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# The importance of succession on business growth: A case study of family farms in Switzerland and Norway*

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*Abstract*
*This paper develops the hypothesis that the level of growth or decline of small family farms is strongly connected to the farms' succession process. Around the process of intra-family succession, both disinvestment in cases of farm abandonment or conversion to part-time farming and investment activities in case of transfer to the next generation reach the highest levels. This hypothesis is confirmed for four different growth indicators using Swiss and Norwegian farm data for the period 2004 to 2009. Management strategy is another significant factor explaining business development, whereas growth and shrinking processes are accelerated by a high degree of specialization.*

***Keywords:*** *Growth, Family Life Cycle, comparative research*

***JEL classification:*** *L25, Q12, R29*

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# 1. Introduction

As Zahra and Sharma (2004) emphasize, succession has become one of the most intensely issues studied in the literature on family business studies. Since Helmich (1974), it is known that succession is a major concern for a firm's development (Chua et al. 2003, Sharma 2004). However, research on how the process of succession itself influences the development of a family business (Gagné et al., 2011) had to rely on small sample sizes and few economic data. There is a lack of evidence whether the size of companies contracts or increases during the process of intra-family transfer.

This paper examines the influence of the succession process on business growth for the farming sector in regions characterized by family farming. This focus is chosen for two reasons. First, the large degree of government intervention in the agricultural sector requires a constant monitoring of farm development as a basis for policy design, and has resulted in comprehensive data sets containing valuable information about the economic performance of farms across time with large sample sizes. For example, farm accountancy started in Norway on a regular basis as early as 1911. The richness of empirical data for farms is in contrast to the observation of a general lack of national statistics on family businesses as observed by Chrisman et al. (1998). This makes farms a potentially interesting object for empirical case studies within family business research and provides a chance to answer the question about the development of companies during the succession process. Second, although firms in the agricultural sector are typically organized as family-owned businesses, the specificity of the agricultural sector may render some of the results that apply to non-agricultural family businesses. That may point to the importance of taking sectors into account, too, when progressing with research on succession and growth.

The remainder of the paper is organized as follows. The argument that succession takes systematically specific forms in the farming sector compared to other family businesses is outlined in Section 2. Section 3 is devoted to the construction of a theoretical model of the effect of the succession phase and status on farm growth. The paper proceeds with an outline of the data and the method including the operationalization of farm development in Section 4. Section 5

presents the results, while the final section concludes and proposes venues for future research.

## 2. Specific succession characteristics of the agricultural sector

While phases of family firms in which the business is handed over from one generation to the next are common to agriculture and other sectors, it is important to note that succession in agricultural family enterprises faces a number of peculiarities that are different compared to non-agricultural businesses as reviewed by Handler (1994) and Molly et al. (2010).

The general family business literature makes an important distinction between the succession from the founding generation to the second generation on the one hand and the potential successions thereafter on the other hand (McConaughy and Phillips, 1999; Perez-Gonzalez, 2006) as a company's performance changes systematically from the founding generation to the generations thereafter (Cromie et al., 1995; Dunn, 1995; Reid et al., 1999) For family farms in Switzerland and Norway, however, empirical data regarding the founding generation usually does not exist as the firms most often belong to the same family for several generationsIn the perspective of Adizes' (1979) Organizational Passages, Norwegian and Swiss family farms are almost all in the adolescent stage or even in the stage of death. Hence, the «founding generation» issue is a variable which we can neglect in focusing on the family farm succession process.

The dispersion of the company's capital on many persons through inheritance is another effect of intra-family succession (Schulze et al., 2003; Blanco-Mazagatos et al., 2010). Such dispersion is prevented by most European legislations, including Norway's and Switzerland's, through special inheritance rules for the farming sector. This aspect does, hence, not apply for family farms and, again, decreases the degrees of freedom for the analysis when focusing on the succession process.

Family businesses that are abandoned because the manager retires are in most sectors rather the exception than the rule (Bruce and Picard, 2006). In family farm systems, however, the retirement of the farm manager often causes farm abandonment whereas the number of bankruptcy cases in the farm sector is very low . In such cases of non-successions and subsequent farm abandonment, the land is sold or (mostly) rented to adjacent farms which usually become more profitable through this process of enlargement

Gersick et al. (1997) and Chua et al. (2003) argue that the relationship with non-family managers is an important concern for family businesses. However, it is a crucial characteristic of agricultural firms in countries like Norway and Switzerland that they are operated by family members. Relationships with non-family members thus seem to be of minor importance in the case of farms.

When comparing agricultural and non-agricultural successions, it appears that, in most regards, succession in the agricultural sector offers less variance than non-agricultural successions, as we usually deal with enterprises with a long history in which non-family members play no significant role in the management. The most significant variable is the question whether a succession within the family can take place or whether the farm has to be dissolved. A focus on the succession process seems to be a more promising starting point to explain farm development compared to the focus on the various aspects of succession that is predominant in the research on non-agricultural firms.

## 3. A theoretical model on succession and growth for family farms

As can be inferred from the remarks made in the previous section, the critical phase in the family farm life cycle is the time when the (older) farmer is looking to retire or is basically forced to do so by agricultural policy regulations. In Switzerland, no direct payments are granted for farmers after they reach the age of 65, while direct payments in Norway are reduced for farmers above the age of 70. This provides a clear-cut focus for modeling the effect of the succession

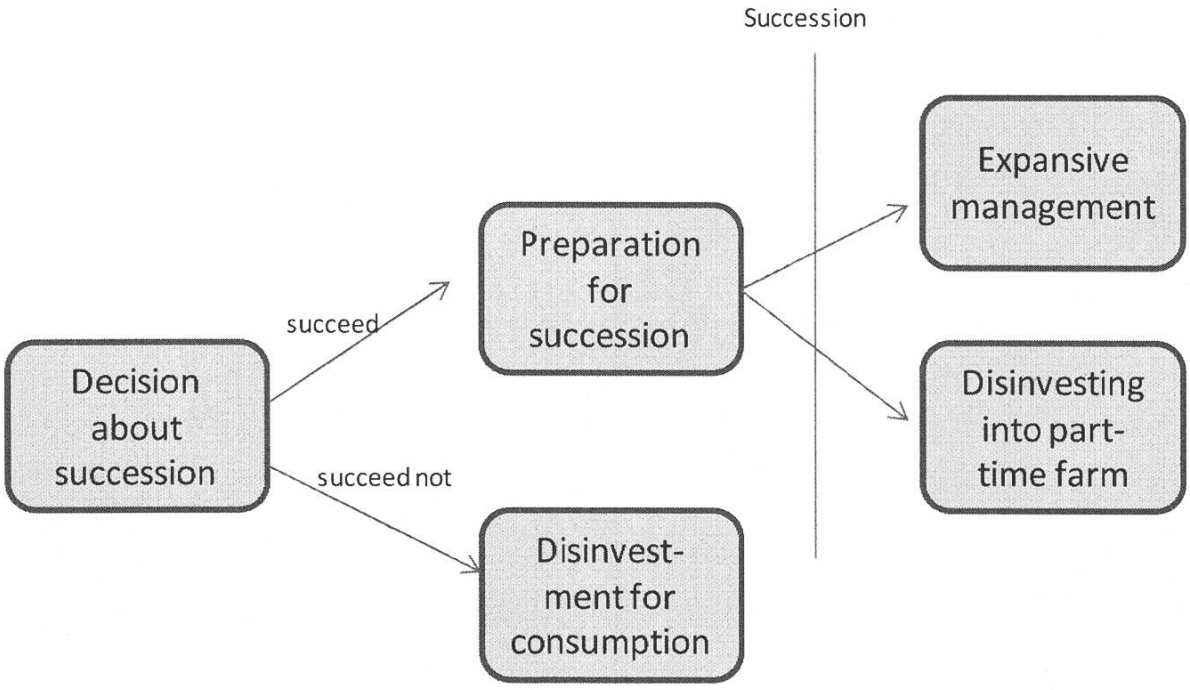
process theoretically on the point where the younger generation, if existing, has to decide whether to enter the farm business or not. It is important to remember that farm succession is not limited to the signature of a contract between parents and one of their children on a particular day, as farm succession is a process that evolves over a number of years (Kennedy, 1991; Keating and Little, 1997). An eventual decision in that respect is therefore the starting point of our model as depicted in Figure 1.

Davis and Tagiuri (1989; 53) talk about men in their early 30's to make their «lasting occupational choice», and agriculture provides no exception. The younger generation takes over the family farm at the age of around 30 years and keeps the management for 30 or 35 years. Extensive research (Kimhi, 1994; Errington, 1999; Dumas et al., 2005; Mann, 2007a) has shown how both economic and personal factors play a role in this choice. Based on the important observation made by Potter and Lobley (1996; 185) that «the succession status of the farm family household is particularly important in shaping the way businesses develop over time», we hypothesize a strong correlation between the decision about succession and patterns of economic farm development. Both the discussion about the possible alternatives among the generations and its outcome will shape farm management decisions. More than influencing profitability, such decisions will shape the size development of a farm and will strongly influence activities of investment or disinvestment.

Having a son is not the same as having a successor. The issue of succession in farming cannot be decided before being in a mature age, 10 or 20 years before retirement (Rossier and Wyss, 2007). Starting with cases where no successor is present or where the offspring has decided against taking over the farm, there is no rationale during the last years of the farm's existence to invest. To the contrary, the most reasonable strategy in such a case is a slow conversion from the farm assets to consumption goods. Among this group of farmers, it will be likely to observe delayed re-investments in farm buildings and machinery (if any) and land sales so as to increase the income flow from the vanishing farm assets. This enables a smooth transfer into the retirement phase.

The rational strategy will be entirely different in cases where a successor is present and generally interested to take over the farm as a full-time business. Only sufficiently large farms will provide a suitable occupation for the next generation (Stiglbauer and Weiss, 2000). That is particularly important in countries like Switzerland and Norway, where legal and natural conditions limit farm size, and where attractive alternative employment opportunities exist due to the countries' strong economic performance. As farm succession is often a matter of pride for the older generation (Mann, 2007b), the aging farmer will have a strong incentive to expand the farm during the latter years and increase farm size to an extent to enable succession in case a successor is available. Schmitt's (1996) finding that aging farmers tend to expand the assets of their farms will be due to a high number of samples with these preconditions.

*Figure 1: A model of the influence of succession on farm growth*




The phase is not over once the successor has taken over. The young farmer will make some effort to adjust the farm strategy to pursue his own personal needs. In many cases, this will translate into an increase of farm size to the point where it generates an adequate income. On the other hand, a lot of young farmers balance the risk of farming by taking up a off-farm part-time job (Gidarakou,

1990) or do not want to give up the off-farm occupation they had before succession (Moxness Jervell, 1999). In these cases, the need to adjust farm size runs into the opposite direction; disinvestments have to be carried out up to the point where the farm can be handled in spite of the off-farm employment.

If the above presumptions are translated into a life cycle model of the active farmer, three stages would be distinguished. The first stage covers the period immediately after succession characterized by a lot of strategic management decisions. They may vary between downscaling the farm from a full-time to a part-time business, and, perhaps more likely, significant investments in order to develop the farm towards an economically sustainable base of living. The second stage may be characterized by consolidating the adjustments made to the business at a rather steady pace, while the third stage may again see a requirement of major strategic management decisions in which the aging farmer eventually has to prepare for the farm's fate after his or her own retirement. This may imply disinvestment, if no successor is available, or this may imply developing the business towards an economic viable situation for the next generation.

On this basis, we suggest the following two hypotheses:

*(1) Growing farms are characterized by a u-shaped growth over the life cycle of the farm in cases of succession. The strongest growth will typically take place during the first and the last years of the farm manager's career.*

*(2) The situation is reversed for declining farms. Disinvestment activities will be highest at the beginning and the end of the farm manager's career.*

## 4. Data and method

The hypotheses stated above are applied to Switzerland and Norway. Each country accommodates around 50 000 farms with an average size of approximately 20 hectares and both are among the top ten countries in the world as far as GDP per head is concerned. The two countries were chosen as their farming sectors are strongly characterized by family farms: Contrary to most

other countries, family farms are almost the only institutional frame for farming in Norway and Switzerland and do not compete with other forms like corporate farming or self-sufficiency smallholdings. Within the family farms, non-family members usually do not play a role in the management of the farms, although they present a significant share of the total work force in agriculture with almost 20 per cent in Norway in 2006 (Statistics Norway 2012). Norwegian and Swiss farm size is well below the European average, so that many farms do not have a successor and there are only very few cases where more than one contender aim to take over the business. In spite of the many similarities between Norway and Switzerland, the two data sets were analyzed separately due to their different structure: As non-EU-countries, they have different bookkeeping systems and Norway provides different information as compared to the Swiss sample.

Farm data was extracted from the national accountancy databases that are standardized at the European level. They represent the most comprehensive database for information about the financial performance of farms. Data was selected for the years 2004 and 2009, as a five-year process seemed to be an appropriate time span for observing business development. The 2004 data set includes about 2,000 Swiss and 494 Norwegian farms taken on an annual basis that existed in the network in both years.

While obviously growth is the first deviation of size over time, the definition of size is rather ambiguous. In the management literature, it is common ground to use either value added (Mouritsen, 1998) or the number of working persons or employees as a proxy for size (Evans, 1987; Wagner, 1995; Kox et al., 2007). In the financial science literature, it is much more common to use equity (Duffee, 1995; Smith, 1996; Anderson et al., 2003) or total assets (Shepherd, 1972; Sharpe, 1994; Maury, 2006). Some other scholars use turnover to describe firm size (Zimmermann, 1983; Penning and Sleuwaegen, 2000; Lenz et al., 2003).

Taken all these possibilities together, it can be concluded that the size definition centers around resource endowment. This is similar to «a measure of the productive capacity», as a size definition suggested by Yee and Ahearn (2005; 2232), but the emphasis of resource equipment is less on productivity and more on

equipment. The dimension of size seems to be dedicated to describe the amount of resources an organizational unit possesses. This claim is fullest met if all resources are brought into one monetary dimension. In this case, having a look at the resources which the firm itself owns (equity) may be as helpful as a look at the resources including the borrowed ones (assets).

In many respects, farm size concepts are nothing but a – not so special – case of firm size. As for firm size, both turnover (Henneberry et al., 1991; Cisilino and Cesaro, 2009) and assets (Davidova et al., 2005) can be found as units used to describe farm size. The number of employees is rather unusual as a farm size indicator, particular for family farms, which is simply due to its little variability. More often than not, it is just the farming couple working at a family farm. Instead, the acreage of a farm is probably the most frequently used scale to describe size. This is another good example for using one important production factor in place for all others as a matter of convenience.

In this study, it is attempted to describe farm growth as independently as possible from profitability so that profitability can then be used to explain growth. Therefore, the focus will be on farms' equipment with factors as capital and land as well as on turnover.

Based on this discussion, the change in farmland (acreage), turnover (sales over one year), assets (the whole capital in the farm business) and equity (the capital owned by the farm manager) between 2004 and 2009 has therefore been used as indicators for farm development. The prices involved have been related to price indices that take into account the inflation rate.

Table 1 summarizes these dependent variables as well as the independent variables. The independent variables focus on farm manager's age as a proxy of the family life cycle, and two management strategies, i.e. specialization and intensity. A recent trend in studies of family farms is to characterize family farms by enriching range capability by traditional variables or typologies so as to give a better representation of the diversity and heterogeneity of developmental trajectories of family farms: the age of the principal decision-maker is found to be only one indicator of life cycle stage compared to a farm family age index

that, by way of an alternative, considers the age of all the family members working at the farm (Burton 2006); focusing on individual farms alone is found to be less helpful in explaining growth pathways than the integration of multi-family partnerships (Moreno-Pérez et al. 2011). However, the choice in this study of using the farm manager's age was made due to data availability, also as a quadratic term in order to allow for the verification of a u-shaped connection.

*Table 1: Descriptive statistics of variables for Switzerland and Norway* [1), 2)]

| Variable | Mean | Minimum | Maximum |
|---|---|---|---|
| Change in deflated turnover, 2004-2009 | 26013<br>440 | -251315<br>-1225 | 492136<br>4564 |
| Change in deflated equities, 2004-2009 | 70817<br>764 | -945159<br>-2557 | 1833045<br>139887 |
| Change in deflated assets, 2004-2009 | 91013<br>722 | -551696<br>1316 | 2275893<br>8820 |
| Change in worked land in ha, 2004-2009 | 0.71 | -38.35 | 34.91 |
| Agricultural Income 2004 | 69341<br>349 | -54297<br>-39 | 272432<br>1411 |
| Off-farm income 2004 | 19040<br>196 | -182385<br>0 | 195230<br>754 |
| Private consumption by farm household, 2004 | 65915<br>299 | 11408<br>41 | 174764<br>746 |
| Fertilizer Expenditure per hectare 2004 | 97.8<br>1002.82 | 0<br>0 | 1346<br>6295 |
| Pesticide expenditure per hectare 2004 | 100.66<br>273.3 | 0<br>0 | 3898.58<br>6085.70 |

| | | | |
|---|---|---|---|
| Herfindahl index | 0.385<br>0.508 | 0.149<br>0.157 | 1<br>1 |
| Farmer's age in years | 42.98<br>51.60 | 23<br>28 | 65<br>70 |
| Practical education (1-yes; 0-no) | 0.36<br>n.a. | 0<br>n.a. | 1<br>n.a. |
| Number of different crops, 2004 | 5.09<br>2.52 | 1<br>1 | 11<br>7 |
| Number of different animals, 2004 | 4.59<br>4.61 | 0<br>1 | 10<br>9 |

[1] *The numbers in the upper part of each cell are for Switzerland, while the numbers in the lower part are for Norway.*
[2] *Monetary values in CHF for Switzerland and 1.000 Nkr for Norway)*

In addition, explanatory variables have been used as control variables whose potential contribution to farm development had been identified by among others Escalante and Berry (2002). The intensity of production is clearly among them. While Zyl et al. (1996) showed small farms in Poland to be more labour-intensive than large farms, Mann (2005) found that growing farms in Switzerland were opting out of agri-environmental programmes, something which would imply a tendency towards intensification. The degree of intensity could only be operationalized for the farms' crop production. The amount of money per hectare spent on mineral fertilizer and pesticides respectively is used as a proxy for intensity, where a lot of resources being invested in fertilizer and pesticides indicate a high degree of intensity. Both initial intensity and its development over time are used to explain farm growth.

The aspects of specialization and diversification referred to may well contribute to growth-related management decisions (Villatora and Langemeier, 2005; Kimhi and Rekah, 2006). Typically, farms are diversified to some extent because they produce more than one output due to crop rotation practices or crop/livestock production systems. Specialization as well as diversification benefits exist at the same time. Diversification economies benefit from risk-reducing effects

and productivity improvements due to complementarities between outputs. Specialization benefits emerge from a reduction in complexity, technological advances, and less investment in equipment. Advances in technology as well as management style may also contribute to risk-reducing effects (Argiles and Slof 2003; Chavas 2008). Therefore, the processes and relationships that generate diversification or specialization gains are operationalized by three variables. The numbers of different crops and of different kinds of animal husbandry are traditional proxies for the degree of diversification, whilst the Herfindahl index (Hirschman, 1964), based on the share and of the number of different activities on the farm, is also being increasingly used to describe the degree of diversification (Mittenzwei et al. 2010). Again, these three variables are both used with their 2004 values and as a development over time.

Farm income, off-farm income and the money used for private consumption have been used (both as an absolute value and as a 2004-2009 trend) in order to include size, wealth and consumption effects. Some variables were only available for one country. A variable describing farmers' educational status was included for Switzerland, while for Norway a binary variable describing whether farm succession had taken place in 2003 or later as well as direct payments per ha of worked land were included. In Norway, most direct payments are not flat rate as their per unit amount decreases with the number of animals or ha of crops. We therefore expect direct payments to have a negative influence on farm growth.

The four definitions of farm growth (by turnover, equity, assets and worked land) were explained in the following three different ways, resulting in twelve regressions for each country.

- A logit analysis revealed the differences between growing farms and farms that remained constant in size or shrank and clarified the explanatory power of variables to predict whether a farm would be growing or not.
- In order to test the hypothesis introduced in the previous section, a (weighed) least squares regression was applied to both the growing and the shrinking group separately. This made it possible to detect different patterns in relation to growth and disinvestment, explaining the extent

of changes in the four growth variables among, for example, declining farms. Weights were applied in order to account for the fact that some farm types, sizes and regions were overrepresented in the FADN datasets, others underrepresented. However, weights were available for the Swiss farms only.

# 5. Results

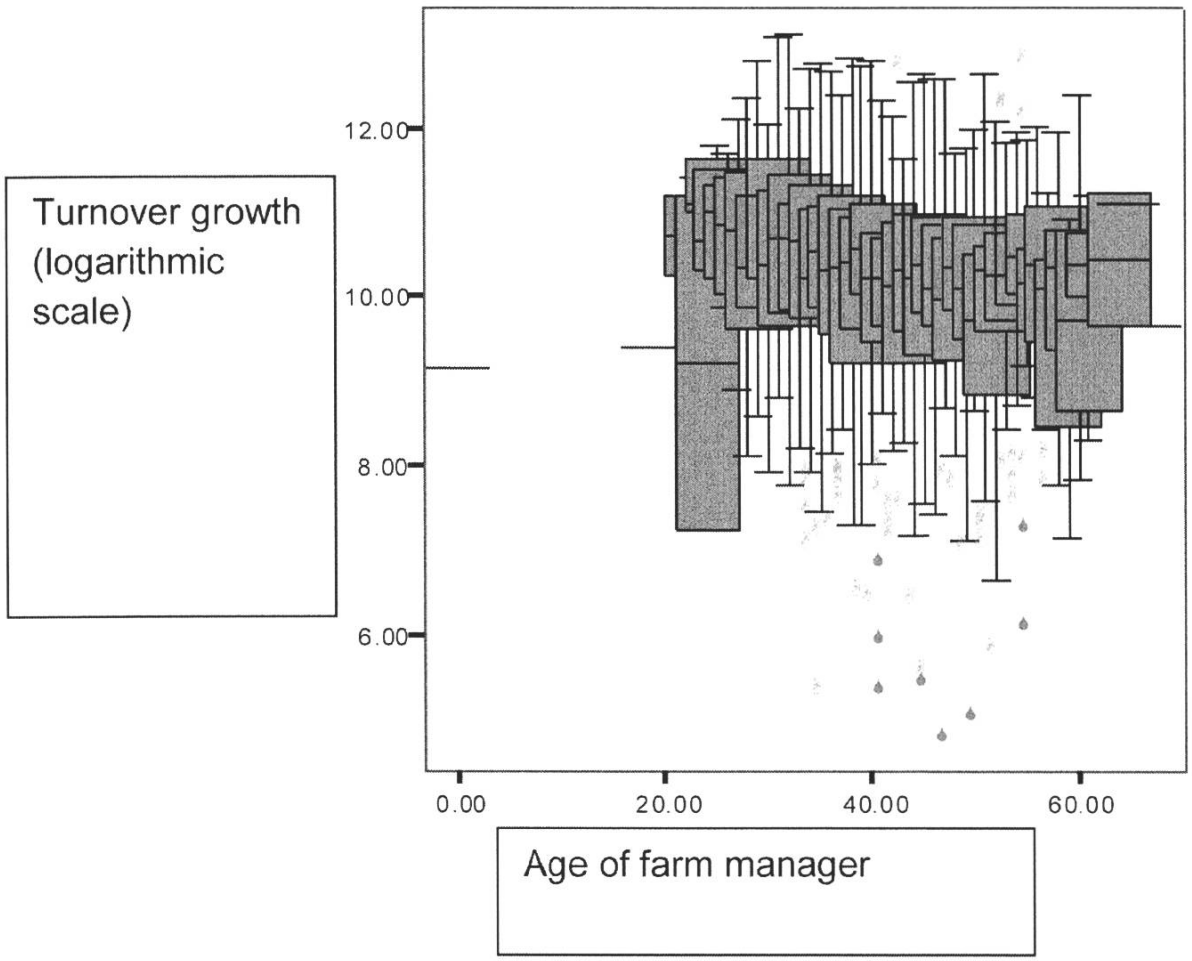
This section presents the results of the logit analyses. Due to the large number of regressions, the impact on the dependent variables is presented by grouping the independent variables into three categories: farm's life cycle, management strategies, and other factors.

## 5.1 Succession

The impact of the farmer's age is unambiguous and quite independent from the definition of business development in those analyses where growing farms and declining farms are separated. This result is more pronounced for Swiss farms than for Norwegian farms. When all farms are analyzed together by a logit analysis, the linear relation is superior to the quadratic term which never led to any significant result. What emerges is a clear trend among younger farmers, as compared to older farmers, to make their farm grow.

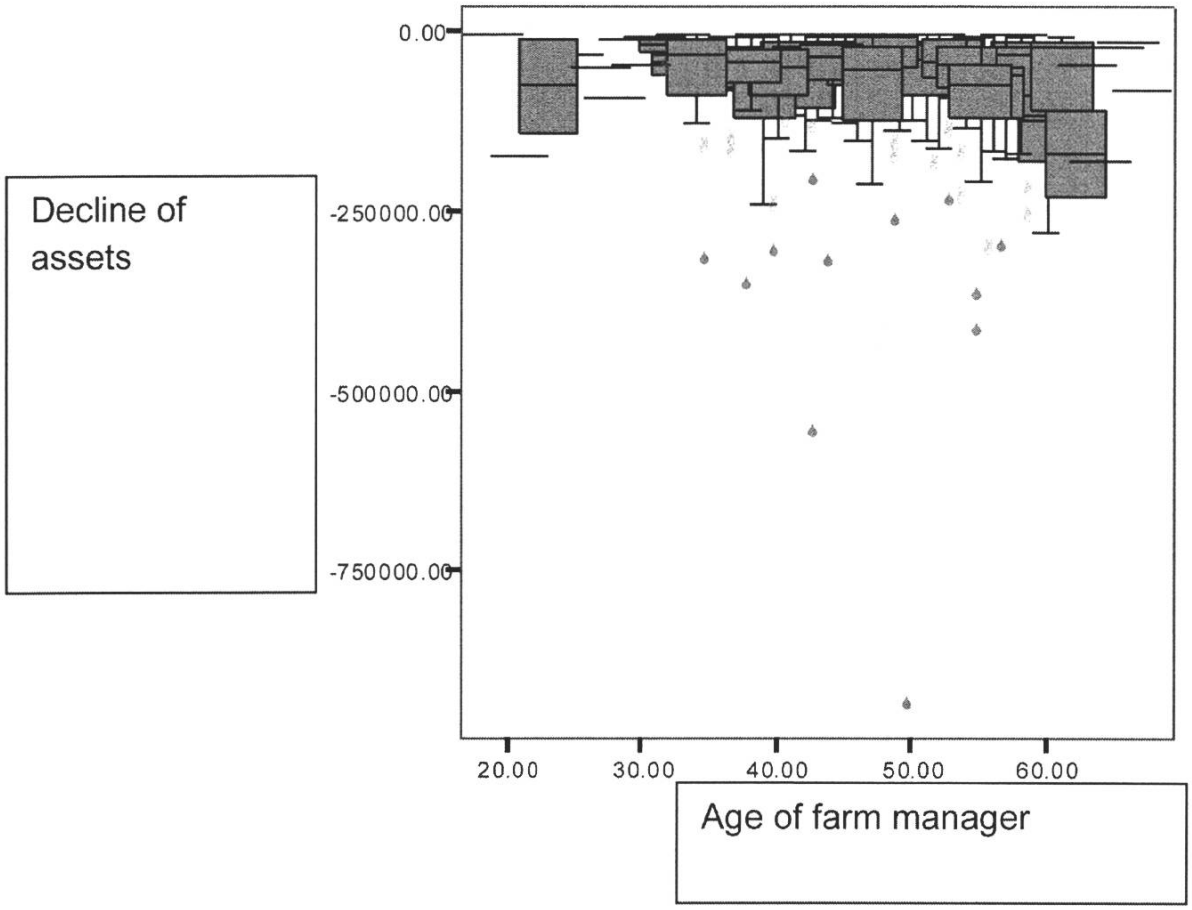
In most cases this linear connection is curtailed once observations are restricted to growing farms only, except in Switzerland for the (similarly negative) linear relationship between age and the amount of land growth, where younger farmers tend to rent or buy more land than older farmers. However, for land growth in Norway and for all financial measures in relation to growth in both countries, there is a u-shaped pattern where, both at the beginning and at the end of the period of activity of the farm manager, strong growth is pursued. In the middle of the farmer's career, growth is much more moderate. This is illustrated in Figure 2 in relation to turnover on Swiss farms. High growth rates are visible when the farm manager is between 20 and 30 years old, as well as above the age of 60 years.

*Figure 2: Increase in turnover on growing farms in Switzerland compared to farm manager's age (Hasselmann, 2011)*




For declining farms, the evidence seems to be mixed. Shrinking turnover seems not to be connected with age. For equity and land, the relationship is negative and linear. The older the farmer, the stronger will be his disinvestment. However, for equity in Switzerland there is a negative u-shaped relationship as well. Disinvestment is strong during the first and during the last years of the farm manager's period of activity, as shown in Figure 3, where the decline of assets is clearly strongest after the farm manager's 60th birthday. This partly confirms the hypothesis developed in Section 3.

*Figure 3: Decrease in assets of shrinking farms in Switzerland compared to farm manager's age (Hasselmann, 2011)*




## 5.2 Management strategies

The impact of diversification on growth is less clear-cut and largely confirms the contradictory view from different scholars as cited above. Changes in the mix of animal husbandry seem to offer a better explanation for growth than a change in the crop production mix. Diversification, as measured by the Herfindahl Index, also goes some way towards offering an explanation for some dependent variables. On the one hand, in Switzerland a large number of different animals makes it rather unlikely that farms will expand their land and increase their equity. On the other hand, a large number of different crops, together with diversification in general, promotes growth where Norwegian farms are concerned. Among the growing farms, diversified farms demonstrate stronger growth, particularly in Norway, while specialized farms shrink faster in terms of

monetary units than diversified enterprises where shrinkage is identified. Whereas there is no doubt that diversification reduces risk, the fact that it speeds up expansion and buffers contraction of farm enterprises represents a new finding. It would seem that diversification enables simultaneous investment in several areas and this accelerates capital accumulation.

Where the dynamic variables are concerned, the evidence is somewhat clearer than for the static ones, although similar stories evolve. The processes of diversification and growth often seem to go hand in hand. However, among the growing farms, the processes differ between the two countries. In Switzerland, specializing farms grow more quickly, while the Norwegian farms that exhibit the fastest growth are those that increase their number of crops and animals. Similar differences between the countries can be found for the group of shrinking farms, although Norwegians seem to fare better with diversification, Swiss farmers with specialization.

Farms featuring intensive crop production are more likely to grow than farms with extensive land management. Among the growing farms, a high pesticide input in Norway will increase turnover growth – this is an almost obvious result, since a higher intensity does tend to stimulate turnover rather than profit. On the other hand, high pesticide inputs will be inclined to slow down the accumulation of assets on Swiss farms.

In Switzerland, intensive crop production seems to be a strategy for shrinking farms which accelerates their decline. Intensity, for these farms, has no significant effect on the hectarage which is sold or ceases to be rented out, but it has a clear effect on all financial size indicators. This result could not be sustained for Norwegian farms.

Whether farmers are in a process of intensification (or extensification) apparently has no clear cut impact for growth or contraction of their enterprises. The modicum of evidence which was found is different between Norway and Switzerland.

## 5.3 Other factors

While Gilbrat's Law (the notion that the growth of an enterprise is independent of its size) has been falsified several times before, this study focuses instead on the financial side of this claim and identifies strong influences. Farms with a larger income are more likely to grow and to give rise to stronger growth, except that a high off-farm income would appear to be a disincentive for increasing agricultural turnover. If total labour is limited, than a growth in turnover will require less off-farm work. For Norway, the latter observation also applies to the extent of growth among growing farms. Interestingly, a high farm income seems to have, at first glance, a paradoxical effect as far as shrinking farms are concerned, increasing the contraction of the business. This indicates that income level mainly serves as a size indicator and larger enterprises have a broader base from which they can shrink.

Whereas private consumption displays a significant negative trend, this indicates that modest consumption is a condition that is good for farm growth. This observation, however, almost pales into insignificance when it comes to financial size measures such as equity. It is noteworthy that, on the other hand, growing farms with a high consumption level do well in relation to both asset and land accumulation. In this respect, the correlation seems to differentiate between generous spenders and nickel nursers.

The impact of education might have been expected to be greater. Farmers who have completed a course of training in farming are not significantly more likely to head up growing farms than farmers who have not. However, better-educated farmers do generate higher growth rates as well as higher rates of contraction.

The impact of degressive direct payments in Norway has a small negative impact on farm growth, especially if growth in relation to land is considered. This result follows directly from the degressivity of the direct payments. The seemingly low effect of direct payments on farm growth may indicate that the payments are not targeted towards farms that grow or farms that shrink. More generally, it raises the interesting question to which extent agricultural policies at all are able to affect structural change.

*Table 2: Logit results for all farms* [1), 2)]

| | **Change in deflated turnover, 2004-2009** | **Change in deflated equities, 2004-2009** | **Change in deflated assets, 2004-2009** | **Change in worked land in ha, 2004-2009** |
|---|---|---|---|---|
| N | 2000<br>483 | 2000<br>494 | 2000<br>483 | 2000<br>494 |
| Pseudo-R2 | 0.0402<br>0.4546 | 0.0659<br>0.1095 | 0.0356<br>0.1159 | 0.0214<br>0.2088 |
| Cons | 2.44*** (5.53)<br>-0.16 (-0.07) | 2.81*** (6.34)<br>1.32 (0.84) | **1.68*** (4.26)**<br>**4.96 *** (3.20)** | 0.394 (1.25)<br>0.83 (0.73) |
| Agricultural Income 2004 | $9.50*10^{-6}$ (0.53)<br>2.25 (1.53) | **0.000018***(8.22)**<br>**2.38 ** (2.54)** | 0.0000112*** (6.21)<br>0.36 (0.47) | $1.20*10^{-6}$ (0.74)<br>1.17 * (1.82) |
| Off-farm income 2004 | $-6.91*10^{-6}$ *** (-2.50)<br>1.84 (1.18) | **0.0000141*** (4.51)**<br>**6.44 *** (4.83)** | **$8.78*10^{-6}$ *** (3.22)**<br>**2.77 ** (2.49)** | $4.71*10^{-6}$ *(1.83)<br>1.11 (1.32) |
| Private consumption by farm household, 2004 | $-4.84*10^{-6}$ *(-1.79)<br>-1.19 (-0.58) | **-0.0000218*** (-7.44)**<br>**-5.28 *** (-3.66)** | -0.0000164*** (-6.29)<br>-1.40 (-0.99) | $1.46*10^{-6}$ (0.49)<br>-1 .02 (-0.96) |
| Fertilizer Expenditure per hectare 2004 | 0.00164** (2.47)<br>-0.04 (-0.85) | -0.0000796 (-0.15)<br>0.02 (0.71) | -0.02 (-0.96) | 0.00157*** (2.86)<br>-0.01 (-0.24) |
| Pesticide expenditure per hectare 2004 | -0.000156 (-0.43)<br>0.02 (0.21) | -0.00 (-0.10) | 0.000590* (1.90)<br>-0.01 (-0.25) | -0.000207 (-0.64)<br>-0.05 **(-1.98) |
| Herfindahl index | 0.445 (1.00)<br>0.94 (0.69) | -0.543 (-1.27)<br>0.07 (0.07) | -0.262 (-0.68)<br>-1.56 * (-1.68) | <br>-1.67 ** (-2.20) |
| Number of different crops, 2004 | -0.0163 (-0.67)<br>0.27 (0.87) | -0.00990 (-0.40)<br>0.01 (0.04) | -0.00561 (-0.25)<br>-0.26 (-1.41) | <br>0.25 * (1.77) |
| Number of different animals, 2004 | 0.00846 (0.30)<br>0.35 ** (2.36) | -0.0507* (1.78)<br>-0.01 (-0.14) | -0.0345 (-1.34)<br>0.13 (1.40) | -0.0547** (-2.14)<br>0.02 (0.30) |
| Farmer's age in years, 2004 | -0.0317*** (-4.89)<br>-0.02 (-0.81) | -0.402*** (-6.03)<br>-0.01 (-0.35) | -0.0242 (-4.09)<br>-0.03 * (-1.86) | -0.0202*** (-3.46)<br>-0.01 (-1.00) |
| Practical education | 0.158 (1.40) | -0.0956 (-0.84) | 0.0918 (0.90) | |
| Direct Payments per ha, 2004 | 0.01 (1.21) | 0.00 (0.99) | 0.00 (-1.18) | 0.01 *** (5.05) |
| Farmtransfer between 2004 and 2009 | omitted | -1.49 * (-1.9) | Omitted | 0.14 (0.18) |
| D_Agricultural Income, 2004-2009 | <br>10.15 *** (5.19) | $2.85*10^{-6}$ (1.61)<br>0.75 (1.05) | $1.75*10^{-6}$ (1.14)<br>0.99 (1.43) | $1.67*10^{-6}$ (1.08)<br>1.57 *** (2.74) |

| | | | | |
|---|---|---|---|---|
| D_Off-farm Income, 2004-2009 | -0.0000114 *** (-3.89)<br>-0.13 (0.10) | $4.90*10^{-6}$ *(1.66)<br>-1.35 (-1.42) | -1.69 * (-1.82) | $2.71*10^{-6}$ (1.02)<br>-1.21 * (-1.80) |
| D_Private Consumption, 2004-2009 | $-7.14*10^{-7}$ (-0.27)<br>-0.19 (-0.13) | $-4.49*10^{-7}$ (-0.16)<br>-0.93 (-1.09) | $-5.92*10^{-7}$ (-0.24)<br>0.05 (0.05) | $-3.89*10^{-6}$ *(-1.57)<br>-0.24 (-0.38) |
| D_Fertilizer Expenditures per ha, 2004-2009 | $9.37*10^{-6}$ (0.43)<br>0.05 * (1.64) | 0.0000189 (0.84)<br>0.06 *** (2.76) | 0.0000189 (0.95)<br>0.02 (0.82) | 0.0000267 (1.31)<br>-0.03 * (-1.81) |
| D_Pesticide Expenditures, 2004-2009 | 0.0000603 (1.44)<br>0.06 (0.67) | -0.0000173 (-0.42)<br>-0.05 * (-1.82) | 0.0000136 (-0.37)<br>-0.01 (-0.44) | **0.0000868** (2.34)**<br>**-0.07 ** (-2.07)** |
| D_Herfindahl-Index, 2004-2009 | -2.05*** (-4.02)<br>-1.67 (-1.08) | -0.413 (-0.83)<br>0.22 (0.20) | -0.182 (-0.40)<br>-0.07 (-0.07) | 0.431 (0.98)<br>-2.04 ** (-2.37) |
| D_Number of different crops, 2004-2009 | 0.38 (1.16) | 0.02 (0.07) | 0.0125 (0.28)<br>-0.33 (-1.41) | 0.0215 (0.49)<br>0.48 ** (2.52) |
| D_Number of Different Animals, 2004-2009 | **0.0963** (2.03)**<br>**0.52 ** (2.54)** | -0.0467 (0.95)<br>-0.04 (-0.24) | 0.43 *** (2.92) | -0.102** (-2.32)<br>0.05 (0.36) |
| D_Direct Payments, 2004-2009 | 0.01 (1.37) | -0.00 (-0.05) | -0.00 (-1.27) | -0.03 *** (-6.39) |

*[1] The numbers in the upper part of each cell are for Switzerland, while the numbers in the lower part are for Norway.*
*[2] Coefficients that are statistically significant in both countries are in bold.*
****: 99 % conf.int. (p < 0.01), **: 95 % conf.int. (p < .05), *: 90 % conf.int. (p< .1); t-value in parentheses*

*Table 3: Regression results for growing farms* [1), 2)]

| | **Change in deflated turnover, 2004-2009** | **Change in deflated equities, 2004-2009** | **Change in deflated assets, 2004-2009** | **Change in worked land in ha, 2004-2009** |
|---|---|---|---|---|
| N | 1395<br>449 | 1101<br>428 | 900<br>424 | 851<br>354 |
| $R^2$ | 0.2096<br>0.1920 | 0.1491<br>0.1376 | 0.1416<br>0.1246 | 0.0402<br>0-3115 |
| Cons | 40609 (1.34)<br>1.69 ** (2.13) | **353662*** (4.75)**<br>**7.118781 *** (4.33)** | **1032329*** (5.49)**<br>**5.71 *** (3.14)** | **3.90*** (4.35)**<br>**67.11 *** (5.00)** |
| Agricultural Income 2004 | 0.331*** (6.35)<br>omitted | 1.25*** (10.03)<br>omitted | 1.08*** (3.78)<br>omitted | -6.81*10-6 *(-1.83)<br>Omitted |
| Off-farm income 2004 | 0.0296 (0.35)<br>-0.5 *** (-2.8) | 0.754*** (3.61)<br>0.41 (1.20) | 0.413 (0.97)<br>-0.42 (-1.04) | -9.77*10-6 *(-1.74)<br>-0.81 (-0.27) |
| Private consumption by farm household, 2004 | 0.100 (1.25)<br>0.39 * (1.74) | **-0.647*** (-3.37)**<br>**-0.91 ** (-2.04)** | 1.14*** (2.68)<br>0.84 (1.63) | 0.0000145*** (2.60)<br>0.71 (0.19) |
| Fertilizer Expenditure per hectare 2004 | 79.6*** (4.62)<br>0.01 (1.26)- | -13.52 (-0.32)<br>-0.02 ** (-2.27) | 0.01 (0.53) | -0.00036 (-0.32)<br>-0.03 (-0.33) |
| Pesticide expenditure per hectare 2004 | 3.26 (0.36)<br>0.02 *** (4.06) | 14.59 (0.63)<br>0.01 (0.62) | -46.4* (-1.92)<br>0.02 (1.46) | -0.00022 (-0.60<br>0.01 (0.17) |
| Herfindahl index | 85792*** (6.26)<br>-0.18 (-1.03)- | 32277 (0.98)<br>-0.43 (-1.31) | 214087*** (3.00)<br>-0.15 (-0.38) | -0.630 (-0.68)<br>-6.15 ** (-2.14) |
| Number of different crops, 2004 | 1665* (1.83)<br>0.03 (1.04)- | 4691** (2.08)<br>0.11 * (1.74) | 12162** (2.54)<br>0.06 (0.82) | 0.0653 (0.97)<br>0.82 (1.58) |
| Number of different animals, 2004 | **1878** (2.01)**<br>**0.04 ** (2.27)** | -235 (-0.11)<br>-0 (-0.09) | **17486*** (3.84)**<br>**0.08 ** (2.08)** | 0.0152 (0.26)<br>0.44 (1.64) |
| Farmer's age in years, 2004 | -3098** (-2.29)<br>--0.04 (-1.26) | **-13512*** (-4.07)**<br>**-0.21 *** (-3.37)** | **-52723*** (-6.23)**<br>**-0.18 ** (-2.06)** | **-0.0687*** (-5.30)**<br>**-2.29 *** (-4.34)** |
| Farmer's age in years - squared, 2004 | 25.7* (1.65)<br>-0.02 (0.79) | **131*** (3.44)**<br>**0.19 *** (3.11)** | **546*** (5.70)**<br>**0.16 ** (2.25)** | 2.12 *** (4.12) |
| Practical education | 3764 (1.18) | 23143*** (3.00) | 49932*** (2.72) | -0.167 (-0.70) |
| Direct Payments per ha, 2004 | -0.00 ** (-2.22) | -0.00 (-1.31) | -0.00 (-1.45) | 0.01 * (1.68) |
| Farmtransfer between 2004 and 2009 | -0.06 (-0.37) | -0.30 (-0.84) | -0.46 (-1.29) | -0.11 (-0.04) |
| D_Agricultural Income, 2004-2009 | omitted | 0.288** (2.49)<br>omitted | -0.0402 (-0.14)<br>omitted | -1.10*10-6 (-0.30)<br>omitted |

| | | | | |
|---|---|---|---|---|
| D_Off-farm Income, 2004-2009 | -0.117 (-1.39)<br>-0.12 (-0.73) | 0.231 (1.05)<br>0.97 *** (3.23) | 1.17** (2.37)<br>0.15 (0.43) | -5.32*10-6 (-0.83)<br>2.28 (0.89) |
| D_Pesticide Expenditures, 2004-2009 | 0.312*** (4.24)<br>-0.01 (0.04) | 0.105 (0.57)<br>0.08 (0.30) | 1.44*** (3.40)<br>0.03 (0.11) | 2.19*10-6 (0.40))<br>-2.05 (-0.92) |
| D_Fertilizer Expenditures per ha, 2004-2009 | 0.531 (0.92)<br>0.00 (-1.00) | 2.14 (1.50)<br>0 (-0.03) | 1.22 (0.34)<br>-0.01 * (-1.89) | -0.0000388 (-0.84)<br>-0.12 ** (-2.20) |
| D_Private Consumption, 2004-2009 | 0.01 * (1.91) | -3.47 (-1.31)<br>0.00 (0.38) | -5.82 (-0.91)<br>-0.01 (-0.69) | -0.000271*** (3.26)<br>-0.04 (-0.37) |
| D_Herfindahl-Index, 2004-2009 | 162006*** (9.73)<br>0.30 (1.49) | 66446* (1.90)<br>0.04 (0.10) | 203993*** (2.95)<br>0.70 (1.49) | -0.923 (-1.02)<br>-7.69 ** (-2.28) |
| D_Number of different crops, 2004-2009 | 777 (0.59)<br>0.07 (1.61) | 4701 (1.49)<br>0.18 ** (2.15) | 7992 (1.04)<br>0.15 (1.48) | 0.0505 (0.51)<br>2.13 *** (2.91) |
| D_Number of Different Animals, 2004-2009 | -613 (-0.43)<br>0.07 ** (2.27) | -5142 (-1.51)<br>0.10 * (1.86) | -16396** (-2.15)<br>0.10 (1.36) | 1.30 ** (2.51) |
| D_Direct Payments, 2004-2009 | 0.00 (0.98) | -0.00 (-0.19) | -0.00 (-0.41) | -0.08 *** (-6.35) |

*1) The numbers in the upper part of each cell are for Switzerland, while the numbers in the lower part are for Norway.*
*2) Coefficients that are statistically significant in both countries are in bold.*
****: 99 % conf.int. (p < 0.01), **: 95 % conf.int. (p < .05), *: 90 % conf.int. (p< .1); t-value in parentheses*

*Table 4: Regression results for shrinking farms* [1), 2)]

| | **Change in deflated turnover, 2004-2009** | **Change in deflated equities, 2004-2009** | **Change in deflated assets, 2004-2009** | **Change in worked land in ha, 2004-2009** |
|---|---|---|---|---|
| N | 606<br>45 | 552<br>66 | 581<br>70 | 682<br>219 |
| $R^2$ | 0.1046<br>0.8880 | 0.1371<br>0.5207 | 0.0953<br>0.3688 | 0.0560<br>0.1934 |
| Cons | 3616 (0.29)<br>-1.28 (-1.01) | -165162** (-2.11)<br>0.21 (0.13) | 7361 (0.41)<br>0.64 (0.49) | 1.621* (2.04)<br>-6.11 (-0.77) |
| Agricultural Income 2004 | **-0.0852* (-1.67)**<br>**-0.52 ** (-2.82)** | **-0.418*** (-3.94)**<br>**-1.04 *** (-3.26)** | **-0.230*** (-2.85)**<br>**-0.56 *** (-2.93)** | 1.72*10-6 (0.45)<br>-1.35 (-1.06) |
| Off-farm income 2004 | 0.163** (2.22)<br>0.11 (0.64) | -0.173 (-1.23)<br>-0.64 (-1.33) | -0.187 (-1.58)<br>-0.24 (-0.91) | **7.78*10-6 (1.39)**<br>**-3.10 * (-1.85)** |
| Private consumption by farm household, 2004 | -0.250*** (-3.30)<br>-0.32 (-1.37) | -0.399** (-2.56)<br>0.30 (0.54) | -0.261** (-2.26)<br>-0.02 (-0.06) | 8.27*10-6 (1.52)<br>2.46 (1.04) |
| Fertilizer Expenditure per hectare 2004 | -16.42 (-0.74)<br>0.00 (0.01) | 0.01 (0.64) | -0.00 (-0.05) | 0.0018* (1.84)<br>0.05 (0.95) |
| Pesticide expenditure per hectare 2004 | -28.79* (-1.92)<br>0.02 (1.28) | -45.0** (-2.35)<br>0.00 (0.09) | -35.5 ** (-2.15)<br>0.00 (0.63) | 0.01 (0.24) |
| Herfindahl index | -21422* (-1.65)<br>-0.20 (-1.37) | -5317 (-0.23)<br>-0.06 (-0.16) | -47717*** (-2.69)<br>0.02 (0.07) | -0.561 (-0.66)<br>0.62 (0.43) |
| Number of different crops, 2004 | -625 (-0.88)<br>-0.03 (-0.77) | 1038 (0.72)<br>-0.06 (-0.67) | 95.5 (0.10)<br>0.05 (1.16) | -0.002 (-0.06)<br>-0.38 (-1.22) |
| Number of different animals, 2004 | -688 (-0.88)<br>-0.01 (-0.40) | 982 (0.60)<br>0.00 (0.02) | -585 (-0.58)<br>0.02 (0.98) | -0.087* (-1.83)<br>-0.15 (-1.05) |
| Farmer's age in years, 2004 | 200 (1.08)<br>0.06 (1.26) | 8127** (2.35)<br>-0.02 (-0.31) | -495* (-1.87)<br>-0.03 (-0.55) | -0.041*** (-3.26)<br>0.15 (0.50) |
| Farmer's age in years - squared, 2004 | -0.05 (-1.24) | -101*** (-2.70)<br>0.02 (0.45) | 0.02 (0.55) | -0.10 (-0.36) |
| Practical education | -2756 (-0.83) | -2801 (-0.42) | -12451*** (-2.67) | 0.327 (1.49) |
| Direct Payments per ha, 2004 | 0.00 (0.48) | 0.00 (1.25) | 0.00 (0.15) | 0.01 ** (1.99) |
| Farmtransfer between 2004 | omitted | 0.02 (0.06) | omitted | 1.74 (0.92) |
| D_Agricultural Income, 2004-2009 | 0.060 (1.16)<br>0.23 (1.01) | -0.395 (0.41)<br>0.39 (1.10) | 0.019 (0.27)<br>0.01 (0.06) | 3.15*10-6 (0.96)<br>0.6 (0.6) |

| | | | | |
|---|---|---|---|---|
| D_Off-farm Income, 2004-2009 | -0.0124 (-0.13)<br>-0.23 (-1.7) | 0.174 (1.26)<br>-1.13 ** (-2.67) | 0.381*** (3.49)<br>-0.35 (-1.49) | -7.72*10-7 (-0.15)<br>-1.7 (-1.09) |
| D_Pesticide Expenditures, 2004-2009 | 0.0351 (0.41)<br>-0.24 (-1.13) | -0.185 (-1.17)<br>0.77 ** (2.17) | -0.0586 (-0.51)<br>-0.07 (-0.30) | -0.000013** (-2.45)<br>1.58 (1.13) |
| D_Fertilizer Expenditures per ha, 2004-2009 | -1.85* (-2.36)<br>-0.00 (-0.14) | 1.27 (0.96)<br>0.01 (1.01) | 1.14 (1.20)<br>-0.00 (-0.66) | 0.000016 (0.35)<br>0.01 (0.51) |
| D_Private Consumption, 2004-2009 | 0.03 *** (3.05) | -1.03 (-0.42)<br>-0.01 (-0.82) | -0.472 (-0.26)<br>0.00 (0.10) | **0.00020** (2.27)**<br>**-0.11 *** (-2.99)** |
| D_Herfindahl-Index, 2004-2009 | -10647 (-0.90)<br>0.43 ** (2.69) | 751.7 (0.03)<br>0.27 (0.71) | -3810 (-0.17)<br>-0.13 (-0.61) | 0.595 (0.55)<br>2.46 (1.48) |
| D_Number of different crops, 2004-2009 | 629 (0.48)<br>0.00 (0.13) | -5015 (-1.64)<br>0.06 (0.51) | -4707** (-2.37)<br>0.03 (0.51) | 0.055 (0.58)<br>-0.04 (-0.1) |
| D_Number of Different Animals, 2004-2009 | -1228 (-0.88)<br>0.03 (1.56) | 1456 (0.53)<br>-0.02 (-0.26) | 1264 (0.61)<br>0.01 (0.46) | -0.030 (-0.31)<br>0.64 *** (2.65) |
| D_Direct Payments, 2004-2009 | 0.00 (1.39) | -0.00 * (-1.78) | -0.00 (-0.08) | -0.00 (1.52) |

*[1] The numbers in the upper part of each cell are for Switzerland, while the numbers in the lower part are for Norway.*
*[2] Coefficients that are statistically significant in both countries are in bold.*
****: 99 % conf.int. (p < 0.01), **: 95 % conf.int. (p < .05), *: 90 % conf.int. (p< .1); t-value in parentheses*

## 5.4 Relationship between growth indicators

Farms that achieve economic growth in relation to turnover, equity and assets do not necessarily increase their farmed land. As Table 5 indicates, among the 494 Norwegian farms that displayed increased turnover, almost one-third (or 149) continued to farm their land on an area constant basis or reduced it. A similar principle is true for the relationship between farmed land on the one hand and equity and assets on the other. However, farms that increase their amount of farmed land are the ones that also enjoy economic growth most often. Still, almost 15 percent of those farms that increased their farmed land saw a decrease in equity. This indicates that the increase in the amount of land farmed first of all comes with a cost that needs to be offset in order to yield economic growth.

*Table 5. Relationship between growth indicators for Norwegian farms*

| | | Farms that enjoy growth in ..., | | | |
|---|---|---|---|---|---|
| | | Turnover | Equity | Assets | Land |
| ... also observe (increase / decrease) in.... | Turnover | 494/0 | 388/40 | 394/30 | 330/24 |
| | Equity | 388/45 | 428/0 | 376/48 | 306/48 |
| | Assets | 394/55 | 376/52 | 424/0 | 310/44 |
| | Land | 330/149 | 306/122 | 310/114 | 354/0 |

As a result, caution is called for when it comes to using increase in farmed land as a proxy for (economic) farm growth. The example of Norwegian farms indicates that economic growth, and even turnover from traditional agriculture, may be achieved with shrinking agricultural area.

## 6. Discussion and Conclusions

Based on case studies of about 2,500 family farms in Switzerland and Norway, many presumptions based on the theoretical model developed above could be confirmed. In addition, some insights have been gained which had not been expected.

A first important finding is that growth is most likely to occur among young farmers. The rather linear negative relationship between the likeliness to grow and the farmer's age indicates that young farmers bring new dynamics into the development of their farm and are eager to expand their business. Another rather powerful predictor for growth is the level of off-farm income. These observations, however, are still largely independent from the question of succession. However, they show that a more dynamic agriculture can be expected if one keeps political tools supporting farm succession, such as an age limit for direct payments.

Nevertheless, the shape of the succession process within the family farm life cycle has been shown to be a powerful predictor for the level of farm growth or disinvestments. During the single stages of the succession process, the behavior of farm families changes remarkably. The quadratic age variable as well as descriptive statistics show that growth activities are mostly extended both at the beginning and at the end of a farmer's career and the same applies to the contraction of a business. This confirms the vast importance of the succession process for an understanding of growth processes for family businesses in the agricultural sector and also the relevance of the model as depicted in Figure 1. Around the inter-generational succession itself, many stages influence the development of the farm enterprise. The process is probably started as soon as it becomes clear whether there is a potential successor who would be willing to take over the farm. The u-shaped growth curves over age for both growing and (regarding equity) shrinking farms and (in the case of growth) for both countries indicate that each stage creates own preconditions for both investments and disinvestments. For farms in which a successor is available, the time around succession is often a time of massive investments. In contrast, it is a rational and popular strategy for farms without a successor to start selling the assets of the farm well before official retirement. Once more, the results show that there can be no «one size fits all» guidelines of how the assets of a farm should be managed, because the social context of the single farm matters strongly.

In general, the focus on the inter-generational family life cycle has proven to be a fruitful perspective to explain farm growth. Still, age is only one of many explanatory variables for growth processes and is set in the context of managerial factors likewise influencing the extent of growth or contraction. The intensity, the degree of diversification and the level of private consumption by the farm family are all among them and show that economic and social processes run parallel and influence each other. The interdependencies between the succession process and managerial variables have not been explored within this setting and await future research.

The study indicates that, in general, the significance of the logit analyses could be enhanced by separating farms that grow from farms that decline. Future research may indicate whether stagnant farms represent a third group with its own patterns which may be worth analyzing separately.

Although the study has identified several specificities of the agricultural sector compared to non-agricultural industries, it may be worthwhile to apply that approach on other industries as well. A decent study of family firms across industry sectors could potentially shed light on to the issue whether the peculiarities of the agricultural sector are significant for family businesses being engaged in the service sector or in manufacturing. Such a study could act as a starting point of more general research on the potential impact of the specific characteristics of industry sectors with regard to the economic performance of family businesses.

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