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Worth the risk? The behavioural path to well-being

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Abstract: There is an increasing interest in the 'economics of happiness', reflected in the volume of articles appearing in mainstream economics journals exploring the major determinants of self-reported well-being. We contribute by exploring the factors influencing how satisfied farmers are with their quality of life. We find that farm income, subjective perceptions relating to the adequacy of household income, debt, health and personal characteristics such as age and relationship status are significantly associated with farmers' self-reported life satisfaction. While significantly associated with farm income, farm structural variables such as farm size, farm type and the presence of a farm successor were not found to be significantly related with life satisfaction. Our results also suggest that farmers who are more risk averse enjoy significantly lower levels of both life satisfaction and farm income than their more risk seeking or risk neutral counterparts. We suggest that, in the same way that risk aversion inhibits farmers from making choices that could lead to an increase in their income, it may also constrain farmers (and the wider public at large) from engaging in certain types of behaviors that could lead to an increase in their self-reported quality of life. Finally, we find that while farm income is significantly related with self-reported life satisfaction, the direct correlation between these variables is weak suggesting that farmer life satisfaction can be distinct from business success.

1. Introduction

One of the central assumptions underpinning neo-classical economics is that utility is formed based on consumption of goods. In keeping with this conceptualisation of well-being, economists have typically focused on increasing the choices available to people through, for example, raising incomes so that individuals can satisfy their preferences (Harsanyi 1982; Dolan and White 2007). Recently, however, there has been a resurgence of interest among economists in subjective indicators of well-being as money and economic growth are increasingly recognised as inadequate indicators of progress, especially in developed countries (Constanza et al., 2014). For example,

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even though GDP has tripled over the past 50 years in the US, life satisfaction has remained largely unchanged (Diener & Seligman, 2004). While consumers are becoming increasingly satiated with products, this is not matched by increases in how they rate their quality of life (Forgeard et al., 2011). The abundance of goods and services coupled with static or declining levels of life satisfaction has been described as the 'progress paradox' (Easterbrook, 2003).

Economists have traditionally paid much less attention to the determinants of subjective as opposed to objective indicators of well-being, due to concerns as to whether subjective data can really serve as an adequate proxy measure of utility. Emerging interdisciplinary research has begun to address these concerns and increasingly suggests that self-rated questions about life satisfaction have a high scientific standard in terms of internal consistency, reliability and validity, and can be a valid approximation for individually experienced welfare or utility (see Dolan and White 2007 for a review). Research in psychology has shown, for instance, that responses to questions about life satisfaction correspond with external reports on respondents by others (e.g. friends and partners) and life satisfaction ratings have also been shown to be highly correlated with actual behaviour, e.g. suicide (Di Tella et al, 2003; Bray and Gunnell, 2006; Clark et al., 2008). As a result of these developments, there has been increasing work on using indicators of subjective well-being for economic and soical policy (e.g. Donovan and Halpern, 2002; Kahneman and Sugden, 2005; Layard, 2005; HM Treasury, 2008; Dolan and Metcalfe, 2012). This work has analysed how economic factors such as income, wealth, and employment as well as non-economic factors such as personality traits, health and socio-demographics affect individuals self-reported life satisfaction (see Dolan et al., 2008 for a review).

We add to this body of work by seeking to understand the dynamics of life satisfaction for a sub-group of the population where little life satisfaction work has previously been undertaken. Farmers are an interesting group to explore as farming is often associated with both having a satisfying life as well as a way of making a living (Howley 2015). Outside the farming context, a wide range of studies have shown that the self-employed are, on average, more satisfied with their jobs than the

organizationally employed, reflecting greater autonomy of choice (Blanchflower and Oswald 1998; Benz and Frey 2008a,b). Being a farm operator also offers greater autonomy of choice, but there are likely to be a number of other nonpecuniary benefits that are of relevance to farming that may not be observable, at least to the same degree, in other types of self-employment. These include benefits such as working outdoors and more generally perceived lifestyle benefits from living in a rural area and close to work. In other words, farmers farm for reasons other than maximizing profit and, for many, farming itself may be an occupation that increases life satisfaction (Howley, 2015; Howley et al., 2015; Maybery et al., 2005; Willock et al., 1999a: 1999b), at least for those who choose it. Ruth Gasson's classic study in 1973, for example, identified four broad 'value orientations' that were important for farmers. These were 'instrumental' (make money, expanding the business), 'social' (maintaining a tradition), 'expressive' (creativity) and 'intrinsic' (enjoyment of work tasks, lifestyle preference) (Gasson 1973).

In seeking to better understand the dynamics of farmers' well-being, we examine the relationship between a variety of variables such as age, education, relationship status, off-farm work, income, debt, subjective perceptions of financial health, farm structural factors and health with farmers' self-reported life satisfaction. Apart from our focus on farmers, where little happiness-related research has being undertaken, our additional novel contribution is an examination of the relationship between risk aversion and self-reported life satisfaction. A common conjecture in economics is that risk aversion can discourage people from engaging in risky activities that might advance their economic well-being (MacCrimmon and Wehrung 1990; Guiso and Paiella 2005; 2008). Focusing specifically on farmers, there is much empirical evidence to suggest that risk aversion could inhibit farmers from adopting efficiency-enhancing technologies that would on average be net-income enhancing, but carry risks of failure (Marra et al., 2003; Yesuf 2007). We hypothesise that a similar argument could also be made in relation to self-reported life satisfaction. To put it simply, in the same way that risk aversion inhibits individuals from making choices that could lead to an increase in their income, it may also constrain people from engaging in certain types of behaviors that lead to an increase in their self-reported

quality of life. We provide a useful first step in testing this proposition by examining the relationship between risk attitudes and both farm operators' self-reported life satisfaction as well as their farm income.

2. Risk attitudes

Investment and production decisions by farmers take place within environments that are affected by a multitude of risks. Consequently, the role of risk attitudes on farmers' land use and management decisions has been a topic of continuing interest for agricultural economists (e.g. Binswanger 1980; Chavas and Holt 1996; Liu 2013). Risk attitudes have been posited as a potential barrier to the adoption of efficiency-enhancing technologies or alternative land use activities carrying a higher expected return. The argument here is that risk aversion can lead to farmers foregoing welfare-improving opportunities by being less willing to undertake activities and investments that have higher expected outcomes, but carry with them risks of failure (Marra et al., 2003; Yesuf 2007). Beyond the agricultural economics domain, there is now a large body of research which suggests that risk-averse individuals are relatively more likely to forego higher expected returns, for returns with lower variability (Hartog et al., 2002; Guiso and Paiella 2005; 2008). The net effect is that more risk-averse individuals should have less variable earnings but end up with, on average, less income and wealth.

In the same way that risk aversion could hinder individuals from making choices that would increase earnings, risk aversion may also constrain individuals from making choices that would have a net positive effect on their overall life satisfaction. We derive a measure of the level of farmers' risk aversion and test the association between this measure and the life satisfaction of farm operators as a useful first step in testing this proposition. In order to determine the role of risk aversion on life satisfaction, we developed a psychometric scale reflecting risk attitudes, based on a number of attitudinal statements reflecting the importance of general farming related risks. The statements draw on a variety of previous work (see Bard and Barry 2000; Pennings and Garcia 2001; Xu 2005; Winsen et al. 2016) and are designed to assess farmers' attitudes towards general farming related risks. Factor analysis is used to

reduce these data to a latent construct reflecting farmers' degree of risk aversion. To date, at least in the economics literature, responses towards lottery-type experiments (e.g. variants of the Holt and Laury, 2002 multiple price lists) are often used as the basis for measuring risk aversion. However, there is an increasing body of evidence, especially in the psychology literature, which suggests that risk attitudes are highly malleable with respect to context (MacCrimmon and Wehrung 1990; Goldstein and Weber 1995; Weber et al. 2002; Johnson et al., 2004; Dohmen et al., 2011). In other words, risk preferences elicited using lottery-type experiments may apply only to gambling behavior, and may not serve as a good representation of risk preferences in other contexts, e.g. in farming. Responses to multi-item scales have the advantage of providing a context-specific measure of risk aversion and are also rather less cognitively demanding for participants.

3. Methodology

The data used in this study come from a cross sectional survey of 364 principal farm operators in County Offaly, Ireland, conducted over 12 weeks between January and April 2013. A survey company was hired to conduct the interviews with farmers. A quota controlled sampling procedure was followed to ensure that the survey was broadly representative of the farming population in Ireland along the key dimensions of farm size and farm type. To provide a measure of farmers' risk aversion, respondents were read a list of 5 general statements (see table 1) and were asked to state their agreement on a scale from 1 (completely disagree) to 7 (completely agree). An exploratory factor analysis of these attitudinal statements resulted in one factor with an eigenvalue greater than one.

As can be seen in table 1, all of the attitudinal statements had high loadings on this factor, labelled as 'farming risk aversion'. The higher a farm operator's score on this scale, the more averse they are to farm related risks. A number of tests were applied to test the validity of the factor analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy is 0.83 indicating that the data matrix has sufficient correlation to justify the application of factor analysis. Using Bartlett's measure of sphericity we reject the null hypothesis that the correlation matrix is an identity matrix and accept the

alternative hypothesis that there is a significant relationship between the variables ($p <$ .0001). Furthermore, there is a high degree of consistency in responses to the attitudinal statements reflecting farming risks, as indicated by a Cronbach's alpha of 0.802.

The life satisfaction indicator used in this paper is based on responses to the following question (see table 2): 'Thinking about the good and bad things in your life, which of these answers best describes your life as a whole?', on a scale from 1 to 7 ('As bad as can be'; 'very bad'; 'bad'; 'all right'; 'good'; 'very good'; 'exceptional'). In the literature to date, the answer to this question has been referred to as subjective well-being, (Blanchflower and Oswald 2004; Ferrer-i-Carbonell 2005), or as self-reported life satisfaction (Luttmer 2005; Brereton, Clinch and Ferreira 2008), or as quality of life (Bryla, Burzynska and Maniecka-Bryla 2013). Since our measure of life satisfaction may not be cardinal (i.e. a given interval between measures may not have a consistent meaning), an ordinal model such as an ordered probit or ordered logit is preferable to a linear regression model. In our analysis, we ran an ordered logit model in Stata to examine the relationship between a variety of characteristics of the farm and farmer with life satisfaction.

To ascertain farm income, respondents were given a payment card with various intervals and asked to indicate which of these best describes their annual farm income before taxes and exclusive of subsidies such as the single farm payment (see table 3). A payment card approach was used as it was thought that this method (as opposed to asking respondents an open-ended question) would result in a relatively high response rate. As illustrated in table 3, we observed a relatively high response rate especially in light of the commonly reported difficulty of getting respondents to answer income related questions in surveys. In addition to collecting data on farm income, a question to provide a measure of farmers' own subjective assessment of the adequacy of their household income was also included in the survey questionnaire. Respondents were simply asked to rate the financial situation of their own household on a scale from 1 (very bad) to 5 (very good). We hypothesized that a subjective assessment relating to the adequacy of the financial status of their household would matter more for life

satisfaction than objective measures of farm income. To provide further insight into the role of perceptions relating to financial health on subjective well-being, farmers were also asked to assess their levels of debt. Farmers were thus asked: *'which of the following would best describe the level of debt in your farm business'* and given three options, namely none at all, lightly in debt or heavily in debt. Background personal characteristics such as age, education, gender and relationship status as well as farm structural characteristics including farm size, farm type and presence of an identified farm successor were also collected and included in the regression analysis of life satisfaction (see table 4 for more details in relation to the structure of these variables).

<div align="center">Insert table 1 here</div>
<div align="center">Insert table 2 here</div>

One of the more robust findings in the literature relating to the determinants of individuals' life satisfaction is the effect of self-reported measures of health status (see Dolan et al. 2008 for a review of this literature). We included two measures of subjective health status in the survey questionnaire. First, farmers were given 5 options ranging from 1 (very bad) to 5 (very good) as a response to a question which asked farmers *'how is your heal*th in general?'. This can be thought of as reflecting respondents' general long-term evaluation of their health status. Second, farmers were presented with a vertical, visual analogue scale (EQ-VAS) with endpoints labelled *'the best health you can imagine'* and *'the worst health you can imagine'*. Farmers were then asked to simply *'mark an X on the scale to indicate how your health is TODAY'* and then to *'write the number you marke*d on the scale in the box below.'* The EQ VAS is a quantitative measure of health as judged by the individual respondent and is widely used in clinical trials, observational studies, and other health surveys (e.g. see Hurst et al., 1997; Jia and Lubetkin 2005; Konig et al., 2009).

<div align="center">Insert table 3 here</div>
<div align="center">Insert table 4 here</div>

4. Results

4.1 Self-reported life satisfaction

Farmers in our survey appear to be largely satisfied with their quality of life (see table 3) with twenty-one percent reporting that it is either very good or exceptionally good, and 51 percent reporting that their quality of life is good. Table 5 presents the results of our ordered logistic model of life satisfaction. Ordered logit models imply a non-linear relationship between the explanatory variables and the ordinal dependent variable. Under this specification, the coefficients cannot be directly interpreted with any substantive meaning. Effects for the logistic model can, however, be interpreted in terms of changes in the odds by taking the exponential of both sides of our equation (see Long and Freese 2006). This is interpreted as follows: for a unit change in the independent variable, the odds of having higher levels of life satisfaction are expected to change by a factor of exp (βn), holding all other variables constant.

The odds ratios for both a unit and standard deviation change of the independent variables are presented in table 5. Examining the effect of a standard deviation change (column headed % StdX[2]) is particularly useful when variables have heterogeneous scales as in this study. As these standardised coefficients are all on the same scale (standard deviation changes), this is a useful method for communicating not just the signs and significance of our explanatory variables but also the overall magnitude of their effect on life satisfaction, i.e. the bigger the number in the column headed % StdX the more substantive the relationship.

We find a negative relationship between age and life satisfaction but a positive relationship between age squared and life satisfaction. This is consistent with previous research, which suggests a U shaped relationship between age and life satisfaction, with higher levels of well-being for the relatively younger and older groups and with lowest levels of satisfaction in middle age (Blanchflower and Oswald 2004: Ferreri-Carbonnell and Gowdy 2007). While some previous studies have also

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[2] The Spost9 collection of Stata ado files was used for post-estimation interpretation (see Long and Freese, 2006)

found a positive association between education and life satisfaction (Blanchflower and Oswald 2004) we find no statistically significant effect of education in our sample. As noted by Dolan et al. (2008), the coefficient on education is often responsive to the inclusion of other potentially confounding variables in the regression analysis such as health and income, both of which we control for in our analysis. Farmers who are in a relationship are 87 percent more likely to have a higher life satisfaction score than farmers who are not in a relationship, also consistent with much previous work (Helliwell 2003). This could be primarily due to selection effects, i.e. those who are happier are more likely to be in a relationship and married people may also have greater access to and stronger social ties with extended family, neighbours, friends, and spouse's colleagues and friends (Putnam 2000). Farm structural factors such as farm system and the presence of a successor do not appear to be significantly related to life satisfaction, and there is no consistent pattern for the effect of farm size.

Again, consistent with the literature, we find a positive relationship between income (in this instance farm income) and life satisfaction (Blanchflower and Oswald 2004 Ferrer-i-Carbonell 2005). A one standard deviation increase in farm income (approximately €17,000) is associated with a 45% increase in the probability of having a higher life satisfaction score. The extent to which this effect is truly causal is an open question with evidence suggesting that happiness may lead to higher future incomes (Diener et al. 2002; Graham et al., 2004). In addition to objective measures of income, there is now a rich literature documenting the importance of individuals' subjective assessment of the adequacy of their income (Clark 2003; Luttmer 2005; Ferrer-i-Carbonell 2005). Our findings are also consistent with this research, as we find that farmers' subjective evaluations to be a much more important predictor of life satisfaction than farm income. As can be seen from the column headed %StdX (table 5), this measure also appears to have a much stronger relationship with life satisfaction than any of the other explanatory variables included in the regression analysis. Consistent with previous research (Brown, Taylor and Wheatley Price 2005; Bridges and Disney 2010), debt was also found to be a significant predictor of life satisfaction, as farmers who felt that their farm was in relatively more debt were

significantly less likely to have a higher life satisfaction score than farmers who reported no farm debt. Farm operators with an off-farm job are 22 percent more likely to have a higher life satisfaction score. Self-reported health status has frequently been found to be a strong correlate of subjective well-being (Helliwell and Putnam 2004; Shields and Wheatley Price 2005). In our sample, both long term and current health status (EQ VAS) are significant predictors, though respondents' assessment of their health in general has a more substantive relationship with life satisfaction than their current health status (EQ VAS).

Finally, 'farming risk aversion' has a significant association with variation in life satisfaction. A one standard deviation increase in our measure of risk aversion is associated with a 30 percent decrease in the odds of a higher life satisfaction score. The farmer with the lowest score for the variable 'farming risk aversion' (i.e. least risk averse) has a mean predicted probability of reporting a very good or exceptional life satisfaction of 0.32; i.e. all things being equal, it would be expected that 32 percent of farmers with these characteristics would report a very good or exceptional quality of life. On the other hand, the farmer with the highest factor score (most risk-averse) had a mean predicted probability of 0.07; i.e. all things being equal, it would be expected that 7 percent of farmers with these characteristics would report a very good or exceptional quality of life. The %StdX column (table 5) indicates that farming risk aversion has an important association with life satisfaction equivalent to that of relationship status and levels of farm debt, but is substantially less substantive than farmers' self-reported health status and their subjective assessment of household income. In unreported regressions (available upon request), we also estimated our model of life satisfaction using ordinary least squares (OLS), which generated the same signs and significance of the explanatory variables. Using OLS has the advantage of allowing for the estimation of the explanatory power of the model as a whole, and indicates that the explanatory variables account for a reasonable share of the variation in farmers' life satisfaction ($R^2 = 0.37$). However, almost two thirds of the variation in reported life satisfaction appears to be related to other uninvestigated or unknown factors, or is random noise.

Insert table 5 here

4.2 Determinants of farm income

As discussed in section 2, there is a substantial body of research which suggests that risk aversion is negatively related to objective indicators of well-being such as income and wealth. Therefore, one potentially useful mechanism to test the construct validity of our risk attitude measure is to examine if this is significantly related with farm income. To obtain a measure of farm income, farmers were presented with a payment card (see table 3). For analytical ease, the midpoint in each interval on the payment card was taken as a measure of respondents' farm income, thereby allowing us to use conventional ordinary least squares regression (OLS) in examining the relationship between our measure of risk aversion and farm income. Reported findings, were found to be robust when compared to alternative modelling approaches such as using a Tobit (one observation right censored at €100,000) or an interval regression model.

The results from the regression analysis of farm income can be seen in table 6. For consistency, we used the same set of control variables as that used in our analysis of life satisfaction. The regression model as a whole accounted for a reasonably large share of the variation in farm income (R^2 =0.38), though as with the life satisfaction model above, almost two thirds of the variation in farm incomes remains unexplained by these factors. 'Farming risk aversion' is negatively related with farm income (table 6), as it is with reported life satisfaction (table 5). Relatively more risk-averse farmers are likely to earn on average significantly less from their farm business than more risk neutral or risk seeking individuals. For instance, the average predicted farm income for the farmer with the highest score on the attitudinal construct 'farming risk aversion' (most risk averse) was €17,546 whereas for the farmer with the lowest score (least risk averse) it was €26,829.

The results for the other explanatory variables are as expected. For example, dairy farmers earned on average €7,686 more from their farm enterprise than non-dairy farmers (e.g. livestock or tillage producers). Dairy farming in Ireland is relatively more intensive than other farming systems and as a result the marginal productivity is generally higher (Hennessy and Moran, 2014). Farm size was also positively related with farm income. Those with an identified farm successor reported lower farm

incomes. There are a number of possible explanations for this relationship. First, succession planning presents a complex challenge for family farms, as farmers face conflicting objectives such as the need to maintain a viable farm business for the next generation, treat all of their children fairly and provide for their own retirement (Wheeler 2012). This complexity and the potential family conflict and tension such a planning process might generate, may hinder farmers in pursuing behaviors that increase farm profitability (Lobley et al. 2010). Internal family settlements, e.g. provision of land for housing of other family members or cash payments to siblings, may also impinge on the capacity of the successor to implement changes. In general, farmers with an identified farm successor may place relatively more weight on ensuring the succession and survival of the family farm as opposed to maximising profit (Gasson and Errington 1994; Kimhi and Nachlieli 2001; Sottomayor et al. 2011; Ingram et al. 2013).

Age, gender and relationship status were not found to be statistically significant predictors of farm income, unlike life satisfaction where age and relationship status were found to be important. On the other hand, education in contrast to life satisfaction, was found to be significantly related with farm income, as farmers with a third level education were found to earn, on average, €12,270 less on the farm than those without a third level education. This could be suggestive of higher marginal returns to education in the off-farm labor market or simply reflect the fact that individuals who pursued a third level education are perhaps less likely to want to spend time working on the farm (Howley et al. 2014; Heanue and O'Donoghue 2014). Whereas debt was negatively related with life satisfaction, farm indebtedness was found to be positively associated with farm income. For example, farmers who felt that their farm business was heavily in debt or lightly in debt were found to have a farm income which was, on average, €6,655 and €4,569 higher respectively than farmers who reported no farm debts. This may either reflect acquired debt being used to finance increased farm income, or simply that debt service costs requires an increase in productive effort. Much previous work suggests that health issues are an important driver of agricultural productivity as well as life satisfaction and the findings here are in line with this literature (Osborne et al. 2013; Osborne et al. 2014).

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Specifically, farmers who report themselves as having a very good health status, earn on average €10,513 more from their farm business than those farmers who report that their health is less than good. The EQ VAS measure of health was not found to have a significant relationship with farm income.

Next we examine the direct correlation between farm income and self-reported life satisfaction, to ascertain the extent to which one can be held as a reliable proxy for the other, when considering farmer welfare. While farm income, as can be seen in table 5, is significantly related with self-reported life satisfaction, the direct correlation between these variables is weak (spearman's rho = 0.29) which suggests that farmer life satisfaction can be quite distinct from farm business success. In addition, the correlation between farmers' perceptions of the adequacy of their household income and self-reported life satisfaction is also weak (spearman's rho = 0.26) which suggests that subjective measures of income can also give a significantly different representation of farmer welfare than self-reported life satisfaction. Both our income measures were also only weakly correlated with each other (spearman's rho = 0.18) which highlights the differences than can emerge when considering objective and subjective representations of income.

Insert table 6 here

4.2 Study limitations

Although the relationships reported here are consistent with existing theory, they may be limited to Irish farmers. Farmers in Ireland are relatively low-intensity and heavily reliant on subsidy payments and off-farm income. It would be useful in future work to investigate the drivers of farmer's life satisfaction in other countries to establish the findings' generaliseability utilising a range of representative samples. One further unavoidable limitation of this work is that findings are limited by their cross sectional nature. Future longitidinal work and/or research using instrumental variables would be important directions for future work to help us to rule out biases associated with the presence of confounding factors and bi-directional causality when examining the relationship between risk and both economic and subjective indicators of well-being. Despite this note of caution, the analysis of this survey dataset does give us a good

overview of some of the main factors associated with farmers' life satisfaction and also some indication of the importance of risk aversion in affecting both income and self-reported life satisfaction.

5. Concluding Remarks

Income and wealth are important facets of well-being, allowing people to satisfy their needs and pursue goals that they deem important to their lives. That said, well-being as a concept encompasses more than simply financial status as there can be a significant disparity between individuals' objective circumstances and their perceptions as to the overall quality of their life. For instance, we find that farmers self-reported life satisfaction and farm income, which can be seen as an objective measure of welfare, are only weakly correlated with each other, suggesting that business success may not necessarily translate into increased life satisfaction. As such, much research within the social sciences has used individuals' self-reported life satisfaction as an empirically valid and adequate approximation for individually experienced welfare or utility, and has sought to better understand the determinants of self-reported life satisfaction or happiness. The main aim of this study was to examine what factors are related with farmers' self-reported life satisfaction, with a particular focus on the role of risk aversion. In keeping with research of non-farmers, we find that pecuniary factors such as farm income, farm debt and subjective perceptions relating to the adequacy of household income are significantly related with life satisfaction. Subjective health status and background personal characteristics such as age and relationship status also emerged as being significantly related with farmers' life satisfaction. While significantly related with farm income, farm structural variables such as farm size, farm type and the presence of a farm successor were not found to be significant predictors of life satisfaction for this group. Another difference between farm income and life satisfaction was in relation to the role of farm debt. While perceptions in relation to the level of farm debt was negatively related with life satisfaction, it was positively related with farm income, perhaps reflecting the need for an increase in productive effort to service that debt.

Outside of the agricultural sphere, risk aversion has been found to be significantly associated with economic well-being (e.g. income and wealth). The argument here is that risk aversion affects investment behavior, with risk averse individuals being relatively more willing to forego higher expected returns, for returns with lower variability. Our analysis of farm operators is in line with this existing research, as we find that farmers who are more risk averse earn, all things being equal, less income from their farm business. In addition to being significantly related with objective indicators of success, our results also suggest that farmers who are relatively more risk averse are less likely to enjoy higher life satisfaction scores. One potential explanation is that in the same way that risk aversion inhibits people from engaging in certain behaviours that are net-income enhancing, but carry risks of failure, it may also constrain farmers (and indeed the general public at large) from activities that would on average improve their self-reported life satisfaction. Of course it is possible that bi-directional causality could be partly driving these results in that happiness itself could lead individuals to be less risk averse. Future longitudinal and/or work using instrumental variables would be useful to further unpick the direction of these relationships. There is also perhaps a need for further work to explore the extent to which farmers, as a group, are more or less risk averse than other groups, and also whether the apparent association between risk aversion and life satisfaction which we find in our sample is replicated among other groups in society.

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Table 1: Farming Risk Aversion

	Mean scores	Factor loadings
I don't think it is a good idea to take too many risks when it comes to farming	6.07	0.812
I am cautious about adopting new ideas and farm practices	5.84	0.717
Avoiding risky options in farm decision making is important to me	6.1	0.733
Before I apply new farm practices they first need to be proofed at other farms	6.1	0.625
I am more concerned about facing a loss than foregoing a profit	5.9	0.462
Extraction Method: Principal Axis Factoring.		
Cronbach's alpha 0.802		

Table 2: Summary Statistics

Variable		% (1s)	% (0s)	Mean	Std.Dev
Male	Gender (1= Male, 0 = Female)	87.64	12.36		
Education	Whether the respondent has a third level education (1= Yes, 0 = Otherwise)	17.03	82.97		
Relationship status	Whether the respondent is in a relationship (1= Married or single and in a relationship, 0 = Single, Widowed or Divorced)	79.67	20.33		
Farm size 25-49 ha (less than 25 ha is the reference category)	Farm size in hectares (1=25-49 ha, 0 = otherwise)	40.66	59.34		
Farm size 50-74 ha	Farm size in hectares (1=50-74 ha, 0 = otherwise)	17.03	18.97		
Farm size 75-99 ha	Farm size in hectares (1=75-99 ha, 0 = otherwise)	8.79	91.21		
Farm size 100-149 ha	Farm size in hectares (1=100-149 ha, 0 = otherwise)	2.75	97.25		
Farm size 150 plus hectares	Farm size in hectares (1=150 plus ha, 0 = otherwise)	1.92	98.08		
Dairy farmer	Whether the farm operator is predominantly a dairy farmer (1= Yes, 0 = No)	12.36	87.64		
Successor	Have you a successor/heir that will work on the farm when you retire (1 = definitely or very likely, 0 = likely, not sure,	43.41	56.59		

	unlikely, definitely not)				
Very good health (less than good is the reference category)	Respondents evaluation of their health in general (1= Very good, 0 = Otherwise)	30.22	69.78		
Good Health	Respondents evaluation of their health in general (1= Good, 0 = Otherwise)	49.45	50.55		
EQ VAS (Health score)	Respondents evaluation of their health at the time of the survey	83.05	13.29		
Debt High (no debt is reference category)	Respondents evaluation of the level of debt in their farm business (1=Heavily in debt, 0 = Otherwise)	13.19	86.81		
Debt Low (No debt is reference category)	Respondents evaluation of the level of debt in their farm business (1= Lightly in debt, 0 = Otherwise)	45.33	54.67		
Off-farm job	1 = Has an off-farm job, 0 = Otherwise	25.27	74.73		
Financial situation is neither good nor bad	Respondents' evaluation of the financial situation of their household? (1= neither good nor bad, 0 = otherwise)	32.14	67.86		
Financial situation is good or very good	Respondents' evaluation of the financial situation of their household? (1=good or very good, 0 = otherwise)	42.03	57.97		
Age	Age of the farm operator (1=20, 2=30, 3=40, 4=50,	% youngest (0.55)	% oldest (8)	55	13

		min (-3.03)	max (1.73)		
	5=60, 6=70, 8=80)				
Farming risk aversion	Derived factor variable reflecting domain specific risk preferences	min (-3.03)	max (1.73)	-1.31	0.91
Dependent variables					
Farm income	Annual farm income before taxes (euros) and not including the single farm payment?			€20,959	€17,099
Subjective well-being	Respondents were asked: Thinking about the good and bad things in your life, which of these best describes your life as a whole? (1= As bad as can be, 2= Very bad, 3= Bad, 4=Alright, 5=Good, 6=Very good, 7=Exceptional)			4.87	0.87

Respondents were asked their age in 10 yearly intervals. We took the midpoint of each one. The last category was 75 plus (8% of the survey). For these respondents we gave them a value of 80. The variable 'Financial situation' initially had 5 categories ranging from very bad to very good. Due to small numbers of individuals at the two extreme endpoints we collapsed this into 3 categories. We used this new collapsed index for the purpose of creating relevant dummy variables.

Table 3: Life satisfaction

	Freq.	Percent
As bad as can be	3	0.82
Very bad	3	0.82
Bad	6	1.65
All right	92	25.27
Good	185	50.82
Very good	71	19.51
Exceptionally good	4	1.1

Table 4: Farm Income

	Freq.	Percent
€0 - €3,999 per annum	41	11.58
€4,000 - €9,999 per annum	81	22.88
€10,000 - €19,999 per annum	97	27.4
€20,000 - €29,999 per annum	47	13.28
€30,000 - €39,999 per annum	26	7.34
€40,000 - €49,999 per annum	37	10.45
€50,000 - €59,999 per annum	16	4.52
€60,000 - €69,999 per annum	6	1.69
€70,000 - €79,999 per annum	2	0.56
€80,000 - €89,999 per annum	0	0
€90,000 - €99,999 per annum	0	0
€100,000+ per annum	1	0.28
Total responses (354) Missing (10)	354	100

Table 5: Factors related with farmers' life satisfaction – results from ordered logistic regression

	b	z	%	%Std X	SDof X
Age ***	-0.2	-2.7	-16.0	-89.6	13.0
Age squared ***	0.0	2.8	0.2	934.5	1463.0
Male	0.0	0.1	4.2	1.4	0.3
Education	0.2	0.3	19.9	3.6	0.2
Relationship status ***	0.6	2.0	87.4	29.0	0.4
Farm income ***	0.0	2.8	0.0	45.2	17099
Farm size 25-49 ha under 25 ha is the reference category)	0.3	1.2	41.9	18.7	0.5
Farm size 50-74 ha	-0.1	-0.4	-12.3	-4.9	0.4
Farm size 75-100 ha ***	0.9	2.0	150.3	29.7	0.3
Farm size 100-150 ha	-0.5	-0.7	-38.1	-7.3	0.2
Farm size 150 plus ha *	1.6	1.8	374.7	24.3	0.1
Dairy farmers	0.0	0.1	4.7	1.5	0.3
Successor	-0.1	-0.5	-11.7	-6.0	0.5
Debt high (no farm debt is the reference category) ***	-1.2	-3.0	-70.6	-34.1	0.3
Debt low	-0.1	-0.4	-9.3	-4.8	0.5
Financial situation is neither good nor bad (fairly bad or very bad is the reference category) ***	2.3	4.9	941.5	200.8	0.5
Financial situation is good or very good ***	2.8	5.8	1623.3	308.0	0.5
Off farm job*	0.5	1.6	57.9	22.0	0.4
Very good health ***	1.7	3.9	455.0	120.4	0.5
Good health ***	0.9	2.7	149.3	58.0	0.5
EQ VAS **	0.0	2.1	2.3	35.6	13.2
Farming risk aversion **	-0.4	-2.9	-32.0	-29.6	0.9

% is the percent change in the odds of having higher levels of life satisfaction. % StdX is the percentage change in odds of having higher life satisfaction for a standard deviation change in our explanatory variable. SDofX is the standard deviation of the relevant explanatory variable. Asterisks *** indicates statistically significant at 1 percent level, ** indicates statistically significant at 5 percent level, * statistically significant at 10 percent level.

Table 6: Factors related with farm income – results from ordinary least squares regression analysis

	Coef.	Std. Err.	t
Age	178	428	0.4
Age squared	-1	4	-0.3
Male	205	2354	0.1
Education ***	-12270	4058	-3.0
Relationship status	3193	2059	1.6
Farm size 25-49 ha under 25 ha is the reference category) **	4891	2003	2.4
Farm size 50-74 ha ***	10651	2491	4.3
Farm size 75-100 ha ***	13322	3136	4.3
Farm size 100-150 ha *	9206	5034	1.8
Farm size 150 plus ha ***	22524	5924	3.8
Dairy farmers ***	7686	2432	3.2
Successor ***	-4426	1606	-2.8
Debt high (no farm debt is the reference category) **	6655	2769	2.4
Debt low **	4569	1903	2.4
Financial situation is neither good nor bad (fairly bad or very bad is the reference category)	-3183	2917	-1.1
Financial situation is good or very good	686	2922	0.2
Off farm job	-1105	1907	-0.6
Very good health ***	10513	2851	3.7
Good health	1878	2269	0.8
EQ VAS	-40	75	-0.5
Farming risk aversion **	-1910	885	-2.2
N = 354 R² = 0.38			

*** indicates statistically significant at 1 percent level, ** indicates statistically significant at 5 percent level, * statistically significant at 10 percent level.