adequate support should be given to facilitate farm succession given the important role of agriculture for the rural economy and for the sustainability of farmland in delivering environmental public goods and services.

The next section discusses accepted drivers and barriers to farm succession based on the literature. Section 3 provides an overview of the data and methods. Section 4 contains the results of the data analyis, while section 5 draws some conclusions.

2 DRIVERS AND BARRIERS OF FARM SUCCESSION

Much research has dealt with the question of farm succession and non-succession highlighting important explanatory factors such as farm holder's age, off-farm employment?, farm size, farmer's education, composition of household members and economic viability (Kimhi and López, 1999; Stiglbauer and Weiss 2000; Glauben et al 2006; Cavicchioli et al 2015). These studies confirm that education and age have significant effects on both farm exit and growth. These studies point out that larger farms both in physical (area) and economic size have a higher probability of succession partly because farm income is more likely to be sufficient to support two generations.

While farm/farmer factors may be relevant to understanding farm succession, their potential effects must be understood with an appreciation for the long duration of succession processes containing the development of successor identity (Fischer and Burton 2014). Fischer and Burton argue that family farm succession should be understood as an intertwined process of successor identification and practical

involvement on the farm, which explains the endogenous succession cycle. The process is endogenous as there is a likelihood of reverse causality with practical involvement on the farm increasing successor identification and the latter in turn motivating a greater involvement on the farm.

In the process? of family farming, potential successors foster their ability to become farmers through gradual involvement in farming and in the development of farm business skills simultaneously. The potential successors reaffirm their successor identity by getting involved in more complex farm activities. Fischer and Burton (2014) find that such successor identity is constructed by the gradual involvement in farming making other external factors towards succession less influential. In other words, negative experiences in the long-term might negatively influence the construction of identity. The life-cycle approach emphasises the importance of considering endogenous factors including social factors that have a relatively close connection with identity construction.

Social factors including negative ones such as stress/anxiety and excessive workload are among the factors that can be considered in the study of farm succession. Deary (1997) identified six major domains of stress for farmers in the UK 1) farming bureaucracy 2) finance 3) isolation 4) uncontrollable natural forces 5) personal hazards and 6) time pressure. Similar domains are likely to be of relevance to farmers in Ireland. In a study of farming in Ireland, Brennan et al. (2021) indicate that the children of farmers may be influenced by the experience of their parents in the operation and management of the farm where excessive working hours and increased workloads at peak times are evident. The authors discuss a range of farm-related stress factors, including difficulty in securing access to labour, in their analysis of farm level data collected in 2018.

Although we may be concerned with reverse causality, we recognise that farm succession is an endogenous process. The absence of a chosen or potential successor may contribute to an excessive workload as less labour and support may be evident on the farm. We therefore attempt to account for the importance of excessive workload in our model as one of the potential factors to influence farm succession due to its importance in the life cycle.

Conversely, this problem of excessive workload could be reduced by increasing human capital via the sharing of workload and information, interaction with other family members or neighbours. Higher levels of human capital lead to stimulation and a more dynamic work environment, which incentivises potential successors to stay in the agricultural sector (Bertoni and Cavicchioli 2016). Špička and Berg (2022) also discuss the positive association between human values of descendants of Czech farmers and the continuation of farming. They revealed that descendants who are traditionalist and believe it is important to follow the traditions have higher chance to successful farming. Abdala et al (2021) identify a relationship between farm succession and social factors, which promotes or inhibits the discussion between farm holders and potential successors in the case of Brazil.

Household composition is likely to be an important factor in influencing family farm succession. The number of children increases the probability of farm transfer and the delay of farm closure (Väre 2006; Banovic et al 2015; Cavicchioli et al 2018). Stiglbauer and Weiss (2000) analyse the succession decision in the Upper-Austrian farm sector empirically using panel data and observe the dynamics of the process. Their studiy reveals that the presence of additional family members aged 16 and over increases the probability of family succession. Moreover, they investigated the relationship between previous farm growth and succession to take account of the importance of the long-term perspective.

Environmental practices and participation in Agri-Environment Schemes (AES) can also be connected to succession. Studies show the importance of securing successors for AES participation. The current farmer is more likely to make innovations to the farm structure and production if there is a potential successor, whereas the new farmer may tend to introduce new technologies and innovation into the farm business (Bertolozzi-Caredio, et al. 2020). Cullen et al (2021) found that farmer's forward-looking attitude positively influences AES participation. Thus, farmers who identify a successor might be more likely to be innovative and look to continue farming into the future, thus more participation to the environmental scheme. In Ireland, the Green Low-Carbon Agri Environment Scheme (GLAS) has been adopted widely with higher participation in the West and North-West region where the rate of presence of successor in the farm is also higher.

Despite wide recognition of the issue, there is still space in the academic literature for further exploration of the potential association between social aspects and farm succession. The objective of our study is to investigate the social and economic determinants of farm succession in Ireland with emphasis on social aspects.

3 DATA AND METHODS

Teagasc National Farm Survey (NFS) data from 2018 [1] is primarily used to undertake the analysis. This data contains detailed information about farms and information about farm succession including whether or not farm holders have identified a successor. Additionally, the Teagasc Land Use questionnaire from 2014 was used to validate the findings from the 2018 NFS data. This 2014 questionnaire was undertaken with a stratified random sample of Irish farmers, collected from a nationally representative sample of 846 farmers. The representative geographical spread is based on known population distribution figures from the Census of Agriculture in relation to specific farm systems (dairy, cattle rearing, cattle other, sheep, tillage and mixed).

In order to analyse the drivers and barriers of farm succession, we use the probit model with the dependent variable being the presence of a chosen successor as a binary variable where successor =1, otherwise=0. We focus the analysis on the subset of farms where the age of the farm holder is over 50 years old. This provides a sample of 538 farmers.

The probit model is used to test the potential relationship between farm, farmer and farm household characteristics (economic and social) with the presence of a chosen successor. The choice of independent variables is based on the need to account for farm, family and social factors. Farmer age, land quality, and interaction between the presence of a dairy enterprise and the size of land ownership are included because much research indicates a positive relationship of farm size with farm succession. Investment is included since it is an indicator for a willingness to further develop the farm. At the same time, investment is another factor that increases potential successor's willingness to take over the farm business (Calus et al 2008).

[1] The Teagasc NFS is part of the EU Farm Accountancy Data Network (FADN), this data was collected in addition to the core FADN dataset.

The agricultural education status of farm holders is included as a possible explanatory factor to test the potential effect on farm succession. This may contribute to the previous debate in the literature as ti the opposing effects of education as mentioned above. Many of these independent variables tend to not vary much in value over time and this reduces the potential problem of reverse causality. We attempt to account for the influence of past household composition by the inclusion of a lagged independent variable using data from the 2013 Teagasc NFS survey. We created a lagged variable of presence of young adults aged 24 to 44 years old in the household in 2013. The NFS 2018 data provides information about social factors including isolation (defined as living alone) and the presence of workload stress/pressure (ascertained from the special survey). These social variables are an important consideration despite the possibility of endogeneity since they are closely linked to the construction of successor identification.

Farm income and farm viability are likely to be associated with farm succession. These variables are likely to be highly endogenous in terms of their relationship with farm succession. Potential successors may play a very important role in influencing the current farm income and viability. At the same time, higher farm income and farm viability may incentivise potential successors to seek to take over the farm business. Farm income has a number of components that are exogenous or weakly exogenous including soil quality, land ownership and agricultural training. We therefore include these variables rather than the farm income or farm viability variables.

Using the sample of farmers of at least 50 years old, the Teagasc NFS 2018 shows that 57 per cent of farmers have identified a successor at that point in time. Among them, 34% were dairy farms. The scale of the problem is probably best described using a higher age threshold as 60 year-old and over. However, for the purposes of the econometric modelling and due to the limited sample size, we concentrate the succession analysis to farmers aged over 50 years old.

The descriptive statistics are provided in Table 1. For this particular sample, the average age is 63 years old. The average age of farm holders with a chosen successor is 65 years old and without a successor is 60.4 years old. We show that 99 per cent of those with a chosen successor have engaged in a discussion about succession with the chosen successor. Dairy farms are similarly represented in both groups. Dairy farms account for 16 per cent of the farms with a successor and 17 per cent of the farms without a

successor. As expected, the proportion of farms in the best soil quality category is higher for those with a successor (32 per cent) relative to those without a successor (26 per cent).

Table 1: Descriptive statistics of variables used in the analysis

	All Farm Holdings (N=538)		Farm Holders with Chosen Successors (N= 305)		Farm Holders without Chosen Successors (N=233)	
Variable	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Chosen Successor (0,1)	0.56	0.50	1.00	0.00	0.00	0.00
Chosen Successor and Discussion about Succession (0,1)	0.56	0.50	0.99	0.11	0.00	0.00
Independent Variables						
Dairy Farm (0,1)	0.16	0.37	0.16	0.37	0.17	0.37
Land Ownership (Hectares)	37.15	28.92	37.30	30.25	36.95	27.16
Interaction of Dairy Farm and Land Ownership	6.66	17.63	8.65	22.39	7.78	20.46
Age of Farm Holder (Years)	63.01	7.79	65.00	7.37	60.44	7.57
Best Soil Category (0,1)	0.30	0.46	0.32	0.47	0.26	0.44
Number of Household Members Age 25 to 44 in 2013**	0.24	0.53	0.30	0.59	0.17	0.44
Isolation of Living Alone (0,1)	0.23	0.42	0.15	0.36	0.32	0.47
Agricultural Education (0,1)	0.66	0.48	0.73	0.44	0.56	0.50
Workload Problem (0,1)	0.29	0.45	0.24	0.43	0.35	0.48
Net New Investment (€)	7,080	21,683	8,085	24,783	5,777	16,797
Formal Advisory Contract (0,1)	0.44	0.50	0.43	0.50	0.46	0.50
Participation GLAS (0,1)	0.37	0.48	0.36	0.48	0.37	0.48

Source: Teagasc National Farm Survey 2018

**Available for 450 observations

4 RESULTS

Firstly, we show the result of the probit model in Table 2. The lagged variable representing the presence of a young adult is available only for 450 observations. However, this is still an important variable to observe the potential role of household composition in influencing succession. We therefore show the result of the probit model both including and excluding the lagged variable. Marginal effects are calculated to show the change in the probability of succession due to a change in the value of the independent variables.

We analyse whether or not the presence of a dairy farm or the farm size influences the likelihood of succession. We expected that the farm system being categorised as dairy increases the likelihood of succession due to the relatively higher farm income on dairy farms relative to non-dairy farms (Donnellan et al. 2020). However, dairy farm categorisation was not statistically significant in our model. The variable of land ownership (as opposed to rented) is also considered as one of the positive factors to identify a successor. However, we find that land ownership is not statistically significant as an independent variable. It is not consistent with previous studies showing a positive relationship between farm size and the farm succession probability (Kimhi and Bollman,1999; Breustedt and Glauben 2007; Morais et al 2018). At the same time, we emphasise that these results are applying to a subset of the farms where the farmer is aged above 50 years old.

The absence of a significant relationship between land ownership size and succession and between dairy farming and succession motivated us to exploring the possible interaction of dairy farming and the size of land ownership. We therefore added an interaction variable for the presence of a dairy farm with land ownership (hectares). As a result of this interaction variable, farm size is not significant for non-dairy, but significant for dairy farms. This indicates that only larger dairy farmer result in a higher probability of farm succession.

If being a dairy farm were significantly related to succession, we would observe an increase in dairy farms over time. This appears to have occurred around the abolition

of milk quota. However, more recent evidence indicates that there is a decline occurring in the number of specialist dairy farm holdings since 2016. The preliminary results from the 2020 Census of Agriculture point to an increase in the average size of dairy farms with a reduction in the number of farms classified as specialist dairy. This indicates a rising concentration within dairy farming. Our result supports the preliminary result of the Census 2020. In future research, we propose to investigate the varying rates of farm succession within and between farm systems using cluster analysis.

Table 2 Probit Model Results: Determinants of Farm Succession in 2018

	Model 1			Model 2		
successor50	Coef.	Sig	Marginal effect	Coef.	Sig	Marginal effect
Interaction of Dairy Farm and Land Ownership	0.006	**		0.005	*	
Age of Farm Holder (Years)	0.066	***	0.02	0.057	***	0.02
Best Soil Category (0,1)	0.213		0.07	0.196		0.07
Agricultural Education (0,1)	0.053		0.02	-0.035		-0.01
Isolation of Living Alone (0,1)	-0.478	*	-0.15	-0.625	***	-0.21
Workload Problem	-0.285	*	-0.09	-0.248	*	-0.08
Net New Investment (€)	0.004	*	0.001	0.004	*	0.001
Formal Advisory Contract (0,1)	0.009		0.003	-0.046		-0.016
Participation GLAS (0,1)	0.481	***	0.16	0.283	**	0.1
Number of Household Members Age 25 to 44 in 2013**	0.379	***	0.12	-	-	-
Constant	-4.234	***		-3.367	***	
Number of obs			413			498
Pseudo r-squared			0.161			0.122

The age of farm holder is positive and statistically significant. It was as expected that older farmers are more likely to have reached the point of identifying a successor (May et al 2019). The marginal effect indicates that the probability of having a successor increases by approximately 2 per cent per year.

Soil quality is positive, but not statistically significant in the farm succession decision. Heanue and O'Donoghue (2014) and Läpple (2015) reported better output for livestock farmers and farm innovation for farmers with agricultural education. Farmer agricultural education is positive in model 1 and negative in model 2 but not significant. Farmers who have sufficient knowledge on agriculture and farm management tend to recognise the timing and importance of succession. An increase in human capital can

allow the farm operator to process information, allocate resources and thus to perform more effectively, resulting in higher succession (Stiglbauer and Weiss, 2000). A more disaggregated treatment of the agricultural education variable may support the expectation of a positive relationship.

Stiglbauer and Weiss (2000) also explain that university education can have a significant impact on exit from farming and formal education may have two opposing effects on farm succession and exits. The Teagasc NFS data does not include information specifically in relation to the overall education level of the farm operator. However, this information is included in the land use survey of 2014. Using this 2014 data, the coefficient for agricultural education is positive while the coefficient for overall education is negative. Neither of these variables are statistically significant in the 2014 data. However, the negative coefficient for overall education is interesting given that previous research has indicated that formal education can have two opposing effects on farm succession.

The results point to the importance of social factors including excessive workload and isolation. Those farmers reporting excessive workload and/or related stress are less likely to have identified a successor. This is in line with previous research by May et al (2019) who found that farmers who experience hardship on their farm may be reluctant to encourage their children to choose a career as a farmer. This could also indicate that children who witness their parents suffering excessive workload might discourage them from taking over the farm. Within the endogenous succession cycle, these type of social factors can negatively affect the decision-making of potential successors during the process of farm development and identity construction. Children or potential successors acquire familiarity with social aspects during the process of identity construction along with involvement in farm business development. Isolation has a negative coefficient in both models (with/without lagged variable) and is significant and a relatively large proportion of farmers in the sample are living alone (~23 per cent). The marginal effect of isolation is relatively higher (-15 per cent) than other variables. Isolation partly explains household composition of farm holders. At the same time, the result may indicate that farmers who live alone are less likely to identify a successor because farm succession mainly takes place in the family. It also explains that the absence of family labour could induce a lower likelihood of successor identification.

Investment was expected to have a strong impact on the probability of succession as reported in a previous study of succession in Belgium (Calus et al 2008), and here it was positive and significant. Investment could be potentially endogenous given that the presence of a successor could motivate the current holder to invest more. However, we included investment in our model considering its importance and the farm succession itself has been verified as an endogenous cycle (Fischer and Burton 2014). Moreover, Calus et al. (2008) concluded that succession intentions start to influence farm investment ten years before the farm is actually transferred. It indicates the importance of earlier identification of a successor to ensure the continued viability of the farm. We assumed that formal advisory contract could be an indicator of higher possibility of farm succession since it may indicate openness or willingness to improve farming activities. However, it was not significant in our model.

Farmerarticipation in the GLAS agri-environmental scheme is found to be positive and significant. This supports the conclusion of Cullen et al (2020) that participation in agri-environment schemes has a positive effect on farm succession and the willingness to continue farming. Finally, the lagged independent variable for the presence of young adults in the farm household was positive and significant. This confirms that past household composition can significantly influence farm succession over time. The influence of household composition was also confirmed in the data from the 2014 land use survey where the presence of children was found to be positively related to succession.

5 CONCLUSION

In this study, we investigate the drivers and barriers of farm succession using social and economic variables. Preliminary investigation finds that selected economic characteristics and age variables are positive factors in the probability of identifying a successor. Similarly, certain social factors are negatively associated with farm succession.

Our results support the conclusion of Calus et al. (2009) where succession intentions are associated with the level of investment. While recognising the possible reverse causality, the influence of investment on succession can be early in the farm succession process and possibly ten years or more before the actual farm transfer. The farm

succession process is an endogenous process. The presence of potential successors might influence future farm investment and viability. The level of current investment can be a significant indicator of actual farm succession.

Our study highlights the difficulties of identifying successors where farmers experience stress/anxiety in relation to workload. In developing pathways for generational renewal, some factors influence succession decision-making over a long-time frame (Lobley 2010). In fact, excessive workload is reported as one of the key stressors among farmers in Ireland affecting farmer wellbeing (Brennan et al. 2021). Furthermore, Conway et al. (2021) explain that the habitus formed based on past and current experience within certain social norms, such as an idea of *'famers never retire'*, has a significant influence on farm succession decision-making. Senior farmers tend to be reluctant to pass managerial control of the farm to the next generation due to this habitus and fears making succession planning even more challenging.

Social factors could form such habitus and therefore it is necessary to consider a gradual reduction in negative social factors toward farm succession to facilitate earlier succession planning (Leonard et al., 2017). Social factors can evolve over time and negative social factors can potentially break the endogenous succession cycle. Therefore, it is necessary to mitigate hardship at different stages of the farm succession process. Our study also finds that farmers living alone and farmers with no children or young people living in the household are less likely to have identified a successor. Brennan et al. (2021) also confirm the positive association between limited contact with others (non-family members) and farm-related stress. Policy measures can help assist older farmers without strong family networks and older farmers with excessive workloads in facilitating a succession solution. Conway et al. (2022) argue that older farmers' isolation has to be more focused in the context of generational renewal policy through the social inclusion of older farmers and the improvement of their wellbeing. It would facilitate agricultural knowledge interaction between older and younger farmers, which result in a more viable and sustainable farming sector. This can also enable older farmers to stay in farming while sharing the workload with an identified successor. For example, this could be enabled under a partnership model or the establishment of social organisation (Conway et al. 2022).

Farmer participation in GLAS agri-environmental scheme is confirmed as having a positive influence on farm succession. This highlights that farmers who participate in GLAS tend to look for ways of running the farm for the future and preparing for the next generation. Such participation is influenced by social factors according to findings of Cullen et al. (2020). Farmers who have neighbours participating in such schemes are more likely to participate themselves. Innovative environmental practices could also attract younger farmers (Farrell et al. 2021). Therefore, social factors can play an important role in improving the viability and sustainability of farming through generational renewal.

A limitation of this study is that the analysis is based on information provided by farmers as to whether or not the farmer has identified a successor and is not based on actual evidence of same. That said, the vast majority (about 99%) of farm holders who have a chosen successor have discussed the matter with the identified successor, confirming to some degree the accuracy of the data in relation to the identification of a successor.

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Appendix

Table 3: Probit Model Results for Determinants of Farm succession in 2014

	Coef.	p-value	Sig
Age 65 or Over (0,1)	.264	.03	**
Best Soil category (0,1)	.046	.682	
Large Dairy Farm (0,1)	.589	.155	
Education Variables			
Agricultural Education	.12	.305	
Leaving Cert Education or	-.124	.329	

Higher			
Farm Household Variables			
Married with Children	.837	0	***
Married without Children	-.18	.541	
Unmarried with Children	.816	0	***
Unmarried, No children	Baseline Category		
Constant	-.769	0	***

*** p<.01, ** p<.05, * p<.10