Project acronym: SURE-Farm
Project no.: 727520

Start date of project: June 2017
Duration: 4 years

D2.2 Report on analysis of biographical narratives exploring short- and long-term adaptive behaviour of farmers under various challenges

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Due date	31/03/2019
Version/Date	Final Version 5/4/19
Work Package	WP 2
Task	T. 2.2
Task lead	ABER
Dissemination level	Public

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Executive Summary

The Horizon 2020 project Towards Sustainable and Resilient EU Farming Systems (SURE-Farm) defines resilience as maintaining the essential functions of EU farming systems in the face of increasingly complex and volatile economic, social, ecological and institutional risks: Meuwissen (2018) suggests that resilience over time is achieved across the increasingly fundamental attributes of robustness, adaptability and transformability, representing system responses to short, medium and long-term external drivers, respectively. Maxwell (1986) also recognised that external drivers vary significantly in time and space and distinguished four different types of perturbations: noise, shocks, cycles and trends. Analysis of narratives (Rosenthal, 2004; Riessmann, 2008) can be used to enable researchers to gain in-depth understanding of the rationale surrounding farmer decision making when faced with drivers of change (e.g. MacDonald et al., 2014), and how farmers manage critical decision points in their farming businesses. This understanding is crucial for developing the tools and policy measures needed to support the sustainability and resilience of European agriculture.

We have used personal histories of family farms, and business histories of corporate farms, to identify phases in the separate production, demographic and policy adaptive cycles (and consequences of interactions between them) as they have impacted on the individuals concerned and their business enterprises. Biographical stories were collected from nine to ten narrators (early-, mid- and late-career), in each of five case studies chosen to represent a range of regions and farming systems in Europe. These included large scale family and corporate arable farms in Northeast Bulgaria (BG) and the East of England (UK); dairy farms in Flanders (BE); small-scale perennial crop (hazelnut) farms in central Italy (IT) and high value egg and broiler systems in Southern Sweden (SE). A single question was used to initiate the narrators' stories, without qualification beforehand, supported only with expressions of interest and encouragement in the first part of the interview, with subsequent exploratory questions devoted to clarifying the internal structure of the narrative. Narratives were transcribed and analysed to identify the drivers and responses to critical decision-making points in the stories. Comparisons across the five regional farming system cases have also been made to generate wider insights into how the narrators responded to different challenges.

The drivers leading up to critical decision points in the narratives were grouped according to themes which followed a spectrum ranging from internal (those arising from within the farm system), to external (those acting on the farm system). Internal drivers included health, relationships, intergenerational change, retirement, redundancy. The more intermediate drivers included financial pressures, skills, labour, disasters, land issues, water. External drivers included supply chain factors, markets, technology, policy and regulation. Some drivers and responses were observed to relate to the farmer whilst others related to the farming system.

Key findings from cross-narrative analysis distinguished inertia as the predominant response to system challenges, and that incremental changes (or creeping change, as we have termed it) in the system over a long-time frame rather than a definable critical decision point, is widely evident in the narratives. Climate change was not identified as being a driver and was only mentioned at all in two of the 45 narratives. Farmer identity ranged broadly across the narratives with the extremes being represented

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by those who farmed because it was their vocation, to those who perceived themselves first and foremost as business operators. To an extent, these identities reflected the degree of attachment to land, with the more vocational farmers having a strong attachment to their farmed land (particularly in the Flemish case) and the more business-minded (particularly in Northeast Bulgaria and the East of England) having less attachment. The long-term nature of the hazelnut crop in Central Italy meant that attachment to the land was strong, regardless of farmer identity. Family support, whether perceived as positive or negative by the narrator, was found to influence decision-making, and changing work/life balance expectations, particularly amongst early-career farmers with young families, was also influential. The narratives revealed different approaches to risk alleviation, both within and across case studies. In instances where land availability was not restricted (for example, Northeast Bulgaria, and to some extent, East Anglia), scale enlargement was predominant, but where land was restricted, diversification was the predominant response (for example, in the Flemish narratives).

There were strong similarities and distinctive differences across the narrative contexts. Similarities included the dominance of internal drivers, intergenerational change as a major critical decision point, the perception of many external drivers as noise, and more frustration with policy drivers compared with weather events. There were few mentions of insurance by the narrators.

The findings indicate that robustness is demonstrated in response to many drivers classified as cycles and shocks, whilst prolonged trends result primarily in adaptation. Transformations were relatively infrequent in the narratives and those identified were not radical in nature.

The main policy related conclusions from the study suggest that farming systems are ill-equipped for a rapid move from direct payments to income insurance. They also appear to be unprepared for climate change. Long-term, coherent strategies required for dealing with intergenerational change were not apparent, confirming parallel literature that suggests that legal, social welfare and policy obstacles to farm succession need to be addressed.

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1 Introduction

The overall aim of the SURE-Farm project is to analyse, assess and improve the resilience and sustainability of farms and farming systems in the EU. This requires an understanding of farmers' risk behaviour and risk management decisions, and how they adapt their production and business processes in response to challenges. Work package 2 of the SURE-Farm project is investigating how individual farmers have responded historically to the challenges of farming risk, to provide the basis for development of enhanced management strategies and decision support tools for farmers that they might need to cope with increasing economic, environmental and social uncertainties and risks. There is a focus on exploring and understanding the context and underlying rationale of farmers' management of critical decision points.

This deliverable, part of Work package 2, reports on a narrative analysis approach used to understand, from a farmer and farm point of view, how challenges are responded to and what the consequences are for resilience. When farmers tell the story of their life in farming, particularly in the unframed interview context, they develop explanations of, and describe responses to, the major change points that they have faced. Often, also, through recollection of retrospective events, they reveal their current mind-sets and rationalise current risk behaviour on the basis of these experiences.

The main conceptual basis of the SURE-Farm project draws on Holling and Gunderson's (2002) framework of adaptive cycles in socio-environmental systems. This comprises four stages – growth, equilibrium, collapse, and reorientation – that such systems pass through because of drivers from their external environment and their own internal dynamic processes. The farming systems under observation have been chosen to represent populations of broadly similar farm systems, in terms of their resources and the way in which they use them (Dixon et al., 2001), even though the individual farm system components may vary widely in terms of their "resource bases, enterprise patterns, household livelihoods and constraints" (Giller, 2013:151).

For the purposes of analysis, three main processes operating on adaptive farming systems cycles have been identified by the SURE-Farm project: agricultural and multifunctional activities undertaken by farms leading to the provision of private and public goods; provision of family and hired labour to farming systems; and governance, including national transpositions of the Common Agricultural Policy (CAP), public and private regulations affecting agriculture, and public and private risk management strategies (Meuwissen et al., 2018). Maxwell (1986) also recognised that external drivers vary significantly in time and space, and distinguished four different types of perturbations: noise, when perturbations occur on a regular basis and are usually expected by farmers; shocks, when perturbations are unusual and difficult to anticipate; cycles, when the variation is due to cyclical change; and trends, when the change is gradual over time.

Agricultural systems in Europe are mostly, though in parts far from entirely, comprised of family farms. Unlike many other family businesses, farming is usually space limited (due to restricted land availability and its high price) and space bound (operations cannot easily be transferred to other locations). Thus the development of many farming businesses occurs through time and is integrally linked with the evolution of the farming family across generations. In contrast to other professions in contemporary society, farming remains a largely inherited occupation and one in which the transfer of ownership and

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control to the next generation is arguably one of the most critical stages in its business development (Uchiyama et al., 2008). This report explores the validity of the framework adopted by the SURE-Farm project at producer level and on a local scale. We use narratives to do this "within the heterogeneous, mediated and power-laden sociocultural relations and processes that govern human adaptations to change" Herman et al. (2018: 113).

We are very grateful to everyone who took part in this study to contribute to a better understanding of farm risk. We hope that the material we have been given to work with reflects the value of the cooperation we have gained from all our narrators. The substance of this report is organised in four main sections. The report begins with a description of the narrative contexts of the case study farming systems in each country in which our narrators were operating. The methodology section sets out the selection of narrators, the method used to interview them, the way in which the transcripts of the conversations were analysed and how analyses from the five farm systems involved were contrasted. The next section summarises the results of individual farming system case studies, providing a comparative analysis between them. The final section provides an overall discussion of the insights obtained from this biographical narrative study. It draws conclusions about how policies and other forms of support could reinforce scope for enhanced risk management in European agriculture and identifies issues which could usefully be further explored. The original analyses of narrative interviews in each individual case study are presented in the Annex to this main report, together with the methodological guide applied by all of the research teams.

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2 Case Study Contexts

Biographical narratives were collected from five of the 11 SURE-Farm case studies that have been designed to represent a range of regional farming systems in Europe. The cases were based on system functions, including the degree to which they produce public goods and saleable provisioning outputs; the balance of power between farmers and other actors including supply chain, regulation and environmental advocacy; and their setting. Selection criteria aimed to include variety along five dimensions: (i) challenges (economic, social, environmental, institutional); (ii) agro-ecological zoning; (iii) type (sector, intensity, farm size, organisational form); (iv) produce (high-value products, commodities); and (v) influence on public goods (landscape, water quality, biodiversity).

The resources available precluded examining biographical narratives in all 11 of the SURE-Farm case studies. The five finally selected provide vignettes on different scales and intensities of farming, agroecology and climate, and the design of policy frameworks to address the broad parameters of variation in European farming systems. They include: large-scale family and corporate arable farms in North East Bulgaria (BG) and the East of England (UK); small-scale dairy farms in Flanders (BE); small scale perennial crop (hazelnut) farms in Central Italy (IT) and high value egg and broiler systems in Southern Sweden (SE). This section provides a brief contextual description of the regions in which each of these farming system types operates.

2.1 Dairy production in Flanders (BE)

In Flanders, economic accounts for agriculture from Eurostat are only available for 2016. These show that animal production in the region was 57% of total production value at basic prices, and of, that milk production, amounting to just under €650 million, contributed 12%. The average farm size (expressed as number of animals and agricultural area) has increased over the last 20-30 years, while the number of farms is decreasing. The overall number of agricultural holdings has substantially decreased from 56,560 farms in 1990 to 23,980 farms in 2016. Sector organizations, research institutes and governance have all supported this tendency for scale enlargement and intensification. About 3 to 4% of the farms are disappearing each year, with an estimated 10,000 farms left by 2040. A similar decreasing tendency applies for total labour force expressed in annual working units (AWU). Increasing average farmer age is an issue in the region (from 48 years in 2004 to 52 years in 2013), a significant proportion of which have no successor. In addition, more and more of the family labour force is in part-time employment off the farm: between 2013 and 2016, there was an increase of 49 percent. Almost all farms are family farms and ongoing mechanization and automation of agricultural production has allowed scale enlargement and capital and input intensification, and farms mainly rely on family labour.

Farms are becoming more specialized, more focused on either animal or crop production, although mixed farms still exist. Of all Flemish farms with dairy cows, about 40 % have between 15 and 60 cows, 30% have less than 15 and another 30 % have more than 60 cows. Historical trends for dairy farmers conform to the dominant trend that is observed for most farm types in Flanders: the amount of dairy farms has decreased from 9,856 in 2001 to 6,658 in 2015; while the total number of lactating cows has slightly decreased (from 329,728 in 2001 to 304,304 in 2015). The ongoing intensification in the sector can be illustrated by the increase in average number of dairy cows per farm (e.g. from 33.45 in 2001 to 47.47 in 2015). Also, although the number farms producing and selling milk has decreased (from 9,827

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in 2001 to 5,071 in 2015), the amount and quality of the milk delivered has improved over the years (Departement Landbouw en Visserij, 2016).

Regulatory pressures related to major environmental challenges (GHG emissions, water quality, soil erosion) are major issues in Flanders. Flemish farmers will need to adopt far-reaching measures that may restrict production capacity and require restructuring of the livestock herd to meet these challenges. However, this will depend on societal priorities and how policy will respond to these demands. For dairy farmers, these trends will have major impact on the development of their farms.

2.2 Large scale arable farming in Northeast Bulgaria (BG)

The NUTS2 region of Northeast Bulgaria, known as 'the granary of Bulgaria', has a varied landscape with semi-mountainous areas, river valleys and lowlands. Climate (a continental type with four well-defined seasons), landscape and fertile soils favour agriculture and grain production in particular is an economically important sector in the region. In the North-East region, agricultural land accounts for 82.7% of the total land area.

In 2016 the total arable land in Bulgaria was 3,480,991 ha, 40% of which was in the case study region. 86% of the total arable land in the country is under crop production (wheat, barley, maize, sunflower seed, rape). The case study region accounts for 43% of the national output of cereals, 42% of oleaginous crops and 17% of industrial crops. Total Bulgarian production of grains is 8.6 million tonnes, of which 51% is produced in case study region. The share of total crop production produced in the case study region is 48% of wheat, 45% of barley and 56% of maize.

Total agricultural output, at basic prices in 2016, is 8% of the country's GVA (56.5% of which came from cereal and industrial crops). The case study region produces 32% of the total GVA in agriculture in the country.

In Bulgaria 97% of the total number of registered plant production holdings (244 594) are physical persons, responsible for managing 32% of the agricultural area; approximately 2.5% are sole traders or limited companies cultivating 51% of the area. 22.3% of the total holdings in Bulgaria, responsible for 38.5% of the total UAA, are in the case study region. Agricultural cooperatives account for only 0.33% of registered plant production holdings in Bulgaria, of which 43.6% operate in the case study region (0.67% of holdings). Despite being a small proportion, cooperatives are important as they cultivate 14.9% of the total agricultural area in Bulgaria. Registered companies account for 1.77% of the total numbers of holdings in Bulgaria, cultivating 36.8% of the area in the country. The case study region contains 32.9% of these registered companies, managing 36.3% of the total area in the agricultural sector.

The political landscape in Bulgaria warrants special mention. Prior to the political changes of late 1989, the 'farmer' (in a proper sense) did not exist, because private ownership and inheritance of land were interrupted for 45 years and the basic production forms in the sector were collective and state units. After the accession to the EU in 2007 Bulgaria adopted the Single Area Payment Scheme (SAPS) as a mechanism to support the incomes of agricultural producers under the First pillar of CAP. The subsidies Bulgarian grain producers received under the EU SAPS were estimated per unit area and were different from those in some Western countries. Recent legislative changes complicate the relationship between landowners and tenants. According to the new provisions of the ALOUA (Agricultural Land Ownership

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and Use Act) introduced in 2018, lease agreements must be concluded each year, in writing with notarized signatures of the parties and authentication of content. This puts a significant administrative burden on tenants, and some financial costs.

2.3 Small scale perennial crop production in Central Italy (IT)

The case study is in Central Italy and is part of the Viterbo province in the Latium Region. Although hazelnut trees have been cultivated in this area for centuries, it is only in the last 50 years that the area had specialized in hazelnut production, becoming one of the most important Italian production areas. Italian hazelnut production contributes to 13% of world production, second only to Turkey (68%). In Italy, the area of hazelnuts cultivated is around 73,214 ha, of which almost 20,000 ha are the Viterbo province, which produces around 50,000 t/year.

The historical and most important area of production is around the Vico Lake. The area includes 15 administrative municipalities, where over 55% of the total UAA and more than 80% of the farms cultivate hazelnuts. In the nine municipalities that constitute the more marginal areas of production, only 14% of total UAA and 3% of the farms produce hazelnuts. In the 15 central municipalities of the district the incidence of the organic hazelnut production is around 10% (2015).

The farming systems are mostly based on small and medium size farms (36% of UAA in farms of 2-5 ha and 27% of UAA in farms of 5-10 ha), although due the strong economic performance of hazelnut production, the number of medium to large farms is increasing. The average yield is 2t/ha and mechanization in the systems is high. Producer organisations play a major role and the majority sell their crop to Ferrero, Loacker, Novi and Perugina. Hazelnuts produced in the region have PDO status 'Tonda Gentile Romana'.

Challenges for the case study region include an ageing population; the unstable political situation in Turkey which, as it is the main global hazelnut producer, causes market volatility; increasing consumer concerns regarding high fat and sugar foods (e.g. Nutella) reducing market demand; price volatility and the dominance of the market by a few buyers, and environmental challenges (high water demanding crop, new pests appearing that could challenge quality).

2.4 High value egg and broiler systems in Southern Sweden (SE)

The case study region of Sweden comprises five NUTS-2 regions as follows: SE11 - Stockholm, SE12 - Östra Mellansverige, SE21 - Småland med öarna, SE22 - Sydsverige, and SE23 - Västsverige. The total area is 129,000 square kilometres out of which 17% is agricultural land. At country level agricultural land occupies 6.5% of total land area. Southern Sweden is recognised for its agricultural activity. While the region occupies one-third of national land area, in 2016, 85% of the utilised agricultural area, and 75% of the agricultural holdings registered in Sweden were situated in this region, employing 80% (in 2013) of the regular labour engaged in agriculture. The contribution to gross agricultural output was 88%. In 2017 gross output of agriculture in Southern Sweden was 9.1 billion euros, out of which crop and livestock output contributed with 4.5 and 4.6 billion euros, respectively. Although the landscape and the soil quality are heterogeneous, the region is recognised for its fertile plain districts, especially in SE12, SE22 and SE23, with cereals the major part of arable production (45% in 2018).

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Private, family-owned farms are most common, owning or managing about 90% and 85% of the total agricultural land respectively. Corporate farms own or manage only about 5% of the total agricultural land. The average farm size in 2016 was 53 ha. Compared with Southern Sweden, farms in the remaining parts of Sweden as a whole were significantly smaller, with an average holding size of 28 ha. The average farm size at national level was 41 ha.

The Southern Swedish case study of high value egg and broiler production consists of two separate sectors. High value broiler production in Sweden is dominated by a handful of large chicken production companies that each contract several farmers, often on long term contracts. The farmers thus deliver all their chickens to the same processing company, and are supplied with chicks by designated suppliers. The larger scale egg producing companies also contract egg farmers that deliver to designated packing companies. While egg contracts can also be long term, this sector is more flexible, with more actors, compared to the broiler sector, for example egg producers (depending on their contract) may sell eggs directly to consumers in farm shops, although this is not the case for broilers.

2.5 Large scale arable farming in the East of England (UK)

East Anglia, a NUTS2 region, is part of Eastern England and its total area is 12,760 square kilometres, of which 975,617 ha (76%) is in agricultural use. Farmland is mostly flat, otherwise gently undulating and low lying. It is vulnerable to rising sea levels, particularly because much of the land has been reclaimed from the sea, primarily through the means of dykes and drainage ditches. Collaborative management of sluices and sea defences remains an important aspect of East Anglian agricultural systems.

Soils are fertile, and the climate is favourable for arable agriculture, with relatively high temperatures and moderate rainfall. In recent years rainfall has been lower than past averages, and there has been considerable investment in irrigation equipment and concern about the sustainability of groundwater abstraction. In 2016, 723,885 ha of land were used for arable crops and horticulture (46% of the total farmed area was used for cereals, 25% for other arable crops, and 3% for fruit and vegetables) and 15% was grassland. Grazing livestock are of minor importance, although intensive livestock, pigs and poultry, which exploit abundant local availability of cereals and other fodder crops, contribute substantially to agricultural value-added.

The average holding size in 2016 in East Anglia was 125 ha; however, most of the land area was managed by much larger holdings. Almost two-thirds of the area was accounted for by holdings of 100 ha or more, and the average size in this category was 285 ha. Compared with East Anglia, farms in the United Kingdom as a whole were significantly smaller (average 90 ha).

In 2017 the gross output of agriculture in East Anglia was £3.6 billion, crop output £1.7 billion, and livestock output £1.6 billion. Farming is relatively more important to the local economy in East Anglia than in the UK as a whole, directly employing around 19,000 full-time equivalent farmers and workers (2013 farm structure data) and contributing £1.1 billion (2.1%) to local GVA in 2016.

A dominant force in arable farming in the East of England is the impact of CAP support, especially area payments, which shape the sector, and the forthcoming uncertainty of Brexit and its potential impacts. Recent trends are to cease livestock enterprises and focus on arable farming. Machinery has become more sophisticated, with GPS guidance enabling variable seed rates, fertiliser and sprays. These

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technological advances have increased costs, such that farmers are adopting a range of approaches to spread fixed costs, including extending periods between replacing machinery, or becoming increasingly reliant on contractors.

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3 Investigative approach

Biographical narrative interviews were used to gather the personal histories of farmers from five SURE-Farm case studies. Our approach has been to gather and analyse biographical narratives of farm businesses at different stages of family succession. Riessmann (2008:11) defines narrative analysis as a "family of methods for interpreting texts that have in common a storied form"; the story in this case is in the form of an autobiography, because "we are dealing with questions of social science or history that relate to social phenomena that are tied to people's experiences and have biographical meaning for them" (Rosenthal, 2004: 51).

Oral histories have been used to study different farming cultures and the processes of change in farming and the landscape (Riley and Harvey, 2007), and more focused farmer life-story analyses have investigated entry into farming (McDonald and Macken-Walsh, 2016), exit from it (Cassidy and McGrath, 2015), and studied the complexity of family farming businesses and strategies of resistance or resilience (Morris and Evans (2004). Narrative analysis, therefore, enables researchers to gain in-depth insight into the context and rationale surrounding farmer decision-making in response to change, uncertainty and risk and how farmers manage critical decision points in their farming businesses. In our approach we use personal histories of family farms, and business histories of corporate farms, to develop an analytic focus on phases in the separate production, demographic and policy adaptive cycles (and consequences of interactions between them) as they have impacted on the individuals concerned, and their business enterprises. As Bühler and Kruker (2002: 312) note, "Listening to narratives will help us find out more about individual cases, which might in turn point to some general trends, but will never – and should never – lose their specificity". Nevertheless, the life experience reported by individuals that we spoke with provides insight into what matters from their own perspectives, and potential validation of the concept of farming system resilience that we set out to study.

These combined life and business histories have been collected in interviews that were intended to provide freedom for the narrators to tell their story in their own words, as far as possible without imposing any prior structure or preconceived ideas. By telling, people recall what has happened, put experience into sequence, find possible explanations for it, and play with the chain of events that shapes individual and social life (Jovchelovitch and Bauer, 2000). The objective of the narrative interview technique is to reconstruct social events as directly as possible from the perspective of those telling their life stories. This avoids imposing the configuration of more typical structured question and answer type interviews, which select themes and topics, order the questions and express them in the language of the investigator.

To gain an authentic representation of the narrator's perspective, the role of the interviewer should be minimal, becoming active only in the analysis stage. To emphasise this, we use the term 'narrator' subsequently in this document, rather than 'interviewee' or 'subject', and 'researcher' rather than 'interviewer'. The narrative investigation goes further than any other interview method in avoiding pre-structuring the interview. It uses a specific type of everyday communication, namely storytelling and listening, to reach this objective (Jovchelovitch and Bauer, 2000). A single question has been used to initiate the story, without qualification beforehand, supported only with expressions of interest and encouragement in the first part of the interview, with subsequent exploratory questions devoted to

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clarifying the internal structure of the narrative. While we might expect, for example, different types of driver to lead to responses displaying different resilience types (such as, for example, a shock triggering robustness, trends stimulating adaptation), this style of inquiry, giving up control to the narrator and active listening by the researcher, allows those expectations to be submerged and potentially refuted.

This is unusual, even for a heavily-interviewed group like farmers. "Being given licence to tell someone, usually a total stranger, the story of your life in any way that you wish without any constraints on the time that this may take or the length that you can dwell on any given facet of your life, and this taking place in a context in which you believe that no judgement will be made on what you choose to reveal, is a unique experience that does not have a parallel in everyday life" (Miller et al., 2012: 3).

Because of the nature of farm family businesses, for the most part such histories have revealed the changes that the narrators believed important, and what has subsequently occurred. Rosenthal (2004: 53) argues that "telling a story is the only way to come close to an integral reproduction of what happened at that time"; the reasoning that the story conveys will inevitably be in the moment of telling, and perhaps also in the way the narrator wishes to be seen, while "we interact more with our memories than with the listeners, our explanations regarding what we experienced are directed at the interlocutors" (Rosenthal, 2004: 53).

3.1 Preparation

Based on pilot narratives conducted elsewhere in the UK (Nicholas et al., 2018), a research guide was produced by the task leaders (ABER) and a training session was held prior to field work commencing (Madrid, April 2018). Each case study partner was given the target to recruit nine farmers or farm managers in their respective farming system case study. These nine narrators were purposively sampled to include three early career stage (up to 5-7 years farming in their own right), three mid-career (approximately 15 to 25 years) and three late-career farmers (looking to retire in the next five years). The choice of this number of narrators was based on experience and convention in qualitative studies. Our objectives were to focus on why farmers respond in the ways that they do to various drivers for change acting on their businesses, in different farming systems. This requires very rich data which, in contrast with quantitative studies that make inductive generalisations based largely on small numbers of variables over many cases, achieves analytic generalisations based on many variables gathered from a small number of cases (Yin, 2003). The validity criterion most widely applied in qualitative research is saturation (no new insights arising from successive interviews), originally proposed by Glaser and Strauss (1967), and currently conceived as requiring consistency with the research question(s), and the theoretical position and analytic framework adopted (Saunders et al., 2018). While the example narratives gathered are not exhaustive, the comparative dimension across different farming systems and (because of the focus on intergenerational transition) the opportunity to reflect on farm succession from different career perspectives, provides some strongly recognisable repeated patterns which develop and extend our understanding of why responses to specific drivers occur.

In some contexts, it was less easy to recruit early-career farmers and the target was not always achieved. There were none interviewed in one of the farming systems due to the demographic structure of the farming population; details of the narrative interviews that took place are described in

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Table 1. Farmers were selected either directly via researcher contacts, or via gatekeepers (such as farm advisors, co-operatives, discussion groups or farming unions) active in the case study region. Gatekeepers can provide social as well as physical access to the social world of interest, and choices were made carefully to minimise potential bias through potential divergence of interest between their, and researcher, objectives. Once farmers were identified they were approached at an appropriate time in the farming calendar, provided with a brief outline of the project and purpose of the narratives and, if they agreed to participate, a meeting was arranged at a convenient time and place. Each participant also signed a consent form covering ethics and confidentiality. All interviews were recorded. Most, intentionally, involved two researchers to allow for a more fruitful discussion and debriefing following the narrative, although this was not always achievable due to financial and staffing constraints in some research teams (Table 1. provides details). Communication regarding meeting arrangement was usually conducted by email and phone.

Table 1. Summary of narratives and researchers in the 5 case study regions.

	BE	BG	IT	SE	UK
No. of narratives conducted	9	10	9	9	9
No. early career stage	3 (M)	0	3 (2xM, lxM+F)	2 (1F, 1 joint M+F)	3 (M*)
No. mid-career stage	3 (M)	8 (2F, 6M)	3 (M)	4 (2F, 2M)	3 (1F, 2M)
No. late-career stage	3 (1F, 2M)	2 (M)	3 (M)	3 (M)	3 (M)
No. of researchers present at each narrative	8x1 1x2	10x2	9x2	9x2	8x2 1x1
Total no. of researchers involved in conducting narratives	2 (F)	2 (F)	3 (2M,1F)	2 (F)	3 (1M, 2F)

* M=Male and F=Female narrator/researcher

3.2 Narrative process

The narrative elicitation (planned to last between 30-60 minutes) was originally intended to consist of two meetings, a main meeting in which the narrative was conducted, and a follow-up meeting approximately one week later to clarify points and gather further detail if necessary. It was initially proposed that the follow-up meeting be face-to-face, but due to time and travel constraints, it was often conducted by phone or email, or was not necessary. The main narrative meeting consisted of six parts: a warm up question such as “Please describe your farm as it is today?”; the central narrative question “Please tell me the story of your farming life?”, involving active listening with only minimal interruption from the researcher (responses varied widely, between 5-60 minutes); post-interview small talk, where the recorder was switched off and the discussion continued in a more relaxed manner, often throwing up further detail; noting immediate experiences of the narrative after leaving the participant (jointly through discussion if two researchers present); and finally, a full debrief and discussion of the narratives conducted, usually involving one or more researchers listening to the narrative recording, making notes of key decisions/change points and identifying areas needing further

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clarification from the narrator. Issues arising from the last, debrief discussion were then explored further with the narrator by phone or email. The completed extended summaries (or in some cases the narrative transcripts), together with selected quotations and timelines were sent to farmers for their comment and any corrections, and to gain permission to quote from their narrative.

3.3 Analysis and reporting

The narratives were transcribed and coded in the local language using NVIVO in all countries apart from Bulgaria, where coding was manual. The East Anglian analysis and summary report were completed first and used as a guide for consistency in the other cases. Farming system reports were then prepared in English for each case study, based on this draft. While a considerable literature exists on the use of translators as it affects trustworthiness of analysis of interpreted material by qualitative researchers (see, for example, Squires, 2009), there is much less discussion of case comparison between studies conducted in different languages. To improve the validity of subsequent work, all research teams were requested to use independent back-translation of quotes from transcripts.

A simple, flat structure of thematic coding was used to organise the material, prior to a more discursive examination of each farm system turning point that involved a clear impetus and had a consequence that could be attributed to it. As a deliberate strategy, themes distinct from the prior driver and response categories of shock, trend, cycle, robustness, adaptability and transformation were inductively created to group these turning points. These were examined, firstly on the basis of frequency of occurrence and subsequently, for coherence, to check whether the infrequent themes identified important issues.

All individual reports included:

- The method used for narrator selection, interviewing and de-briefing.
- Basic information about the interview(s) including when they were conducted, by whom and some general intuitive comments on the mood of the interview(s).
- A general description of the case study region in which the interviews took place.
- An extended summary of each narrative.
- A timeline and summary of key events/turning points for each narrator including quotations that illustrate drivers and responses surrounding those key events. The key events from each narrative were categorised and tabulated across all narratives according to three of Maxwell's (1986) four components of change: Trends, Cycles and Shocks. Noise, being the forth component, by definition is expected and therefore rarely stimulates perceptible change.
- A coding summary including
    - Separate lists of all driver nodes and sub-nodes and response nodes and sub-nodes used and a description for each.
    - A node frequency summary indicating the number of narrators (Sources) who mentioned the node/sub-node and the number of times it was mentioned across all narratives (References).
    - A node frequency summary indicating the number of times each individual narrator mentioned a node/sub-node (not completed in all reports).

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The most important drivers were identified from the node frequency tables. They were classified as trends, cycles and shocks (Maxwell, 1986), the turning points were identified, and responses described. They were then ascribed to one of three types of resilience: robustness, adaptability or transformability (robustness is the ability to maintain desired levels of outputs despite the occurrence of perturbations (Urruty et al., 2016). Adaptability is the capacity to adjust responses to changing external drivers and internal processes and thereby allow for development along the current trajectory (Folke et al., 2010). Transformability is the capacity to create a fundamentally new system when ecological, economic, or social structures make the existing system untenable (Walker et al. 2004).

- These tables were then used as the basis for a discussion of resilience approach and themes.
- An Appendix including: researcher comments on the visit and impressions gained, extended summaries with verbatim quotations (in the original language and English) to illustrate key points and a timeline of major turning points identified from the narrator's story.

3.4 Overall analysis

Once the country narrative context summary reports were received by the task leaders, they were reviewed, and points of clarification addressed by partners. Each report was read by several people, several times, including the extended summaries of each narrator's story, to gain as full an understanding of the narratives as possible. The key changes/turning points identified from the narratives and classified as trends, cycles and shocks (Maxwell, 1986) were tabulated to identify, for each change/turning point, the driver of the change, the actual turning point, the response to the driver and the type of resilience demonstrated (e.g. robustness, adaptation, transformation), and the response strategy. This consolidation of data from each country drew out patterns of similarities and key differences within the data, between countries and between career stages, regarding the challenges they faced and their responses to them. This framework, combined with the narrative summaries, interpretation provided by each of the research partners, and direct quotations from narratives provides the basis of discussion in the following section.

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4 Results

The results below are presented in three parts. Section 4.1 presents an overview of narrative analyses in each farming system, as reported by the partners; Section 4.2 provides an initial commentary on comparison of instances of turning points. These are presented in graphic form, by career stage and country, relating drivers to responses. Section 4.3 presents the discursive analysis which arose from a consideration of individual change points in farm systems to check whether drivers and responses could be identified as shocks, trends and cycles, and robustness, adaptability and transformation, respectively. It is somewhat artificial to break these drivers down into themes, since as we observe from the narratives, many drivers are interrelated; however, describing them in this way facilitates discussion. The elements of discussion in Section 4.3 are organised in a continuum which ranges from the most internal drivers arising from within the farm system, to the most external factors acting on the farm system, effectively outside the control of farmers. This approach has been influenced by one of our major findings: that internal pressures are described, by narrators in their histories, as so much more important.

4.1 Conclusions from individual farming system cases

What follows in this first part are the conclusions abstracted by partners based on the findings of each individual farming system case study. These illustrate the major themes and concepts that emerged and provide insight into the variety of contexts our comparative analysis draws upon.

4.1.1 Dairy production in Flanders

Financial instability due to milk price volatility was an issue mentioned in many of the Flemish narratives. Combined with this, all narrators indicated that the workload that they experience is disproportionate to the financial returns they gain. All the same, when discussing workload, all narrators also mentioned attractive aspects of a farmer's life, why they love it so much and how they could not imagine themselves doing anything else. In some narratives, though, the negative aspects were discussed for example closer to the beginning of the story, while motivation was communicated closer to its end; in others the opposite happened. The two topics always appeared, but with no consistency of timing in the story. Regarding business approach, there was little desire amongst the narrators to expand beyond approximately 120 cows, and they tended to be risk-averse when it came to future investment in the farm, preferring to diversify with existing resources than to increase the size of the dairy enterprise. Most narratives mentioned that land was very expensive and rarely available. Two main approaches to farming were observed amongst the Flemish narrators. The first group chose the path of diversification within existing resources, the second group aimed to gain as much as possible out of existing resources with minimal inputs and only one worker (intensification). With regard to policy, the narrators showed feelings of exasperation towards the tangled structure of local, national and European regulations and felt they had little power when it came to expressing their dissatisfaction.

4.1.2 Large scale arable farming in Northeast Bulgaria

Labour shortage was the most commonly mentioned issue by all narrators, specifically the lack of sufficiently skilled workers and the difficulty of retaining workers in the country. Direct payments under

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the Single Area Payment Scheme were also a key area of discussion amongst narrators, who highlighted the past and current differences in payments between Eastern and Western Europe and their expectation in the next framework that this would be equalised. Another issue arising in Bulgaria was that, regardless of whether a farm was registered as a family farm or as an agri-business, the role of the family in operating the farm was significant either directly or indirectly, and strong family ties were evident in the narratives. In terms of risks facing their businesses, narrators identified the following challenges: economic (prices, markets, competition, investment); social (labour force (availability, numbers and skills), demographic decline, outmigration); environmental (climate change, experienced as droughts, floods, or fires) and institutional (such as changing policy objectives, rules and regulations, red tape). Despite these challenges, individualism, rather than cooperation, was very much the main business strategy of the narrators. A key response of narrators to domestic economic risks (land markets, land lease, rental prices), frequently reported in the narratives, was engagement in land transactions. Finally, narratives conveyed predominantly positive attitudes to innovation and the use of technology.

4.1.3 Small scale perennial crop production in Central Italy

Hazelnut orchards have a very long productive life (longer than one generation), and narrators emphasised the long-term business view in terms of challenges and decision-making. A trend observed within narratives concerned the enlargement of farm size and increasing investment in new hazelnut plantations, an effect of the high sale price of hazelnuts and, more generally, the high profitability of hazelnut cultivation relative to alternatives. Technology, in particular the use of automated harvesting equipment, was described in narratives as not only in a reducing unit production costs but also improving product quality. These drivers have propelled hazelnut intensification and specialization within the farming system and, in the last few years, new plantations have spread outside the traditional growing areas. Strong formal and informal interactions among farmers and between farmers and non-farmer actors featured in many narratives, and cooperative arrangements were common. Almost all narratives mentioned the importance of non-farm actors and an awareness of being part of a larger business 'community' in which they are closely intertwined with non-farm agents who played a role in the success of their business.

4.1.4 High value egg and broiler systems in Southern Sweden

An overall trend within the poultry sector in Sweden concerns the involvement of production companies, mainly in the broiler sector, who take on an active role in recruiting, supporting and encouraging farmers to either convert to or develop their production towards broiler chicken. The production planning, expansion strategies and control schemes set up by the production companies serve as a stabilizer of farm finances. Many narrators had family-based farm businesses where they may have succeeded many generations before them and have children who had already taken over, or were in the process of taking over, the farm. This intergenerational shift was observed to be crucial to allow people to farm – many of the narrators pointed out that farm facilities are becoming increasingly expensive and without an inheritance, it may be very difficult to enter farming. Heavy workload was frequently mentioned in the narratives and, while labour intensity of broiler production is relatively low compared to other forms of animal production, workload was still considered to be high. Workload varied, depending on the family situation, sector administrative requirements, type of production form,

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as well as the overall economic and organisational situation of the farm. Broiler production was thought by the narrators to be profitable compared to other forms of livestock production. While a proprietorship (sole trader) was an easy way to run the business and required less administration, it was also seen as a risk by some narrators, should the business go bankrupt. Dividing ownership between different companies and family members was seen in some businesses as a way to minimize the risk of conflict between family members. Central to many of the narratives was the farmers' focus on new ventures. Whether narrators have been prompted by a wish to diversify the farming business in order to deal with risk, or an entrepreneurial drive to experiment and engage in new projects, expanding the business and making use of opportunities that arise was a commonly observed theme.

4.1.5 Large scale arable farming in the East of England

From the narratives there appear to be two clearly distinct approaches to business management. The first is of heavy capital investment and the need for continual expansion of the farmed land area (either through land purchase or more commonly contract farming[1]) over which to spread the costs of machinery. The second approach involved a much leaner cost structure, with minimal investment in machinery and a reliance on contractors to carry out field operations, such as harvesting, that require specialist equipment. The latter system typically relied on family labour alone whereas the former employed outside labour. As well as this distinction between management approaches, our narrators can also be characterised according to whether they saw themselves as primarily farmers, or as business men or women. Most narrators perceived themselves to be farmers, arable farming was the core of their business and that is what they did best. Others had evolved significant business interests outside of the farm and in many cases leveraged capital from the farm to invest in these businesses. By and large, the narrators who perceived themselves to be primarily farmers were risk-averse. Support networks, especially family and mentor support were very important for the confidence and to a certain extent the contentedness of our narrators. Those that had good parental support found the transition period from one generation to the next much easier than those that did not. Mentors were specifically mentioned in terms of helping develop links and contacts within the broader farming industry. Drivers that initiated the succession process included the retirement of the principal farmer, due to age or illness, and also the retirement of key workers on the farm – usually those that had been there for many years. These retirements provided opportunities for the next generation to enter the farm business. Another factor that was apparent from the narratives was the trend of loosening ties to the farm with successive generations. This became particularly evident in discussions surrounding succession between the current generation and the next. The possibility to employ contractors to carry out field operations in arable farming opens a wider range of succession options than in, for example, livestock farming. The loss of livestock in these arable farms, which were present in the previous generation, has potentially accelerated this loosening of ties to the farm and land.

[1] The term "contract farming" is often used to describe the supply of farming services, sometimes-specific operations but normally including complete management packages for a fixed fee. In terms of risk bearing, it is the opposite of rental. It is different to the other common usage in Europe, which refers to contracts with a buyer (such as a multiple retailer) specifying quantity, quality and production conditions.

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4.1.6 Comparison between farming systems

Different enterprises were selected for this study to cover a range of farming systems, but the different stories must be seen within the context of the country which provides the landscape in both metaphorical and physical senses. These structural differences will produce different responses. Notwithstanding this, there were similarities in approaches in both countries (Northeast Bulgaria and East Anglia) in which arable farming was studied, namely loosening attachment to land and, rather than farming as a vocation, a more entrepreneurial approach. Narrators in both farming systems also mentioned the dependence of the industry on the Area Payments.

> *"…but I think going forward, it's going to be the loss of subsidies, all these, because all these contract farm agreements, rent agreements, they're all based around subsidies, so it's going to be, it's going to be a whole restructure of the industry I think." UK/EC1*

In all contexts, family stories were the baseline for the narratives. Even in Northeast Bulgaria, where political changes of the 1990s in Bulgaria resulted in the emergence of a completely new structure of farming enterprises, the family nature of agricultural businesses appears to have become quickly and strongly established.

Intergenerational change was the most frequent driver of change reported, although most frequently the response was robust (16 instances) rather than leading to adaptation (seven instances) or transformation (two occasions, one Southern Swedish and one Flemish). Land availability and cost, and volatility of milk prices dominated the Flemish dairy farmer stories, restricting expansion and increasing aversion to risk. It is a feature of increased longevity that there is a 'stretched' intergenerational transition cycle: the older generation may not be ready to hand over the farm when the next generation are ready, or in many cases (Flanders, Southern Sweden, East Anglia) there was insufficient labour requirement to employ the younger generation while the parents were working.

The Central Italian narratives from hazelnut farmers contrasted markedly with other stories due to perennial cropping and the consequent long-term nature of challenges and decision-making. This, broiler production in Southern Sweden and cereals production in Northeast Bulgaria, were profitable, whereas dairying in Flanders and arable production in East Anglia were marginal.

> *"… I would have thought out of the last… 23 years, I think, probably, about three or four of those years have been profitable, truly profitable in that arable sense." UK/MC2*

Central Italian narratives mention only three shocks, two of which were weather events and one a human health issue; Northeast Bulgarian narratives feature only two, one of redundancy and the other environmental as a result of flooding. In comparison, Southern Swedish narratives report ten shocks, East Anglia 12 and 15 descriptions of shocks in Flemish narratives.

Many Flemish, a few Southern Swedish and some East Anglian farmers mention personal workload problems. These are not mentioned in the Northeast Bulgarian narratives due to the scale of enterprise and spread of workload, but accessing enough skilled labour was a frequently mentioned challenge. In Central Italy, increasing mechanisation has improved product quality and quantity and reduced the role of women in the enterprise.

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Networks with the community for information and ideas were mentioned as important by hazelnut producers in Central Italy. In the East Anglia, Flanders and Southern Sweden, other family members were the major source of support, with some resulting tensions arising in the arena of everyday life.

4.2 Drivers and responses

To establish an overall perspective on discussions in subsequent sections, Tables 2-4 provide summary data on the drivers of change points and the kinds of responses they elicited across all of the narratives that were collected. The patterns that they indicate are considered in detail in individual sections below. The first analysis reflects on similarities and differences between farming system case studies, and also between the different career stages identified by the sample selection strategy. The second, deeper exploration sets out the discursive development of themes based on the initial coding of farm and farmer life histories, and points to the important themes that contribute to an enhanced understanding of farm (and farming) system resilience responses.

Table 2 Trends and Response types

Drivers: Trends	Robustness	Adaptation	Transformation.
Constraint labour	BG-M	BG-M(2)	
Constraint policy	BG-M	SE-M	BE-M
Falling profitability	SE-M, BE-M	SE-E, UK-L, IT-L(2),UK-M(2)	IT-E,SE-L
Intergenerational change	BE-M(2),BE-L	SE-E	BE-M,IT-M
Limited land availability	BE-M	BE-M,IT-E,IT-L,SE-M	
Long transitional cycle	BE-E	UK-E(3)	BE-E
Opportunity - land	BE-L,BG-M	BE-E,BG-M(3),IT-E,IT-M,IT-L	IT-E , IT-L
Opportunity - market	BE-L ,BG-M	BG-M ,IT-L(2)	SE-E(3),SE-M,SE-L(3)
Opportunity - Policy	BG-M	BG-M(2),IT-E(2), IT-M (2), SE-L, UK-L(2)	IT-M
Opportunity - Technology		BG-L, IT-M	
Opportunity - Skills	BE-L	BG-M, BG-L	BG-M,UK-M
Opportunity	BE-L, IT-E	BG-M(2), IT-E, IT-L(2),UK-E,UK-L	-
Personal health	UK-E		BE-M
Resource water			BG-M
Supply chain	BE-E	BE-E, IT-E(2),IT-M,IT-L(2)	IT-L
Underinvestment	BE-L	BE-E,BE-M	

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Table 3 Cycles and Response types

Drivers: Cycles	Robustness	Adaptation	Transformation.
Changing work/life balance	SE-L		
Constraint		SE-E	SE-M
Intergenerational change	BE-E(5), BE-M,BE-L(5), BG-M(2), IT-L, UK-M, UK-L	BE-E, BG-M, IT-E, SE-L, UK-E, UK-M, UK-L	BE-E, SE-E
Opportunity - Land	UK-L	BE-E, SE-M, UK-L	
Opportunity - Skills			BE-E
Opportunity	BE-M, BG-M	SE-L	
Retirement		UK-E	BE-L

Table 4 Shocks and Response types

Drivers: Shocks	Robustness	Adaptation	Transformation.
Animal health	BE-M		UK-L
Death	UK-L	BE-M	SE-L
Family breakdown	SE-M, UK-L	UK-M(3)	
Financial crisis	BE-E		
Fine	BE-E		
Fire	SE-L		UK-M
Human health	BE-E, BE-L(2), SE-L, UK-M	BE-E(2), IT-E, SE-M(2), UK-M	
Intergenerational change		UK-E	
Limited land availability	BE-M		
Planning shocks		BG-M, SE-M	BE-L
Long transition cycle	BE-M		
Policy shocks	BE-L		UK-L
Redundancy	SE-M	BG-L, UK-M	SE-M
Supply chain shock	BE-M		SE-M
Weather event	BE-M, BG-M, IT-E(2)		

4.2.1 Drivers and responses – career stage and farming system comparison

The responses (robustness, adaptation and transformation) to drivers of change that were observed in the narratives are summarised in the figures below. This information is presented separately for drivers that were observed to be trends, cycles or shocks (Maxwell, 1986).

Figure 1 indicates that most responses to trends were adaptation (across all career stages) and countries, the exception being Flanders where the responses to trends tended more towards

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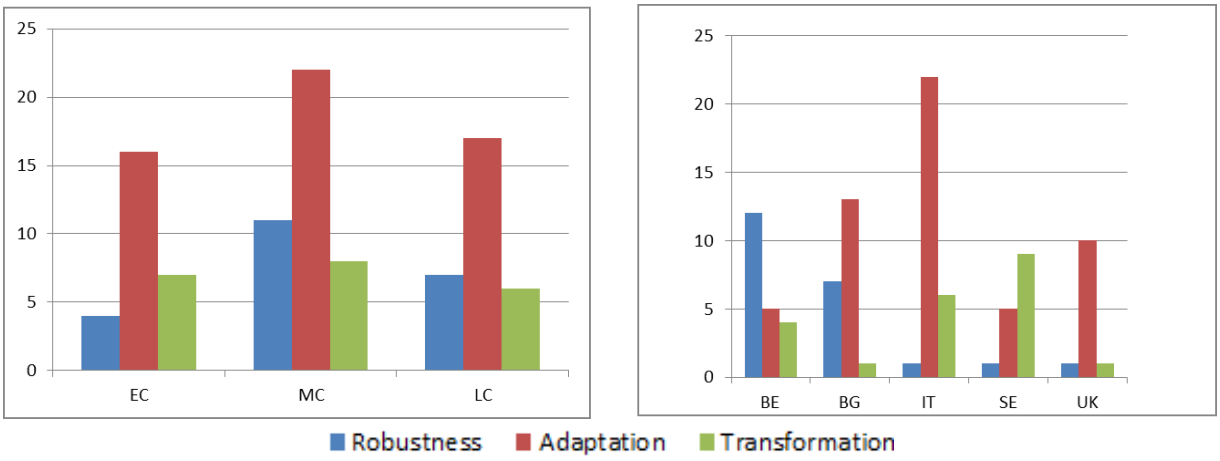
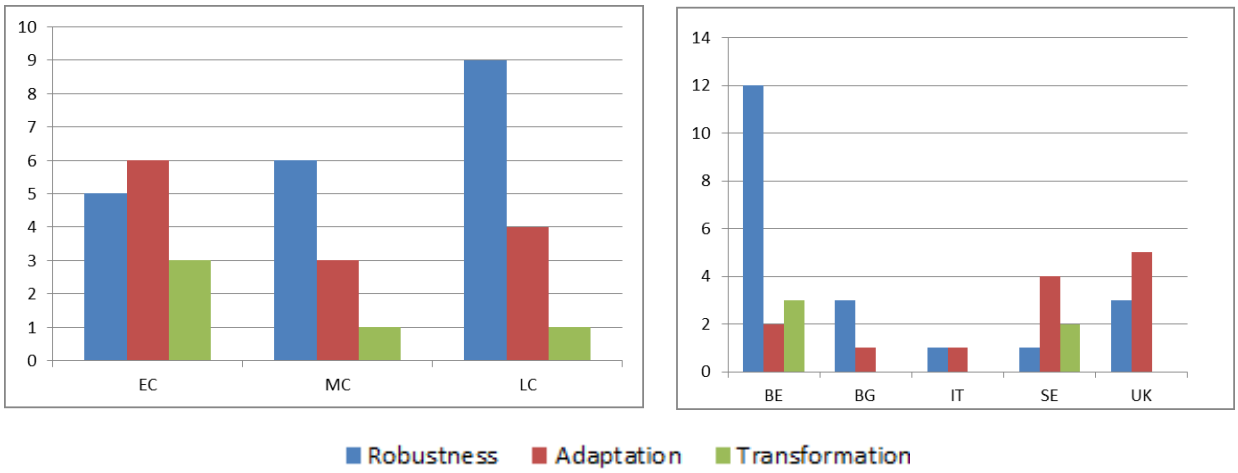
robustness. The main reasons for this difference in Flanders are land constraints and the predominance of sole proprietorship has restricted change in the systems and therefore hindered opportunities for adaptation. Of the trends that led to transformations (22) only two were policy related, six market opportunities/supply chain related and four were intergenerational change (which were personal, rather than farming system, transformations).

Figure 1 Responses to trends by career stage and country.



In the case of cycles (Figure 2), robustness was the dominant response for the mid- and late-career farmers, but with adaptability and robustness being common responses for early-career farmers. For these early-career stage farmers, the intergenerational shift allowed them the opportunity to make changes to the farm business, or indeed to continue business as usual. Later-career farmers, closer to retirement, have had the opportunity to plan their businesses over a prolonged period and were therefore less likely to make major changes to their systems – demonstrating robustness rather than adaptability. Again, the Flemish responses to cyclic drivers were dominated by robustness, for the same reasons as described for trends. Responses to cyclic drivers in the other countries were varied, but there were no transformations in response to cycles in Flanders, Central Italy and East Anglia.

Figure 2 Responses to cycles by career stage and country.



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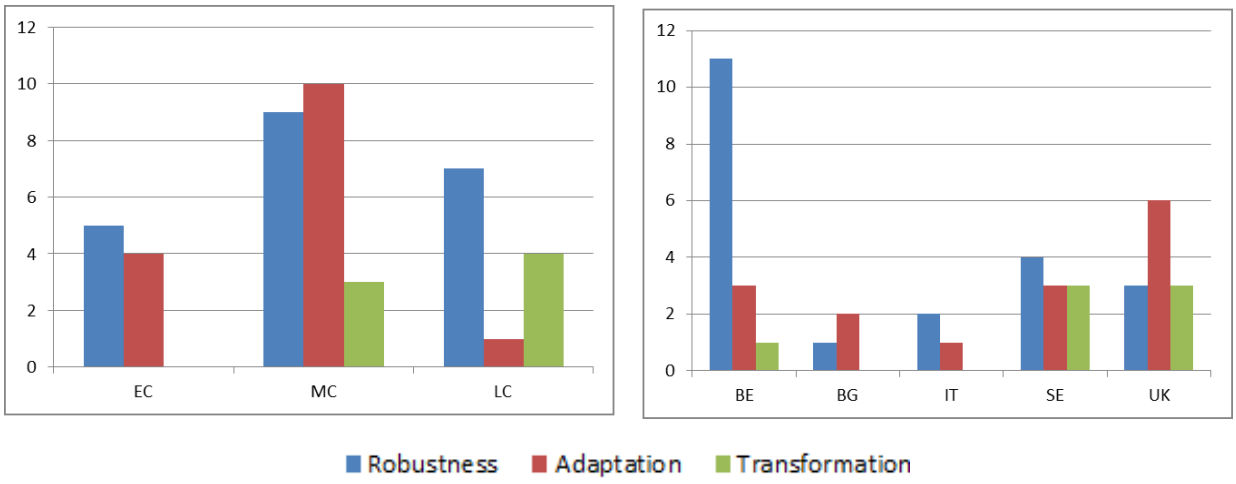
In the case of early-career stage farmers (Figure 3) it was often a shock for their predecessors, for example the death of the father, which resulted in their takeover of the farm. The responses to these shocks took the form of robustness and adaptability, rather than of transformation. Of the seven shock events that lead to transformations one was policy driven (sale of dairy herd and quota), whereas the others included animal health, death, fire, unemployment, supply chain and planning issues. No transformations in response to shocks were observed in Northeast Bulgarian and Central Italian farm systems. In Northeast Bulgaria, the political changes that occurred prior to their accession to the EU drove continual and universal transformation, which has stabilised since the CAP has been applied. Whilst Central Italian narrators experienced shocks (weather-related), the long-term nature of their production systems and of land parcels distributed across varied microclimatic regions provided an in-built degree of resilience to their farming systems.

Figure 3 Responses to shocks by career stage and country.



4.3 Conceptual development

These concepts arose from discussions about major narrative themes that add insight to how drivers produce various kinds of response. The exercise of placing each farm system turning point into discrete categories drew our attention to the fact that, in most situations, there is not one sole driver that causes a single response. The narrators experienced the key events in their life as a complex process shaped by multiple factors of influence. Nevertheless, for the sake of presentation, we have ordered the influences that emerged in the narratives as important explicators of system change points sequentially, from those mostly arising internally in the farm system to those that were mostly external. This categorisation, of necessity, needs to be treated with some caution, and sometimes the same influences (and indeed, turning points) arise as relevant in several subsections.

4.3.1 Health and wellbeing

Human health, whether due to unanticipated accident or illness, was the most commonly mentioned shock to the family farming business (amounting to 11 of the 43 shock events recorded). It was mentioned in the narratives of those from all career stages, although not at all in Northeast Bulgaria. In the case of the early stage career famers, it was an illness or accident affecting the narrator's father

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(typically the head of the family farming business at the time of the shock) that resulted in a turning point in the narrative. For these early-career farmers, the response to this shock tended to be an acceleration of their involvement in the farming business, either taking over full time, or continuing off-farm employment but increasing their role in the day to day management of the farm. In most cases this was interpreted as an adaptation or an example of robustness, the general outcome being the continuity of the family farm business.

> *"That was actually the most natural thing in the world. On that moment in time [when father was injured]. That was actually the most normal thing in the world that I would do that. That I even called my boss to say 'I'm not going to work tomorrow'. BE/EC1*

In the mid- and late-career farmers, it was a mixture of father's illness, their own health crisis, or that of a dependent member of the family that drove the key turning point. The illness of the father resulted in the narrator usually ceasing or reducing off-farm employment and returning to the home farm to take over day-to-day management and labour responsibilities. In all cases with the late- and mid-career farmers this was interpreted as attributing robustness to the family farming business, which all carried on business as usual. Personal health crises, whether mental or physical, resulted in adaptation to the farming business, to build capacity to reorient the business in the case where an injury occurred when working with cattle, and, in another case planning to ensure a clear transition to the next generation to avoid uncertainty and stress.

> *"Father's, he's 79, he's had MS since the mid 80s and in the last ten years he's not really been very mobile so he's, and in fact he's been quite poorly recently, so he hasn't been in at all, he did come in this morning but he's stepped right back now but he used to do the day to day management." UK/MC1*

In one Flemish case (BE/MC3), the farmer was diagnosed with a long term health problem which resulted in him radically transforming the future direction of his business, from milking cows to cooperating with his neighbour and rearing young stock, in order for him to continue farming. Adaptation of the farming business was also required to accommodate a dependent family member with health problems in Southern Sweden (SE/MC4), ensuring that the farmer was able to work closer to home.

Compared with other countries, the Northeast Bulgarian narratives were notable for not mentioning human health-related shocks at all. Whilst family farms were prevalent in the Northeast Bulgarian case study, their large scale meant that a single individual tended not to be responsible for the day to day decision making and management of the whole farm business, which spreads the risk associated with a single member of the business becoming ill or injured, as was generally the case in Flanders, East Anglia, Southern Sweden and Central Italy.

In East Anglian, Southern Swedish and Flemish narratives, the effect on well-being of heavy workloads and work/life imbalance were often mentioned. Many narrators (at all career stages) found it challenging to achieve a balance between achieving outstanding farm results and spending enough quality time with their family. There was a contrast between how early-, mid- and later-career farmers approached this situation. Examples of early-career farmers in East Anglia and Flanders tended to work

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long hours with little work/life balance to try to get themselves established as farmers, mostly at the expense of family time and their own health and well-being. There also appeared to be different expectations among the early career narrators' families, perhaps in some cases due to their experiences working in non-farming jobs, regarding parenting roles and hours of farming work.

> *"...well I don't really remember dad being hands on in our upbringing so much, whereas now it's… expected and actually I enjoy it, but we're trying to balance that with the … particular lifestyle of… I say lifestyle of job... career of farming, where windows and opportunities of actually doing what you need to do are becoming smaller and smaller." UK/EC2*

> *"… trying to get their ship set so that when they do have the families that things are under control and they can take more of a steering role rather than a quite such an active, on the seat of the tractor role, I think is what needs to happen to the industry for sustainable agriculture for people so that we don't end up, well with too many farmers committing suicide or whatever, or suffering wellbeing, health problems and things." UK/EC2*

Mid- and late-career farmers tended to have more farming experience and confidence in their farming abilities (perhaps they had less to prove), their children were older and, in the case of older generation farmers, they had spouses who also worked on the farm and/or took on a more traditional role of supporting the farmer. However, they still typically worked long hours, though on reflection, statements such as "I don't understand why we worked so hard for so many years, without a single break" and "We should have taken more time off" appeared in the narratives of Flemish farmers.

In contrast to the dairy farmers of Flanders, the poultry enterprises in Southern Sweden had lower labour intensity, though they still reported working long hours. One farmer (SE/MC1) mentioned that the heavy workload was potentially what had made his children reluctant to engage in farm work, and he pondered that "Maybe they have seen how much I work and become put off". Unlike farmers in other countries, SE/LC1 described his son taking parental leave and the business had to employ new members of staff to accommodate this, interpreted as an example of robustness.

Workload and work/life balance were not mentioned in Central Italy and Northeast Bulgaria to the same extent. Central Italian hazelnut production is highly mechanised and many of the smaller hazelnut farmers also worked in jobs off the farm. In Northeast Bulgaria, the farms employ large workforces so the pressure on individuals to carry out all the farming activities, as is so often the case in the East Anglia and Flanders, is not apparent.

Table 5 Human Health: Drivers and Responses

Human Health 11 shocks, 2 trends	Robustness	Adaptation	Transformation
Accidents	BE-E, BE-L(2)	BE-E(2), SE-M	
Illness	SE-L,UK-M	IT-E, SE-M, UK-M	BE-M
Overwork	UK-E		

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4.3.2 Relationships

In one story a relationship was transformative for the narrator: the grandfather of BE/MC1 had started the farm, but his father had not been interested so that the farm was lost to the family. BE/MC1 therefore established an alternative career in the chemical industry but then, having married into a farming family, returned to a farming career.

There were four mentions of family breakdown that were shocks and identified as potential turning points in the narrators' stories (three East Anglia, one Southern Sweden). These were three in mid-career and one in a late-career narrative, although two were in a previous generation. Two of the family breakdowns caused adaptations, but in two cases the farm system was robust. The family breakdowns occurred both in the narrator's stories but also featured in the farm story. In UK/MC2 and UK/MC3 family breakdowns in the previous generation profoundly affected the current generation. In UK/MC3 the splitting-up of the farm during the divorce determined the narrator's attitude and ambition to re-unite the farm in his lifetime. In UK/MC2 it was an intergenerational relationship breakdown in the previous generation that drove the somewhat formalized contractual nature of the son's involvement and ensured that he prioritised family relationships over retaining the farm size when his father died.

> *[when…]"my father died, my brothers and sisters decided that, because we were all equal shareholders, or we inherited equally from my father, they decided they wanted to sell out. I didn't really want to stop them, so we agreed to sell the two bits that belonged to my father." UK/MC2*

In one case (UK/LC3) the farm had only survived the marriage breakdown with young children involved, because at that stage, forty years ago, there were farm workers that could step in when the narrator had to look after his children. That narrator now farms the same area alone, illustrating perhaps that the same situation would result in a very different response today.

> *"…I was left with the two boys and so there was a time then when we were glad of the chaps around because I was bringing up two boys and I had to employ housekeepers and that sort of thing, they were only five and seven when I was left on my own. So it was handy to have a couple of blokes on the farm because they could carry on." UK/LC3*

Family breakdowns were evident in other stories but were not highlighted by narrators perhaps because they did not want to talk about it, or because they deemed it not relevant to their farming story.

Table 6 Relationships: Drivers and Responses

Relationships 5 shocks	Robustness	Adaptation	Transformation
Marriage breakdown	SE-M,UK-L	UK-M	
Intergenerational problems		UK-M(2)	

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4.3.3 Intergenerational change

Intergenerational change was largely seen as a cyclical driver, with the most frequent response being categorised as displaying robustness, accounting for 25 of the total of 38 cyclical change drivers. This driver was most frequently identified in Flanders (17 of the 25 change drivers); in other farming systems contexts there always some, but fewer. Only two of the 11 early-career farmers participating in the study were in their 20s. There were none in Northeast Bulgaria, because many narrators, mid- and late-career, took over holdings carved out after transition). This suggests that the process of transition from one generation to the next has extended to children in their 30s and 40s. Although intergenerational change is inevitable through the cycle of life, few cases demonstrated careful planning of the transition to the narrator, or had firm plans for the next generation.

The cycles of generations lead to farm adaptations in all countries: adaptations occurred when farms or enterprises were divided between siblings, or in East Anglia, one instance of a nephew being interested in farming entirely rejuvenated the uncle's approach; the uncle (UK/LC2) otherwise had no successors.

Except for Southern Sweden, all case studies also had narratives where robustness was associated with intergenerational change; this process was judged to lead to transformations only in Southern Swedish and Flemish cases. In Southern Sweden, one narrator's father had not wished to take over the farm from his father, so the narrator (SE/MC3), who had worked on the farm during his holidays and studied agronomy, was able to take over from his grandfather. In another Southern Swedish case, the saturated jobs market in his graduate career caused SE/EC2 to return home, to then also study agronomy and to later transform the farming business. Four of the East Anglian cases (2 early-career, 2 mid-career) involved intergenerational change by a return to the farm by a son that was stimulated by retirement by either the principal farmer (the father) or 'the men': this is an example of robustness in terms of the farm, despite a transformation of lifestyle for the narrators.

The stretch of generations disturbed succession in East Anglia and Flanders and highlighted scale issues limiting the ability of farms to provide incomes for the next generation; in Southern Sweden this was overcome through the proactive recruitment of farmers by broiler companies which provided extra enterprises to existing farms. Early-career farmers in the Flemish and East Anglian cases were especially affected by intergenerational stretch, causing the narrators to either farm elsewhere (BE/EC2) or to have separate careers before returning to the family farms (BE/EC1 and BE/EC3 worked in farming related jobs). In East Anglia, two of the early-career farmers (UK/EC2, UK/EC3) had qualified to degree level in careers outside farming and were in their 30s before they returned to the family farm. In neither case did there seem to be a sense of expectation from the parents, or indeed from the narrators, that they would return, and their return to the family farm led to adaptation. The East Anglian mid-career farmers, in contrast, had agricultural qualifications, two intended to return to the family farm, the third (UK/MC2) did not expect to as he was the fourth child, but later approached his father when he lost confidence in his other career; thereafter followed a curious series of contractual arrangements with his father until his father's death, when land was sold to pay out his siblings.

In Flanders, the parents of BE/EC1 decided to give him a chance at an earlier age than they had had. Even so, this took some adaptation and a change of dwellings before the transition was successful. BE/EC2's move to three times daily milking can be interpreted as a transformation through

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intensification. In other Flemish narratives, the return of the younger generation to take over was unremarkable, in terms of change to the farming system (robustness, two cases). Following an accident which might have ended his farming career, BE/LC1 depended on the support of his son for the survival of the farm, although could not afford to pay him as the farm was too small to produce enough margin for two full-time incomes. This was resolved when the narrator found an off-farm job, enabling the succession to be completed. SE/EC3 provided the other incidence of transformation following succession, when the farm was converted to an organic system.

Intergenerational change occurring on neighbouring farms also impacted narrators. UK/EC2 had to adapt due to the shock of the neighbour's son returning home and taking over driving of the combine, disrupting a planned cooperative arrangement and incurring an unanticipated labour charge of £20,000.

When the next generation have taken over, in some cases the retiring generation can become a source of mentoring and support or, in contrast in others, they can cause stress due to interference or conflicts of ideas. In Flanders, BE/MC2 struggled with his father's involvement (despite his retirement) and used independent consultants to enable him to officially become the main farm manager, providing him with freedom he needed to transform the farming enterprises and operations.

Further challenges were noted when the successor generation was expected to generate income to support the retired parents (UK/EC2) or when the death of the older generation caused farms to be split, or narrators have had to buy out their siblings, either reducing the size of the farm (UK/MC2) or increasing indebtedness. The death of the main actor in the farming business (often the father), not only resulted in accelerated succession, but also tended to be associated with a change in the priorities or enterprises of the business. Examples of robustness, adaptability and transformation were observed with the death of the main farm actor in East Anglia, Flanders and Southern Sweden, respectively. For UK/LC1, the same enterprises remained after the death of his employer, the Estate owner; however, the priorities given to those enterprises shifted when the son took over (robustness). Conversely, UK/MC3 mentioned that his children were not particularly interested in farming the land themselves, but would prefer to leverage capital from the farm business for other activities, meaning the land would still be held in the family and farmed, and possibly managed, by contractors. BE/MC3 took over after his father's death, but the labour required to manage the farm education diversification enterprise was excessive and so the infrastructure previously been used for this purpose was converted to agritourism (adaptability). SE/LC3 had to sell cattle to pay the inheritance tax when their father died, resulting in the transformation from a beef to poultry enterprise.

Table 7 Intergenerational change: Drivers and Responses

Intergenerational change	Robustness	Adaptation	Transformation
Trends (7)	BE-M(2), BE-L	SE-E	BE-M, IT-M, SE-E
Cycles (25)	BE-E(5),BE-M, BE-L(5), BG-M(2),IT-L, UK-M, UK-L	BE-E, BG-M, IT-E, SE-L, UK-E, UK-M, UK-L	BE-E, SE-E
Shocks (1)		UK-E	
Death (3)	UK-L	BE-M	SE-L

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4.3.4 Retirement from farming and redundancy from off-farm jobs

Retirement, a driver occurring as a cycle, arose in many narratives in the context of intergenerational change, although only two narratives identified retirement as a key change point, one related to entry into farming and the other to leaving farming. UK/EC3 discussed how retirement of the farm worker responsible for the arable enterprise of the farm led to the arable enterprise being contracted out; it was only brought back in hand when the son (the narrator) returned to the farm some 14 years later. This was interpreted as long-term flexibility and adaptability within this farm system. In Flanders, BE/LC3, with no successor for the farm business, spoke of his plan to sell the farm buildings (the land was rented) and retire to the city and purchase a house with his wife in 2020 – a clear transformation for this narrator, and an end to his farming business, although dairying could continue on the land. This might not itself affect the resilience of the farming system as a whole, but its frequency for other farmers it is probably the main mechanism propelling the secular decrease in farms in the Flemish case.

As a shock driver, redundancy from off-farm employment was instrumental in driving change in three family farming businesses (BG/LC1, UK/MC3 and SE/MC4). SE/MC4 described how, prior to the narrator taking over the farm, both her parents had part-time off-farm jobs, and both were made redundant at different times. The narrator's father was made redundant first, prompted establishment of a poultry enterprise (transformation) to replace the lost income. When the narrator's mother was also made redundant, they expanded the business by building a second poultry shed to support two full-time workers. These redundancies thus played a crucial role in development of the family business, which the narrator subsequently took over. In 1996 BG/LC1 was fired from his job as a bank director when several banks in Bulgaria went bankrupt. After a period of unemployment he formed a partnership with a veterinarian to establish a farming business. This was a clear transformation for the narrator, who had had no previous farming experience.

> *"I spent a very tough time after closing the bank - perhaps a year or two, I looked in the eyes of people accusing me of losing their money, even though we had no bad debts, we did not have bad credit, but the state decided to close it. It's another topic ... to shut people's money down, to devalue them – then the hyperinflation started in 95/96 … After this period of time and I said – Fine, you have to work for yourself. And we got together on the goodwill with the doctor." BG/LC1*

The final example of a redundancy as a key change point in the narrator's story was related by UK/MC3. He had worked away from the family farm for most of his adult life. The company he was working for was brought out in 1995 and he was made redundant, coincidentally around the time his father was approaching retirement age, so the decision was made for him to return home and take over the running of the family farm. This can be interpreted as an adaptation to the farming business, it largely continued as it had done before, albeit under the management of a new and enthusiastic farmer.

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Table 8 Retirement and Redundancy: Drivers and Responses

Retirement and Redundancy	Robustness	Adaptation	Transformation
Retirement (Cycles)		UK-E	BE-L
Redundancy (Shocks)	SE-M	BG-L, UK-M	SE-M

4.3.5 Financial pressures

Relatively few instances of major changes arising from financial pressures were identified in farmer narratives. Conversely, nearly all the narratives indicated substantial and continuous investment to improve the performance of the agricultural businesses in question, but this appeared to be a matter of routine, anticipated as a normal requirement to stay on in farming. There were only two instances of unanticipated financial crisis, both in Flanders, which had a major impact; these can consequently be interpreted as shocks. The remainder of incidences of financial pressure involved falling profitability, gradual accumulation of underinvestment that needed remedial action, and one issue of scale without any opportunity to increase it. All of these can be interpreted as trends.

Table 9 Financial Pressures: Drivers and Responses

Financial pressures	Robustness	Adaptation	Transformation
Crisis	BE-E(2)		
Falling profitability	BE-M, SE-M	IT-L(2), SE-E, UK-M(2), UK-L	IT-E, SE-L
Underinvestment	BE-L	BE-E, BE-M	

4.3.5.1 Financial crises

An accountant's error during a period where the farm business was changing its legal status exposed a family business in Flanders (BE/EC2) to a charge of fraud. The consequences of this shock compounded several other serious prior financial problems; nevertheless, the family carried on their business much as before, but on a further reduced income. The family business of BE/EC3 also suffered four consecutive years of severe financial instability. This arose from a combination of, mainly, low product prices, weather-related losses in their contracting businesses and delayed payment of benefits and subsidies. Major investments had to be postponed for both the farms described to remain in business. Their response, reflecting that heard in many other narratives, was of stoical (though dissatisfied) acceptance:

> *"Yes, the drive to do better tomorrow… Yes, you cannot give up. That is the most stupid thing you can do." BE/EC2*

Other than these two Flemish stories, financial crises were not identified in any other narratives. Nevertheless, the narratives frequently mentioned fluctuating prices and incomes but, as they did not lead to identifiable turning points, they can be interpreted as noise.

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4.3.5.2 Falling profitability, underinvestment and problems of small scale

Declining returns appeared as a gradual trend (creeping change) in a number of life stories. In recent decades, the general farming business environment in the Flemish case-study area has been characterised by small sized farms buffeted by price volatility, and in these conditions of uncertainty investment decisions have been risk-averse. Where profitability has fallen to unacceptable levels – for instance where a successor needs additional income – investment requirements became inescapable. For BE/EC1, major investment decisions had all been postponed by his father. Thus, the burden of added debt repayments from building new livestock housing and installing a milking robot all occurred in the early years of his management. He took a proactive stance with a clear plan to develop and expand the farm.

> *"At once I had to keep up with everything and to improve everything at the same time. I had to take over a farm business, and I also had to make a huge catching-up for the farm business. And that was sometimes a lot at the same time." BE/EC1*

BE/MC1 handled the problem of underinvestment by erecting a new deep litter cattle building by himself. However, while that saved cash flow, it took time to erect and milk yields were depressed for a year after completion. On both these farms, the response to falling profitability was capital extension to improve long-term viability. Another unrelated Flemish example of falling profitability was in BE/MC3's tourism diversification enterprise, which had been established to provide income for two farm generations. Capacity in their B&B was never fully utilised, and the labour involved in providing the breakfast service proved too costly. The robust response was to shift to providing less regulated and lower cost self-catering accommodation.

Two narratives in the Central Italian case identified falling profitability as the prompt for a system change. In one of these (IT/EC1), the narrator's father realised that the revenue from the area's traditional viniculture – which produced poor wine – could be improved by shifting to hazelnut production. The transformation was also aided by grants for grubbing up unproductive vines.

> *"Three years ago we have planted hazelnut trees also, because of the high profitability. It was my father's decision, I didn't want to." (IT/EC1)*

In the other case (IT/LC3) the rising cost of labour and potential productivity improvements twice encouraged mechanisation, firstly mechanical harvesting in 1973, and in 1980 use of a self-propelled harvester. Several other narratives in this context (IT/EC2, IT/MC2, IT/MC3, IT/LC1) underlined the importance of investing in technological innovation, mostly related to harvesting machinery. Five Central Italian life stories identified, to a varying degree, collaborative efforts in cost reduction and marketing power to overcome their relatively small scale. The other four narrators were all pluriactive, with their main jobs outside the agricultural sector.

Two Southern Swedish narratives also mention falling profitability; one in which falling returns to beef production motivated introduction of a mink enterprise in 2012, the other (SE/EC1) discontinued unprofitable pig production and reduced labour costs after converting to an organic system. Mink production, however, had not been as profitable as expected for SE/LC1, and the earlier transformation

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to broiler chicken in 1995 poultry brought most income into the farm. SE/EC1 stopped producing pigs in order to concentrate more on poultry production:

> *"We invest in what generates income and doesn't take too much time".* SE/EC1

The introduction of organic poultry involved financial constraints that were addressed by reducing labour; while to an extent this adaptation has been mitigated by some mechanisation, it has been at the expense of an increase in peak workload, and vulnerability to future shocks, such as an episode of adverse health affecting either one of the farming couple, which would require more backup than currently exists.

Three East Anglian narratives associated the trend driver of falling profitability with a major change of farming system. The first of these (UK/MC1) had experienced a decade-long evolving trend of increasing debt-financing costs on additional land purchases and falling returns, until eventually it was realised that a fundamental review of the farming system was required. The response was a restructuring of the overall asset base, including consolidation and rescheduling of debt repayments, some land sales (see 4.3.10) and a refocusing on contract farming as the mainstay of the business. This necessary reinvestment in efficient modern machinery was better utilised and more cost-efficient.

UK/MC2 had begun a lengthy process of transfer from his father but the amount of land he was farming was not enough to support his growing family.

> *"… at that point, dad, with some convincing on behalf of my wife and myself, decided that he'd let me contract farm the other bit." UK/MC2*

This adaptation, expanding the area farmed, continued for seven years until his father's death, when as discussed in Section 4.3.3 above, the farm was divided between him and his siblings requiring further adaptation of the business:

> *"…we agreed to sell the two bits that belonged to my father. I kept hold of what was originally mine and I had to make, it was quite hard, I had to make some people redundant and, at that point, I decided to go on and keep on doing it myself or should I go in with somebody bigger, and with the economics, how they were, I just thought I'd be, I stood a better chance of going in with somebody bigger, which is what happened, and that's where we are today, so it's a bit convoluted." UK/MC2.*

In seven life stories, contracting played a clear role in addressing small scale and the high cost of machinery, either by undertaking contract work on other holdings (the majority of cases) or conversely, contracting in others to undertake varying proportions of farm operations.

The final East Anglian example of financial pressure stemming from falling profitability was narrated by UK/LC1, manager of a large estate, who was faced with high labour costs. For both cultural and social reasons, these could not be reduced. Potatoes at that point were being produced on the estate through profit-share arrangement with another grower, so:

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> *" I was trying to find these guys jobs … So we bought a de-stoner and we started stone separating, then we started planting the potatoes, and after three or four years of doing this, in this partnership, we said well hang on, we might as well do it ourselves." UK/LC1*

Taking back the management of the potato enterprise, and moving from early production to main-crop, provided the opportunity to better utilise the farm labour force and, because the estate had better resources and production ability to than the grower, profitability improved.

Ability to achieve expansion of output has been limited in dairying by the existence of the quota policy. For BE/LC1, some scope for expansion arose from quota purchase and allocation from the national reserve, but eventually "*if one wanted to buy quota, then one needed to take over* (another) *farm*". Thus, the farm maintained an output that produced sufficient income to live on, provided that risks were avoided and costs were kept as low as possible. The exception was the urgent need to replace the livestock housing, which was achieved through the use of his own labour.

4.3.5.3 Resilience to financial pressures

While relatively few of the few farm system changes identified resulted primarily from financial pressures, the latter issue often arose in the narratives and is an example of background 'noise' (Maxwell, 1986). It is notable that none of the turning points in the Northeast Bulgarian narratives was associated with financial pressures, although much of the narrators' conversation focused on investment, particularly in infrastructures that enabled modernisation of farming practice to proceed. The major financial pressure leading to change was associated with falling profitability, illustrating the classic microeconomic production choice model by substituting between enterprises according to their profitability. Poultry and hazelnuts, in Southern Sweden and Central Italy respectively, most closely corresponded to this phenomenon. In other respects, the frictions preventing smooth substitution between different outputs were more significant, including problems of small scale in Flemish and, interestingly, East Anglian farming systems, where despite the relatively large land area of holdings, ever larger land areas were required to absorb the rising costs of machinery. In both cases, the high cost of land as an input and the immobility of labour (resulting from information and transactions costs, and rigidities) have acted as constraints on adaptation or transformation, at least until the pressures have become acute.

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Tables 10 and 11 recognise that miscellaneous factors interact to produce the effects on system change points driven by, primarily, external opportunities and constraints. These will be considered in the remainder of this section.

Table 10 Opportunities: Drivers and Responses

Opportunities	Robustness	Adaptation	Transformation
Transferable skills	BE-L	BG-M, BG-L	BE-E, BG-M, UK-M
Miscellaneous	BE-M, BE-L,BG-M, IT-E	BG-M(2), IT-E, IT-L(2), SE-L UK-E, UK-L	-
Land	BE-M, BE-L, BG-M, UK-L	BE-E(2), BG-M(3), BG-L, IT-E, IT-M, IT-L, SE-M, UK-L	IT-E, IT-L
Market	BE-L, BG-M	BG-M, IT-L(2)	SE-E(3), SE-M, SE-L(3)
Supply chain		IT-E(2),IT-M, IT-L(2)	IT-L
Technology		BG-M, IT-M	
Policy (trends)	BG-M	BG-M(2), IT-E(2), IT-M(2), SE-L, UK-L(2)	IT-M

Table 11 Constraints: Drivers and Responses

Constraints	Robustness	Adaptation	Transformation
Labour	BG-M	BG-M(2)	
Disasters			
Animal health	BE-M		UK-L
Fire	SE-L		UK-M
Weather extremes	IT-E(2), BE-M, BG-M		
Supply chain problems	BE-E	BE-E	
Policy constraints			BE-E
Policy shock	BE-L		UK-L
Planning shock		BG-M, SE-M	BE-L

4.3.6 Transferable skills

The ability of our narrators or their family members to draw on skills developed outside of farming provided many opportunities for diversification and drove change points in several narratives. Where such events occurred, the narrator or their partner were previously, or currently, working or studying off the farm. Three turning points in the Northeast Bulgarian narrative context were enabled through the skills, knowledge and experiences generated off the farm. BG/LC1 and his business partners became interested in biogas generation and a more environmentally friendly way of farming so travelled widely to gather information to support the implementation of such a system on their farm (adaptation). As discussed above in Section 4.3.4, both had had long careers, in banking and veterinary practice, prior to farming. These provided them with the business planning and research skills to realise

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the project. BG/MC1 initially qualified and worked as an engineer, and used his experience to establish an irrigation business. Finally, BG/MC5, through study and work off the farm developed the skills to support development of several diversified enterprises on the farm (such as the feed pelleting plant), interpreted as a transformation since it enabled year-round use of farm labour.

BE/LC2 transferred skills from a previous career to provide additional income through running courses. Similarly, UK/MC3 had had a long career in estate management, part of which involved helping tenants to obtain water abstraction licences. These experiences gave him the confidence and skills to set up his own irrigation abstraction company (transformation) after he had returned to manage the home farm. In this latter instance it was a transformation of the farmer and his broader business interests rather than a transformation of the farm business itself which occurred. In Flanders a new relationship for BE/EC2 with a girlfriend who had a career in marketing brought new skills to the farming business. These resulted in significant diversification (transformation) of farm activities including direct marketing of meat, a farm website and school visits.

4.3.7 Capitalising on other opportunities

There was a range of opportunities that presented themselves to narrators across all countries which did not easily fit into the categories described in this section, but which also resulted in change points for the narrator and/or their farming business. These fell into several areas: diversification as an adaptation or transformation outcome of various drivers, funded scholarships, acquiring practical farming experience, cooperation and financial opportunities. They come some way into the spectrum from internal to external drivers, mostly arising externally but requiring also some personal involvement of the narrator.

These miscellaneous openings are present in narratives across all career stages and in all case studies apart from Southern Sweden (diversification opportunities described in the Swedish narratives are interpreted as market opportunities in Section 4.3.13 below). Diversification opportunities in Central Italy included starting agri-tourism enterprises and building an olive oil mill on the farm, all adaptations to the farming business. Similarly, starting a grain mill and introducing farm education activities were diversification enterprises introduced in Northeast Bulgaria and Flanders, respectively. All these examples of adaptive diversification resulted in securing the financial situation of the farm business in the short term. Nevertheless some, for example the education activities in Flanders, despite being profitable did not last due to the high labour requirement in addition to the primary farming operations. Farming scholarships were mentioned as change points by UK/EC1 and BG/MC5. The enthusiasm and confidence gained by the narrators as a result of taking up the farming scholarships provided positive adaptation stimuli to their respective farming businesses. Two farmers (BE/EC2 and BG/MC5) spoke of the opportunity to work away from home to gain farming experience, building their interest and enthusiasm, and providing them with a personal turning point that led to their future farming businesses. UK/LC3 acknowledged an opportunity to cooperate with two neighbours which meant he had more land to farm, greater labour flexibility and lower machinery costs. This adaptation has led in turn to him finding a farming successor, his neighbour's grandson. A financial opportunity presented itself to SE/LC1 who took advantage of the financial recession to buy cheap building materials with which to build a new chicken barn. This adaptation allowed the farmer to expand his operation at lower cost than if there had not been a recession.

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The range of opportunities presented in this section clearly acted as major drivers that led to potential change points in farm businesses. Reflecting on these, however, several narratives identified opportunities that existed but were not taken up, and many others may have not been mentioned because they were frustrated, and the status quo prevailed as a result of a range of financial, resource and social issues.

4.3.8 Labour

A lack of labour was only mentioned as a driver of change in the farm businesses in the Northeast Bulgarian narratives. However, labour requirements and constraints were also mentioned in Central Italy, Southern Sweden and East Anglia in a range of contexts that may have in the past or in the future influenced the resilience of the farming businesses. Labour, other than the workload of the farmer, was not mentioned in the Flemish narratives at all. The small size of the dairy enterprises in Flanders meant that a single operator usually contributed labour, with their partner or children occasionally contributing some additional input on a part-time basis.

In the Northeast Bulgarian narratives, the most serious and frequently mentioned problem was the lack of sufficiently skilled migrant workers and the difficulty of retaining them in the country, even though salaries offered were not perceived to be unattractive, compared with workers' home countries, and social facilities were often provided such as housing, working clothes, a kindergarten. Bulgarian farming systems were characterised by very high labour inputs compared to other narrative contexts, although it is not clear what proportion were working on the arable enterprises. Issues with competition for labour from other countries, workers living in remote communities a long distance from the farm and the closure of vocational and agricultural technical schools were all mentioned as constraints to hiring and retaining a quality labour force in Bulgaria.

> *"From year to year it's getting harder with people. There are no qualified people, even if you find them, they have the document [diploma, certificate] but they do not have the practice. The outflow of quality people out is great, especially in our sector." BG/MC2*

Such was the problem with labour for three mid-career Northeast Bulgarian farmers that they made changes to their farming businesses to cope with the issue. Two farmers (BG/MC4, BG/MC7) chose to move out of labour-intensive vegetable production and concentrate solely on arable cropping (adaptation). The other farmer (BG/MC8) chose to scale back the size of his operation over time to reduce the need for labour (robustness).

Only one farmer (BG/MC5) did not complain of lack of staff or high staff turnover. This was explained as a result of the narrator continuing to pay the same salaries paid by their previous, now bankrupt cooperative employer, and in doing so had gained the trust and loyalty of his labour force.

All narrators in Northeast Bulgaria expressed anxiety concerning the ageing rural population and the lack of generational renewal in the labour force. This theme also arose in the East Anglian narratives, but more positively since it offered an opportunity for incoming younger generations (see also Section 4.2.4 on retirement). One late-career East Anglian narrator commented that the retirement of the older labour force on the farm meant that he was able to recruit new blood, who were more open to fresh ideas.

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"They [the older workers] weren't very keen to embrace new ideas always, I think that's the best way of putting it." UK/LC1

In contrast to the Northeast Bulgarian situation, where keeping the workforce was a problem, UK/LC1 felt that he was creating a culture of complacency by offering a very comfortable way of life (housing and good employment conditions) with very low staff turnover as a consequence. He felt that a certain degree of 'churn' amongst the labour force was a good thing to allow new ideas and innovation to occur within the business. Another labour-related issue apparent in East Anglian narratives was the possibility, in arable farming, to employ contractors to carry out all field operations. This possibility offered up a wider range of succession options for the next generation than there might be in livestock farming, for example.

In Southern Sweden there did not appear to be too much difficulty in retaining good employees, but finding skilled employees was problematic for some farmers. SE/MC4 found it difficult to recruit people interested in farm work. Having family members or employees that are skilled in all areas of the production system was observed in Southern Sweden to be important for the robustness of the farm, as then everything is not dependent on one single person. If something should happen to that person, family members or employees can step in and take over before an economic or animal welfare crisis materialises.

In Central Italian narratives, discussions concerning labour focused on the increased mechanisation of hazelnut farming reducing the need for labour, consequently reducing the traditional roles that women used to play in the family farming operation, mainly to do with the harvest. The Central Italian researchers noted a clear demarcation between the roles of men and women in the farms studied, the women were either not involved at all in hazelnut production or perhaps worked off farm, or they focused on related non-agricultural activities on the farm such as agri-tourism. This was one of the few gender-related discussions that arose in the narratives and highlights how the increased mechanisation of farming has contributed to change in the social and demographic structure of farming communities. Otherwise, perhaps because narrators were predominantly male, gender was not a theme that arose.

4.3.9 Disasters

Disasters, as unexpected shocks, included extreme weather events, fires and animal disease outbreaks. These were identified in narratives in all countries and at all career stages. Extreme weather, such as frost (IT/EC1), drought (IT/EC2), severe rainfall (BE/MC1), hail (BG/MC3) events all resulted in little or no response, despite the impacts in some cases appearing quite large (for example, 26% of BG/MC3's crop area was completely damaged). Farmers appeared to accept that extreme weather events and the losses associated with them were just part of farming 'noise', they dealt with them as they occurred and moved forward, demonstrating the robustness of these farming systems to climatic events. The long long-term nature of hazelnut production meant the severe frosts and droughts in the space of two years (2017-2018) were perceived as "critical" years that "were part of the game" (Central Italian Task 2.2 Country Report, 2019).

There were two significant fires mentioned in the narratives. One took place in East Anglia, when the narrator (UK/MC3) was a young man; however, this event changed the direction of the farm to the present day. The combine harvester caught fire and the narrator and his father took the decision not to

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replace it and, from that moment on, not to replace any machinery on the farm as it wore out but to hire in contractors instead to reduce the fixed costs of the business. This was a transformation in how the business operated. Although the fire took place a long time ago and transition occurred over an extended period, this affected the entire logic of operation and farm business philosophy by focusing on reducing capital costs and contracting out all farm operations remains the same. The second fire (SE/LC2) stimulated the succession to the next generation.

Animal disease shocks, whilst not common, were influential turning points in two narratives, one in the East Anglia and one in Flanders. In East Anglia, the outbreak of Foot and Mouth disease in 2001 resulted in a proportion of the 1,200 strong sheep flock on the mixed arable-livestock farm (UK/LC2) being slaughtered on welfare grounds. This event was very distressing for the narrator and his family, who as a consequence took the decision to sell the remaining 800 sheep and go out of livestock production altogether. This resulted in a transformation of the farm to solely arable enterprises.

> *"And effectively we had a welfare slaughter on the farm and we just lost heart, just, it was just horrible to see it. They wouldn't even let the damn lambs go across the public road to another field, it was stupid. So, we sold 800 ewes back up to Cumbria and never looked back. So, we missed the sheep but not the work involved!" UK/LC2*

The second animal health shock occurred in Flanders, prior to BE/MC1 taking over the farm, but the implications of that shock, which resulted in dairy cow numbers being reduced considerably just prior to quota being introduced in 1983, determined the future size and prospects of the farm that the narrator took over. Despite this disease outbreak, the robust response led to the farming business continuing with no major changes. The major effect was consequential, because expansion was not possible before transfer mechanisms for quota developed, and after that acquiring additional quota incurred extra costs.

4.3.10 Land

Opportunities with respect to land resulting in change points in the farm business were dominated by examples from Central Italy and Northeast Bulgaria, but with several examples in Flanders, two in East Anglia and one in Southern Sweden.

In Central Italian narratives, the high profitability of hazelnut production and in some cases the desire to set out on a farming career were key drivers for the desire to purchase land. The high profitability of the enterprise meant that existing farmers were able to raise the finance to acquire extra land as and when they were ready to expand, and three farmers (IT/EC2, IT/MC3 and IT/LC3) did just that (adaptation). However, a high land price and restricted availability in the most desirable growing regions meant that much of this expansion occurred into more marginal growing areas. Two other farmers (IT/EC3, IT/LC2) had spent their working lives in non-agricultural careers; but with a desire to eventually own a farm they had saved up considerable capital, providing them with the opportunity to purchase land when they were ready to make the move (both personal transformations for the narrators).

In Northeast Bulgaria, compared to the other case studies, the land situation was unique. Three of the four Northeast Bulgarian farmers mentioning land opportunities as change points (BG/MC5, BG/MC6,

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BG/LC2) were either existing businesses investing in agricultural land to set out in farming, or existing farming businesses purchasing land to expand rapidly (adaptation). In these cases, the availability of both EU support payments and available capital provided the opportunity to purchase apparently abundant land. The other Northeast Bulgarian narrator (BG/MC8) decided to grow his own cereal for a poultry enterprise, thereby achieving secure supply at good cost and quality, and began to rent suitable land that had become available. This opportunity provided security for his business (robustness).

In Flanders the availability of good farming land for sale is scarce, so when opportunities arose to acquire, or even plan to acquire, additional land for expansion, this resulted in a change point for the farming system. BE/EC2 identified an opportunity to build new livestock housing on nearby land (not on the home farm) to expand the business and to allow him to return to the farm (adaptation). The same narrator heard about a neighbouring farm coming up for sale in two years' time and, with the land owner's agreement, developed a business plan that involved acquiring this extra land to expand the family farm business (adaptability). In another Flemish instance, land that had previously been rented by BE/LC2 came up for sale and the family decided that they must purchase it to secure the future of the farm business, despite the high cost associated with doing so (robustness). In another unusual example, BE/MC1 was repeatedly approached by interested parties to buy his farm for urban development, due to its desirable peri-urban location. This provided a potential change point for the farm business and the family considered selling up and farming elsewhere. After a prolonged period of reflection, they decided to turn down all offers and remain farming where they were, in part due to language barriers in the region they would have moved to. This example indicates robustness as an inherent quality and draws attention to decisions at change points that result in no change to the status quo, if this is considered to be the best option for the business.

In East Anglia, examples of land-related opportunities that resulted in farm business change points were when previously rented land came up for sale and the two late-career farmers involved purchased it. UK/LC3 continued farming as before, albeit with a mortgage, whilst UK/LC2 set up a limited company with his wife, nephew and the latter's wife – a new business structure (adaptation). The rationale behind these land purchases for both farmers was to secure the land and expand their business. In the case of UK/LC2, the land purchased was in a different location to the home farm which was susceptible to flooding, also providing a degree of resilience for the business in response to anticipated rising sea levels.

Land availability constraints, due to high land prices or simply the lack of land for sale, were mentioned as being a driver for change in the farming business in narratives in three farming systems (Central Italy, Southern Sweden and Flanders). Land prices, availability and transactions, however, were topics that arose in narratives in all case study areas.

In Central Italy, rapid expansion of hazelnut production in traditional growing regions driven by relatively high profitability, and the consequent high land prices in those regions, encouraged farmers to look at more marginal growing regions to purchase more affordable land to expand their businesses. IT/EC2 and IT/LC3 purchased land in a neighbouring, more marginal hazelnut-growing region, to be able to expand their businesses when land around their own farms was too expensive. Whilst this is interpreted as an adaptation to ensure the resilience of the business, it also came with some risk as yields in these marginal regions can be lower due to poorer growing conditions and greater prevalence

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of drought. However, IT/EC2 saw some advantages, despite disadvantages of having land parcels in different regions:

> *"Our farm is fragmented in several plots. This has its disadvantages because of the distance between the various plots but also the advantage of compensating the years with non-positive climatic events that impact differently in the various plots." IT/EC2*

SE/MC2 believed that the location close to Stockholm restricted access to land, so the family chose to diversify within their current resource base rather than to try to expand. This decision was a turning point in their business when they started producing meat baskets to sell directly to consumers (adaptation). The local land constraint turned out to be to their advantage due to the proximity of a large population of potential customers. Land ownership was also discussed by other Southern Swedish narrators (SE/MC2, SE/LC2 in terms of the resilience of their businesses. They commented that renting, rather than buying land put limits on the rights and/or economic returns of investment made on the land, thus acting as a discouraging factor in business development. They viewed ownership of land, buildings and other assets as a means to increase the long-term robustness of the farm business.

> *"…then we realized pretty quickly that we were not so keen on being tenants, because… well, it is like renting a house. You don't get the money back." SE/MC2*

In contrast, UK/MC1 commented that high debt servicing level on purchased land relative to the low returns that could be gained meant that she would prefer to contract farm land owned by others.

> *"We really need other people to buy the land and ask us to farm it to be able to grow our business because we can't afford to buy the land because unless you've got big money coming in from somewhere else, you just can't do it." UK/MC1*

In Flanders, land availability was mentioned in many narratives as a constraint to expansion. Competition with other agricultural and non-agricultural businesses, urban development and 'pension farmers' (large land owners who have given up farming themselves and lease their land to tenants) were identified as drivers for high land sale prices and lack of available land. The competition between farms for adjacent land was observed by Flemish researchers to be driven by social status, since owning land that surrounds the farm house was perceived as a barometer of the farming family wealth. They observed that it was very inconvenient and embarrassing for a farmer if a strategically located parcel of land was for sale and either he or she could not afford to extend the land area, or if another farmer somehow claimed the land through informal network connections or arrangements. Even so, only one narrator (BE/MC3) clearly identified a turning point in relation to land availability. In this instance, the narrator's parents' farm, which he was expected to take over, was small, located close to a city centre, and subject to a 'difficult' (in terms of relationship) lease agreement with the land owners. This made it an unattractive prospect for the narrator's farming future. The introduction of the 'VUT' (early retirement) regulation, and the opportunity to take over both his parents' and his father's colleague's farm at the same time (both at retirement age) gave the narrator the opportunity to fulfil his ambition to take over a promising farm business with enough land, infrastructure and stock to continue the family farming business, albeit on a larger scale (adaptation).

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There were some differences in the relationship of farmer with farmland expressed in narratives in East Anglia and Northeast Bulgaria, compared with Flanders, Southern Sweden and Central Italy. Northeast Bulgarian narratives were characterised by rapid and large increases in size of farm (through land purchase and renting) over the course of the farming histories since 1990. However, despite this seemingly endless supply of land with which to expand the farm business, the researchers noted that since the political changes of 1989, the process of land transactions has been unstable, volatile, and dependent on continuous institutional changes, although this process has slowly stabilised since entry into the EU in 2007. However, increased competition in the grain production sector (entry of smaller grain farmers and larger investment funds), future uncertainty, the legal requirement for one-year rental contracts with landowners and its associated administrative burden, and lack of skilled and available labour, have led to a reduction in the amount of land rented by famers. Several Northeast Bulgarian narrators (BG/MC2, BG/MC3, BG/MC8) mentioned that they were reducing the amount of rented land they farmed and were relying on their own (often recently) purchased land.

In East Anglia, land farmed within an individual business tended to be a mixture of owned, rented and contract farmed (land owned by others but cultivated by our narrators: see footnote 1). Two distinct management approaches were observed in the narratives of East Anglian farmers. The first was to reduce fixed costs to an absolute minimum and farm a fixed area of land, the second to invest heavily in machinery and farm as much land as possible over which to spread fixed costs. With farmland prices being comparatively high in this part of Eastern England, farmers adopting the second approach tended to contract farm for others to expand and spread fixed costs over a larger land area. Some better capitalised mid- and late-career farmers (such as UK/MC3 and UK/LC2) continued to buy up small parcels of land when they became available.

4.3.11 Water

Water as a resource constraint and the need for irrigation were mentioned in Northeast Bulgaria, Central Italy and East Anglia, which were the narrative contexts with enterprises most likely to be directly susceptible to water shortage. However, these were only identified as drivers for change in Northeast Bulgaria and East Anglia. BG/MC3 emphasised the importance of water availability for cereal growing in his region, since it was delivered by aging irrigation systems dating from the socialist period. When these irrigation systems started breaking down and becoming unreliable (in the mid-1990s), rather than reinvesting heavily the narrator chose to transform the farming system from intensive to more biological management practices. This involved using no-till techniques and building up the organic matter in the soil. This ultimately resulted in a more sustainable farming system with improved soil fertility and water holding capacity.

UK/LC1 described how his elderly estate owner was getting his affairs in order to pass the farm on to the next generation. The owner sold 1,100 acres (approximately 450 ha) of land to invest in farm infrastructure, particularly by upgrading the irrigation systems necessary for potato production. Another facet of water shortages in this region, and growing of the water-demanding potato crop, provided an opportunity for UK/MC3 to develop a new business providing professional support for farmers to submit water abstraction licences. Because he had an understanding of the increasingly strict requirements for abstraction licences and the decreasing amounts of water allowed for

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abstraction, he had also put in an application to build a dam for his own water use to increase farm robustness.

In Central Italy, water was discussed particularly in the context of hazelnut production moving into less traditional, more marginal growing regions where drought could be more problematic. Irrigation systems were common in the more traditional hazelnut growing regions. However, even given this potential for water shortage in these new growing regions, the long-term nature of hazelnut plantations and production means that if infrequent, drought events are considered to be 'noise', having no long-term impacts on the farming business.

4.3.12 Supply chain: constraints and market opportunities

Changes in supply chain relations for farmers were occasionally drivers for change. Three of the five narrative contexts have market structures characterised by high concentrations of purchasers. The Italian company Ferrero buys a quarter of the global supply of hazelnuts; the Swedish poultry processing and distribution sector has a small number of operators; and in Flanders the dairy sector is dominated by three large processors, Danone, Friesland-Campina and the largest, Micobel, and although producer organisations exist, they are organised around the supply pool of a single processor and required to sell 100% of their output to it. In contrast, the arable farmers in the East Anglian and Northeast Bulgarian case studies sold through a variety of mechanisms and use grain storage to respond to a strongly seasonal pattern of price variation.

In the Central Italian and Southern Swedish narratives, strong demand for final products has driven a process of change in farming systems. One system transformation in Southern Sweden, from turkey to broiler production (by SE/MC1), arose from a change in the processing company's focus. In the Central Italian case, two trends stand out in terms of supply chain organisation: significant investment in harvesting and initial processing, and organisation of producers into cooperatives which provides countervailing bargaining power. Mechanical drying of hazelnuts has improved quality.

> *"With our own dryer the costs are also reduced … (in) addition quality is controlled better by immediately drying the product." IT/EC2*

Warehouse space for post-harvest storage also allows opportunity to be taken of better spot prices. Most hazelnut producers are also members of a cooperative, and three of the narrators (IT/MC2, IT/LC1 and IT/LC3) were instrumental in the establishment of their organisations. The first such initiative was founded by IT/LC1, who noted that

> *"In 1964, Perugina invited me to its headquarters and told me that if I assured a certain quantity of product they were prepared to purchase it. So, the first cooperative of the area has been founded, the Conger, that still exists." IT/LC1*

Taking advantage of farm expansion, intensification and specialization in hazelnut cultivation, and improving product quality promoted a transformation in an area previously dependent on relatively low-quality viticulture.

In contrast in Flanders, weak organisational bargaining power and reliance on market intervention have had different effects. Low prices, the high cost of additional quota and the difficulty of acquiring extra

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land led to a feeling of powerlessness among narrators. Only two, however, described system changes driven by supply chain issues. BE/EC3 lost a great deal of money on a potato contract, a difficult blow considering the large investments and consequent debt undertaken to develop and extend the farm. The result was a resolve never again to use contracts as a means of securing a market outlet. BE/MC1 had a contract to supply Kosher milk which paid a premium price, but this was terminated abruptly in 2007, and in 2008 the processor he had switched to also failed.

> *"..that whole crisis year cost us somewhere between the 35 000 end 40 000 euros. I always say to my wife 'we will never see that money back, even if the prices will rise strongly'. When you are still climbing out of the previous debt, the following crisis is already there, so to speak." BE/MC1*

Change points driven by market opportunity overlap (although not entirely) with the discussion in section 4.3.7 above. They were dominated by examples from Southern Sweden (seven of 12), though there were two examples from Central Italy, two from Northeast Bulgaria and one from Flanders. In all the Southern Swedish narratives, these market opportunities resulted in transformations of the farming businesses.

Since the early 1990s the Swedish broiler sector has worked actively on expanding their business in the case study region, with leading processing companies taking an active role in recruiting, supporting and encouraging farmers to either convert to or shift their production towards broiler chicken. In four of the seven Southern Swedish examples, farmers were approached directly by broiler companies, three approaches for organic chicken to early-career narrators (SE/EC1, SE/EC2 twice) and one to a late-career farmer (SE/LC1) for conventional production. Because of the profitable diversification opportunity this provided, all transformed their farming businesses to produce poultry. SE/EC2 also starting an additional supply chain activity by rearing parent birds. Narratives do not indicate whether the broiler companies actively target younger farmers, but from their point entry into a sector that provides advice and support on all aspects of production, supply contracts at fixed prices and is a growing industry must be an attractive option. SE/MC3 was not approached by a broiler company but saw an advertisement recruiting farmers, and again the attractiveness of the opportunity resulted in a poultry enterprise transforming the farm business.

SE/LC3 transformed to broiler production by a completely different route from those previously described. He had inherited a mixed dairy-cropping farm from his father but was not keen on livestock, so sold the dairy herd in the 1970s and specialised in arable production. In the 1980s he read an article about chicken production and became interested. At the same time, he was approached by an aspiring poultry producer wished to develop a 50,000-bird unit on SE/LC3's land. This arrangement was established but, after the original bird owner went out of business and after several different managers, the narrator eventually took over management of the unit and subsequently purchased and expanded it (transformation). This unintended, phased takeover of the broiler enterprise allowed the narrator to learn about farming poultry before taking the risk and investing himself.

BE/LC3 also considered entering broiler production because it was a profitable option considering his current land resources. However, the workload implications and time input required for a sole farmer,

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and his wife's dislike of farming were insuperable constraints upon this potentially adaptive change point, and so the farmer chose to maintain the status quo.

In contrast to the quite aggressive recruitment of farmers by Swedish broiler processors, SE/LC2 had to seek out egg production opportunities himself. He produced wheat, and wanted a way to use the bulk of it on farm. The egg company were receptive to him building poultry housing and starting egg production (transformation) which added considerable value to his crop production enterprise.

In Northeast Bulgaria, two narrators recognised market opportunities. BG/MC4 identified markets for vegetable growing, which led him to start out in farming; BG/MC8 expanded his broiler enterprise to make a better living for himself entirely from farming (he had previously worked off the farm) and for his family (robustness).

There were no examples in the East Anglian narratives of market opportunities driving change points, probably since arable farmers in the UK are generally price takers. UK/EC3, UK/MC1 and UK/LC2 chased markets for grain and potatoes by forward selling or using storage to achieve better prices. An entrepreneurial late-career farmer, UK/LC2, actively sought market opportunities for grain crop by-products, and sold straw to the local zoo for bedding and to another company for mushroom production.

4.3.13 Technology

Technology appeared as an enabler of farm system resilience, but some narratives also reflect the kind of treadmill effect established in Cochrane's (1958) classical model. Two late-career farmers, one in Central Italy and one in Northeast Bulgaria, were pioneers regarding opportunities for developing the use of, and investing in, technology. BG/LC2, who grew up on a farm but had trained and had a career as a radio and electrical engineer. These skills, along with the trend for increasingly large farms that required ever scarcer and harder to retain labour, led him to start a mechanised agricultural services company alongside his own farming activities. IT/MC2, keen on new technology and needing to reduce the amount of labour required for the hazelnut harvest, was one of the first farmers to purchase a mechanized harvester. This early adaptation was the precursor to what is now standard practice in hazelnut harvesting.

> *"The hazelnuts at that time were picked by hand on the plant. Then we have seen that we could easily harvest letting the fruits fall and picked it up from the ground. Then in the seventies the first harvest machine arrived." IT/MC2*

Technology was discussed in most East Anglian narratives, although was not interpreted as driving a change point. All East Anglian narrators mentioned using on-board computer systems and GPS in their tractors to allow strategic application of fertiliser and agrochemicals, also in some cases to vary seed rates or measure yield at harvest. With increasing regulatory pressure on the availability and use of agri-chemicals, this type of technology was considered by the narrators to be standard equipment for current arable farmers. Productivity (and ecological) impacts of detachment from the land are ambiguous, as UK/EC3 expressed:

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> *"…this corner of this field, which the bloke hasn't been in for a year, the bloke who knew it intimately would know you need to turn the drill up because it was a bit stickier down there and he'd need to put more seeds in the ground, and now the machine does it because it knows it and it's scanned the satellite image and it scans the soil and everything else." UK/EC3*

Technology was also mentioned as largely background 'noise' in Flemish narratives. BE/EC1 referred to a robotic milking parlour as part of a larger livestock housing development, which was interpreted as a turning point. However, the farmer viewed this technology as just an intrinsic part of the larger development.

> *"First, I bought everything, and I had an architect drawing plans for my stable but at the end, I chose for a milking robot for the social aspect. To be able to go to a baby shower anyway, without already saying 'I have to be home soon' before I even depart. (…) For everything actually because you live your life following the rhythm of milking. (…) You wake up in the morning in function of when you need to milk the cows. Everything you do during the whole day, is in function of: then I need to go to milking the cows. In the evening, you want to go out to do something and you're already thinking 'later I have to go milking the cows'. We go to a wedding party and I'm already thinking 'At what hour do I need to go home to be able to milk tomorrow?'." BE/EC1*

Technology was not mentioned in Southern Swedish narratives.

4.3.14 Policy and Regulation

Policy and planning shocks were interpreted as drivers resulting in all resilience response types (robustness, adaptation and transformation), although only in narratives of mid- and late-career farmers, and no policy shocks arose in Central Italian narratives.

Dairy quota policy shocks were mentioned in the narratives of UK/LC1 and BE/LC3. The introduction and subsequent restriction of dairy quota drove up the value of quota in the UK, and in 1987 the Milk Cessation of Production Scheme in England and Wales came into effect. This prompted the owner of the large estate managed by UK/LC1 to decide to sell the quota while its value was high, disperse the dairy herd and invest the money in irrigation, reducing the farm's vulnerability to drought and enabling expansion of the arable enterprise (transformation). The other policy change mentioned related to the abolition of quota in 2015. BE/LC3 described his anger at the overnight loss of €120,000, the value of the quota prior to abolition, in a year when milk prices were low. This paper loss resulted in a very difficult financial situation for the farm business, which survived only by relying on the narrators' wife's income and delaying payment to suppliers (robustness).

In Central Italy, four narrators (IT/EC1, IT/EC3, IT/MC3, IT/LC2) converted to organic hazelnut production. Three cited environmental reasons for converting. However, there were generous agri-environment payments and a market opportunity to differentiate and add value to their hazelnut production. The former motive was explicitly cited by IT/MC3 as a driver for his farm's transformation to organic production.

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Planning shocks resulted in the transformation of the farm business of BE/LC2 and adaptation of farm businesses in Northeast Bulgaria and Southern Sweden. BE/LC2, the farmer of a mixed dairy/pig farm had applied for and expected to obtain planning permission for new pig housing, but it was refused by the local authority. Combined with increasingly poor returns from pig production, this resulted in the sale of the pigs and a transformation to a farming system specialising solely in dairying. BG/MC4 had to shift the family farming business to another area because of plans to flood the farmland to create a dam reservoir the existing land. Interpreted as adaptation, the family continued to grow vegetables at the new location. Unforeseen planning issues caused an abrupt halt in the renovation of a poultry house resulted in significant delays and lengthy negotiations to SE/MC4's intended expansion of her poultry enterprise. However, permission was eventually granted, and the expansion goal was achieved (adaptation).

Changing trends in policy also resulted in several examples of changes in the farm businesses in Flanders, Northeast Bulgaria and Southern Sweden. In Flanders, the very high price of quota meant that BE/MC3 had no opportunity to expand dairying, so looked for diversification options based on their existing resources. With the help of extended family and a neighbour, the family began education courses alongside their existing farm business (transformation). BG/MC4 had received farm development support under the CAP, but uncertainty about future arrangements meant that plans to develop the business needed to be put on hold (robustness). A general impression from the Northeast Bulgarian narratives regarding the high (although declining) levels of rented land, the lack of long-term rental agreements and the lack of long-term policy vision meant decision-making was relatively short-term, and that farm businesses had to be nimble in adapting rapidly to change. From a policy and food security perspective this agility and ability to get in and out of land quickly can be positive (very responsive to policy drivers) or negative (cessation of farming to produce food and changing to something else). The trend to an increasing administrative burden associated with farming (a recurring subject in many of the case countries) resulted in SE/MC4 hiring an employee to carry out paperwork to enable her to focus on the farm business and achieve a better work/life balance (adaptation).

There were eleven instances of policy opportunities identified as trends, but none as either cycles or shocks. There were no mentions of policy opportunities in the Flemish narratives. Policy opportunities usually lead to adaptations, although there was one Northeast Bulgarian outcome was robustness and one Central Italian outcome of transformation. BG/MC3 mentioned the introduction in 2007 of SAPS payments as a support to sustain the farm business and securing regular family income (robustness). IT/MC1 and other Central Italian narrators (IT/EC2, IT/MC2, IT/LC1) made use of EU policy support for grubbing up vines to facilitate the switch to hazelnut production (transformation).

Agri-environmental support provided a policy opportunity, leading to adaptation, for four narrators in Central Italy (IT/EC1, IT/EC3, IT/MC1, IT/MC3) and one in East Anglia (UK/LC3). BG/MC4 mentioned the Bulgarian Rural Development Plan's modernisation grants, enabling adaptation investments and engagement in grain production. BG/MC6 explained how privatisation of farm assets had enabled him to purchase a fattening farm for calves: interpreted as an adaptation, the farming system was maintained, albeit under a different business management regime. This mirrors the changes observed in narratives where intergenerational succession often stimulates adaptation to the farming system.

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5 Discussion and conclusions

This exploratory comparison between life-stories drawn from separate narrative contexts adds considerably to the understanding of actual farm resilience, and how it operates in relation to a variety of risks and uncertainties. It is important to note that the insights are drawn from a limited, unrepresentative set of narratives that invoke interpretive hindsight on the part of the narrator, depend on selective memory, and may reflect projection of a desired persona rather than accurate causality and chronology of trigger pint for change. As noted, they may also neglect unobservable features, such as potential transformations in the farm systems. Sometimes internal drivers such as family breakdown were not identified as turning points, and opportunities presented themselves but were not always taken. Perhaps more importantly, it has not been possible to explore narratives of farmers and farm systems that have not been resilient. What these narratives do provide, however, is a range of examples of how economic, social, environmental and institutional drivers, in specific circumstances, have produced (and occasionally have not produced) robust, adaptive or transformational responses.

In this final section, the main implications of the findings of this analysis are explored. Some striking regularities that emerge across all the narrative contexts can be recognised, along with some major variations that are explainable as context-dependent. These insights are sometimes surprising, compared with what might have been assumed prior to the analysis being undertaken. They relate to the main types of driver and the responses that they produce, the importance of farmer resilience and the significance for that of family and community, career stage, and farming system. We draw on this interpretation to draw implications for policy, farm business and future research on farming systems resilience.

5.1 Drivers and responses

Our chief finding is that, compared with what we might have expected, farmers did not consider external shocks to be of major importance in their farm stories. Extreme weather events, for example, were interpreted as ‘noise’, the fourth category of driver, as they appear in Northeast Bulgarian and Central Italian narratives. The overriding responses to such shocks, robustness, involved absorbing the challenge and carrying on. In contrast, internal drivers such as intergenerational change, health, illness and mortality and family relations were identified by narrators as much more important. Almost as prominent a finding observed in the narratives was that robustness was the most predominant response to cycles and shocks.

Inertia is predominant, and trends affecting management mostly induce gradual adaptations, which we described as creeping change, rather than transformation. This could be a new response category, of gradual adaptation, lying beyond robustness, which is not a sufficiently clear, discrete farm system adaptation. All the narratives were gathered in 2018, although they stretch back over varying spans of time according to the career stage of the narrator. Those with longer time frames revealed a continuous creeping change, unremarkable at any point, but overall amounting to a stronger change in direction.

Global issues such as climate change, along with local weather events such as floods or drought, were not mentioned as turning points, but the impression conveyed in the narratives was that these constituted background noise that the farmers take in their stride.

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Most responses documented as transformations are rather weak. This suggests that resilience responses lie on a continuum, and that inevitably judgements about where on it the boundaries between categories lie will be subjective, and therefore subject to some ambiguity. In Southern Sweden, transformations principally relate to market opportunities in the broiler chicken sector. Similarly, in Central Italy demand from the processing sector and better harvest technology together stimulated the replacement of viniculture with hazelnut production. In all narrative contexts, only two transformations related to policy drivers, whereas most others occurred in response to intergenerational change, deaths or personal health problems.

Robustness appeared to be the most common response reported to all drivers in Flanders. Nevertheless, there are indications in the narratives of a building up of pressure that will require transformation. In the Flemish narrative context, the competition for land for urban development, and the highly regulated nature of the land market (Ciaian et al., 2010) make this an extreme case, but throughout all narratives there is a sense that transformation in the agricultural sector may have been less, and slower, than in other industries due to the predominance of policy restrictions (Moreira, 2015), which have entrenched structures and reduced flexibility. The Northeast Bulgarian narratives also exhibited a dampening of land price and rent volatility after the implementation of CAP subsidies.

Technology adoption appeared only occasionally as a response to drivers, especially to trends and cycles. In Flemish narratives, mention of building new livestock housing also involved secondary decisions to modernise their dairy technology. Central Italian narratives were the exception, since technology was central to this context; investments in irrigation, harvest and postharvest equipment were induced by the hazelnut market opportunity, resulting in a farming system turning point and an accompanying social transformation. Many Northeast Bulgarian narratives identified a lack of strategic common infrastructure investment as a constraint; most others mentioned technological innovations as a given, as for example in the East Anglian, where all cultivation and harvesting machines were computer-aided and GPS- supported.

5.2 Farmer identity

Although, as already noted, the narrators that were recruited were predominantly male, there were no specific gendered differences in their stories. As well as providing a chronology of turning points and their causes and consequences, the elicitation technique gave insight into the narrators' views, character and identity through the way in which their story was told. These were interpreted as shaping their responses to drivers as well as influencing their memory and explanation of the event. In general, the stories portray farmers who can take pressures in their stride – they are able to absorb noise, remain robust in the face of shocks. They experience numerous adverse trends, but it also takes a lot of pressure to make a big change.

This may indicate mental and physical resilience in this purposive sample from the farming population. However, we note that the nature of sample selection overlooked those who were currently struggling. There were hints which arose, through the process of telling their story, that some may not have realised the amount of pressure they were under until they started talking. There were some explicit and some implied examples of mental distress, among the narrators and those that they knew, but the elicitation approach precluded probing, and for many this is a sensitive issue that is difficult to discuss.

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The pressures of working alone, sometimes with a lack of support, were frequently mentioned in narratives from East Anglia and Flanders, but not in Bulgaria where corporate farming structures spread responsibilities. There were some signs that confidence in decision-making develops through career stages, although this could also stem from changes in expectations of family involvement and the need for a work/life balance. Whereas farming used to be a family occupation, involvement and support from the spouse is increasingly no longer expected. The challenges of having time for family were mentioned in East Anglia, particularly noting that the increase in mechanisation had removed the potential for involvement of children in the farming enterprise. In Central Italy the increase in mechanisation has largely removed any role for women in the enterprise.

Across the enterprises covered in our narrative contexts, there was a variation in passion for farming and engagement with it, expressed most strongly by large livestock farmers (Flanders), less so in chicken production (Southern Sweden) and only faintly in arable production (East Anglia and Northeast Bulgaria). At the latter end of this range, narrators characterised themselves as businessmen and women, and the attachment to land was much less emphasised. This may be related to family heritage and the cultural script which arises from the specific circumstances of farming and to some extent provides compensation for the hard work and loneliness often experienced.

Northeast Bulgarian narrators were mostly more recognisable as businessmen than farmers, fluid in their response to drivers, and not attached to specific parcels of land or enterprises. East Anglian arable farmers appeared to be on the same path, with four of the nine narrators portraying themselves primarily as business people, often using the farm to leverage capital for non-agricultural investments and not appearing to be attached to identifiable land parcels. The demands of small-scale dairying ensured that the Flemish narrators were, first and foremost, farmers. The frequently pluriactive Central Italian narrators, though, do not fit easily into this arrangement, as their hazelnut production was a long-term permanent crop, a supplementary income source which did not appear to impinge on other careers. Detachment from land (and reduction in labour needs resulting from mechanisation in the East Anglian and Central Italian narrative contexts) has accelerated loss of involvement of family members and, through diminishing rural community solidarity, worsened infrastructure and potentially increased isolation.

5.3 Family and community

In East Anglian narratives, the contentedness of the narrators appeared to relate to the quality of support from the previous generation. The farming heritage influences the pathway of the farm, through the transmissions of family values and attitude as well as provision of practical advice and emotional support. Equally, there is often a tacit or explicit expectation for potential successors to work for little money. A frequent thread observed in the narratives related either to support from, or pressure by, parents and partners. BE/EC2 stated that, after splitting up with his girlfriend over his farming workload, he had vowed never to put a relationship before farming again; BE/LC3's wife is not interested in farming and on retirement this narrator plans to will sell up and move to a town house. Where both partners are from farming families, the couple may form a dynastic merger of farms, supported by an understanding of the workload required to operate a farm business.

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Across all the narratives, intergenerational succession was the most frequently mentioned driver of change. In many such cases what we have termed 'intergenerational stretch' created challenges, as farm resources were frequently not enough to provide income for two generations and a lack of pensions (and CAP policy regarding 'active farmers' to receive support) made it difficult for the older generation to retire. While the problem of 'sofa farmers' was addressed by a revision of the definition of farming activity,[2] there are no disincentives to claiming state pensions and continuing to receive direct payments, frequently noted as driving increased levels of farming operations carried out by other contractors. This may create job opportunities in farming contracting, but also blocks a younger generation from taking on the overall management of land. Flemish farmers specifically mentioned the issue of policy and 'active farming' restricting access to land and there was a degree of pent up enthusiasm that seems frustrated because of this.

Narratives stress the demand on farm finances when whole families join the farm (UK/EC2, UK/EC3), less so when individuals join (UK/EC1). In Southern Sweden, diversification opportunities offered by the expansion in the broiler and layer sectors provided opportunities for the next generation to join the farm business. In Northeast Bulgaria, opportunities were available, often through the single farm payment, to take on additional land (purchase or rental) to expand the business to allow multiple generations to be involved. Northeast Bulgarian narratives described the diverse range of farming activities and large scale as offering an opportunity for the next generation to join the farm business and take responsibility for a particular managerial role, thereby somewhat smoothing the process of intergenerational change.

The change of generations has been accompanied by a change in lifestyle expectations. Stories from Flanders, East Anglia, Central Italy and Southern Sweden indicate that young people, particularly those growing up away from a farming environment, are used to structured working hours, defined time off for holidays and sick leave, and rights to participate in parenting. These expectations are challenging in family businesses where the principal operator has sole responsibility, particularly if the spouse has no experience of the impact of farming on family life. This can increase isolation, particularly as the trend for reducing numbers of farmers leads to a loss of a collective 'voice' and loss of status and wellbeing. UK/EC2 specifically mentioned shrinking weather windows as cumulative problems that hindered a satisfactory work/life balance. Narratives mentioned relationship and marital breakdowns (Flanders, East Anglia, Southern Sweden), both in current and previous generations; while clearly important to the narrators, these appear not to have led to farm system change (responses were robustness and adaptation).

An emerging picture is that of loosening ties to the land. This may be associated principally with the enterprise and farming system being studied rather than country or career stage. Nicholas et al. (2018) studied beef and sheep farmers in Wales (UK) who were thoroughly embedded in their land, their community and way of life, yet arable farmers in the East of England are less tied to farming specific land parcels. The older generation of Flemish narrators appear to have a strong attachment to a 'home farm', and there is much kudos attached to the ability to acquire contiguous parcels of land if they come

[2] Article 9 of Regulation (EU) No 1307/2013.

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on the market. This attachment seemed to be looser in younger generations, who appeared more mobile if opportunities arose. Most of the East Anglian arable farmers in the East of England had a home base, but not usually one that had been in the family for many generations. In Northeast Bulgaria, land attachment was only strong when there had been family involvement prior to political change. With arable enterprises the inherent knowledge of the land, acquired through the generations, may be of less importance now due to the use of GPS technology. This may liberate farmers to take on unfamiliar land and optimise production without inherited knowledge.

Overall, loosening ties to land could promote the capacity to adapt – or transform – in response to the various drivers; conversely, where deep crises affect the farm, this fragility of engagement could limit capacity for robust responses.

5.4 Farming system

Policy makers wishing to encourage farm resilience attributes of adaptation or transformation clearly require in-depth understanding of the farming system, including how their elements, farmers and farming businesses, prioritise and respond to the internal and external drivers of change. Narratives indicate that these are influenced by a broad range of economic, social, environmental and cultural factors. Moreover, narrators discuss, directly or indirectly, their roles as food producers, environmental managers and their links into the rural (and some cases urban) community.

These different linkages exist and may be influential in the resilience of the farming system. Several narrators talked about involvement in local or farming politics, and those in Central Italy were very actively involved in cooperatives. In Southern Sweden and Flanders, proximity to urban communities provided opportunity for diversification, although in Flanders proximity to urban areas increased demand for urban land increased farmland prices. Farmers in East Anglia discussed the huge importance of reputation in the rural community for securing farming contracts. Because such links could have a positive (allowing change) or a negative (tying the system down and making it more static) influence on the resilience of the farming system, it is important to recognise their existence and include them when defining its scope.

Strategies to deal with farm-level risk varied across the five narrative contexts. In East Anglia there were two obvious approaches. One was to invest heavily in machinery and then spread its fixed costs across a greater area of arable land, through land purchase, rental or, more commonly, through contract farming (see footnote 1). The alternate strategy was to reduce fixed costs as far as possible, employ one labour unit to farm a fixed land area, and to buy in the specific, machinery-intensive services such as for harvesting. At the time of gathering the narratives, the uncertainty surrounding Brexit appeared to have postponed all but essential investment, however. In Flanders, land and labour constraints prevented any great increase in scale, so investment focused on diversification activities that enabled greater income to be generated from a fixed area of land. In both Southern Sweden and Central Italy, farmers chose to invest in market driven enterprises. Both poultry and hazelnuts have very strong collaborative elements in common; for poultry with the processing companies and for hazelnuts with producer cooperatives. While, classically, poultry farmers are often dependent on large downstream actors and therefore less powerful in the value chain compared with the countervailing organisation of hazelnut producers, in the former case shortages of poultry meat and eggs played to the

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substantial advantage of producers. Thus, these collaborations both provided a degree of support, stability and financial security for the farmers involved.

In Northeast Bulgaria, large, diverse businesses (of which farming was just one part) emerged because of specific historical structures and the policy changes after 1989. In East Anglia, Southern Sweden and Flanders, the farms tended to be managed by single individuals which exposed the business to greater risks associated with ill health, accident or death, particularly if there was no clear succession plan in place. Nevertheless, in East Anglia the nature of arable farming, particularly with the increasing use of technology, allows increasingly remote management. In contrast, regular feeding and welfare checks on animals required in the Southern Swedish poultry and Flemish dairy systems does require daily engagement. Northeast Bulgarian narrators are clearly more business people rather than farmers, functioning as part of a management team and responsively switching land parcels and crops as market signals dictate. Perennial crops are robust in terms of not requiring daily attention, and can therefore be, and commonly were, managed alongside other careers.

Narratives show that the enterprises that an early-career farmer took over were often predetermined by land availability and other resources, which could restrict opportunities for adaptation and transformation. This was particularly evident in Flanders where most responses to drivers were of robustness, simply because there was no flexibility to do much else. In Southern Sweden, the transformation to poultry production by the parents of early-career farmers allowed them to enter the family farming business by providing an alternative income stream, thereby locking in the subsequent generation to a specific enterprise. Clearly, due to the long term, fixed, nature of hazelnut production there was little opportunity to change to alternative enterprises, unless new enterprises were developed from scratch; these often took the form of non-agricultural activity (such as agri-tourism or food manufacturing businesses).

5.5 Policy propositions

Shocks, trends and cycles affecting farm systems have clearly had a variety of impacts on the farm systems that have been explored and analysed in this report. Predominantly, the outcomes have demonstrated robustness, although where adaptation and (more rarely) transformation have occurred, the narratives show considerable change in the nature of enterprises, their agro-ecological impacts, and the encompassing farming system. This dynamic change in farming systems is recognisable generally (for example, van Vliet et al., 2015), although perhaps not in such specific detail or degree of emphasis that our approach has revealed. European farming has, for decades, been heavily reliant on public intervention in various forms; questions thus emerge from the narratives about the role of the Common Agricultural Policy, and the fitness for purpose of future policy reforms for current agricultural structures.

The interview method applied gives maximum freedom for narrators to select and describe the chronology and events that make most sense to them to convey to the researcher team. As well as providing details of major turning points, the narratives give important insights into the mind-sets of farmers, and it is as important to listen to what they did not say as much as what they did. Regarding the former, drivers that narrators reacted to as noise received little or no consideration; concerning the latter, intergenerational transition emerged as the most problematic topic.

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It is perhaps because of income stabilisation support systems that many of the external drivers affecting farm systems are considered as noise (for example, weather events, price volatility) and seemed less likely to trigger system changes. Our conjecture is that farm systems have been conditioned to be protected from such shocks, which is why external factors were relatively underemphasised. The topic of insurance arose only rarely and usually concerned asset or weather risks. Only one narrator (BG/MC5) mentioned hedging of crop values as a means of insuring income, and that was to emphasise that improved resilience in agriculture was impeded by the generalised resistance to financial innovation. There is some political support for a long-term ambition to replace basic income support with insurance against less predictable incomes (especially in East Anglia, promoted as an option for post-Brexit agricultural policy: Defra, 2018). There is CAP provision (and resources available) for income insurance and mutual stabilisation schemes, but few are in place. Those that do exist require substantial subsidies, and even then, uptake is relatively low (Meuwissen et al., 2003). On the other hand, narrative examples of robustness as a response to various drivers often appear to have relieved pressures, or forestalled opportunities for adaptation and transformation, mirroring the conclusions of the UK House of Lords (2016) report on agricultural price volatility.

The important conclusion we draw from this is that the farm systems represented in our samples are ill-equipped for any major shift from direct payments to income insurance and winning the confidence of farmers to make such a change would require a carefully prepared strategy. The narrative contexts in Flanders (especially) and in Southern Sweden and East Anglia indicate that substantial structural issues constrain farmers' ability to change their approach and outlook, and these should be addressed before any novel income stabilisation tools can be considered as a major element of public policy.

In a similar vein, most narratives did not identify agri-environmental policy as either a driver of or a response to system change points. Agro-ecological issues did arise, as incentives for change (the Higher Level Stewardship scheme in the East Anglian narrative context, the generous organic hazelnut area payment compared to conventional in Italy) or as constraints on expansion or intensification (especially nitrate groundwater pollution in Flanders and Southern Sweden, and restrictions on use of certain agrochemicals), but provide yet another instance of established issues that played little role in their business approach, the noise driver. There was one mention of the effect of climate change, and that was expressed in an equally matter-of-fact way. In terms of what they did not mention, this additional insight into farmer mind-sets may indicate unpreparedness for some of the more far reaching environmental future changes in terms of local climate effects on agronomy and biodiversity interactions. This is certainly an issue for further investigation, since it implies that far more preparation in terms of awareness and skills should be developed to ensure food security, a resilience issue affecting the whole of society rather than simply agricultural systems.

The other major headline result that emerges from the narratives concerns the increasing complexity of farm intergenerational transitions and their outcomes. The variety of causal influences described in narratives range from legal frameworks governing land tenure and inheritance taxes, state pension and other welfare payments, greater longevity of farmers, and the influence of direct payments to continue as 'active farmers' even if the agricultural operations on their holdings are undertaken by contractors. This is consistent with other evidence that public interventions, including measures for setting up young farmers and retirement aids for farmers are not adequate or effective in the face of this problem (see

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for example, Zagata and Sutherland, 2015), especially in comparison with the high and rising cost of farmland, which is increasingly making agriculture an entirely hereditary profession.

All the narratives analysed in this study are from farmers who have come through their own intergenerational transition. Due to the nature of the study, there are no direct observations of families that left agriculture at the transition stage, although when relevant several stories make references to cases of this in neighbouring holdings where the outcome was inevitably amalgamation and consolidation. Stories often mention that there is a problem of too few farmer exits rather than insufficient young farmers entering, and this could constitute a serious problem for the resilience of farming since younger farmers tend to be better educated, are more likely to undertake long-term investments and are swifter adopters of new technology. It is also clear that there are no quick or easy public interventions that can tackle this requirement, especially as many potential barriers to entry are Member State responsibilities. The proposed reforms for the CAP after 2020 would give much more Member State flexibility for tailored solutions, which could result in coherent and integrated approaches to intergenerational transition. The final conclusion for policy is that, since every retirement and subsequent farm system is virtually unique, the best way to tackle the issue in the first instance is to make this a high priority for education, vocational training and farm advisory services, requiring them to develop the expertise to support succession planning. This, combined with Member State action to address the most glaring disincentives to intergenerational transition, would be one of the most effective approaches to improving agricultural system resilience.

5.6 Implications for future research

To our knowledge, this report is the first to use an unstructured, unprompted narrative interview to explore questions of farmer and farm business behaviour. It has provided rich and substantial insight into the complexity surrounding farmer decision-making when faced with uncertainty and risk, and can be recommended as an approach to explore this and similar research topics.

The major gaps which have emerged as important for completing the understanding of resilience responses relate to negative cases, and passive reactions. The negative case is where a farm system has not been resilient, and gone out of business. As noted, there were a few instances in narratives that described cessation of farming by others, but these were mostly recognised in terms of the effects on the narrator's own story. Passive reactions occur where a system change point is not noted because it is not recognised as such, and no response has taken place. The negative case could in principle be explored through further careful and sensitive narrative interviews. The passive reaction would be much more difficult to identify since, although as researchers we subjectively believe that some such instances have been evident in narratives, that perception is not shared by the narrators themselves. It could be that that lack of recognition is an indicator of future resilience failure and, if so, needs to be considered as an important theme for subsequent SURE-Farm investigation.

The importance of internal drivers, whether shocks, trends or cycles, that stimulate resilience responses, compared to external influences, indicates that the search for and use of modelling proxies for these should be given priority. The overall conclusion that the robust, adaptive and transformative responses to change stimuli are not distinct categories but lie on a continuum is also instructive. First, in several instances, allocation to a specific category has seemed arbitrary and ambiguously

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problematic. Second, the emergence of the potential new category of creeping change, incremental adaptation undertaken almost unconsciously, provides a counterpart to our finding that noise – which includes several impetuses that might be considered as 'proper' drivers by researchers – was not perceived as a such by narrators. SURE-Farm could usefully consider whether and how such the conception of resilience categories might be modified by these two insights.

The final insight which could provide fruitful material for future research relates to the complexity of the stimulus-response process and the way in which outcomes may evolve over different periods of time. The nature of the qualitative approached used identifies the context-specific aspects of resilience responses and indicates some longer-term ethical dilemmas for researching this topic. An example drawing on many of the stories elicited will help to explain this. The catch-up of farm systems with the rest of the social world, including adoption of contemporary attitudes to family life, more business-like approaches to the farm system business dimension, and loosening ties to land and farming as a vocation, can be interpreted as contributing to improved farming system resilience while at the same time undermining the resilience of the farm system elements of which it is comprised. But paradoxically the weakening of these constituent parts may undermine the longer-term overall resilience of farming systems. There is no clear and simple way of reconciling these conflicting pressures. What is apparent, however, is that in seeking to understand how future agricultural systems will develop, as researchers we may be influencing that evolution.

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List of abbreviations

ALOUA	Agricultural Land Ownership and Use Act
BE	Belgium
BG	Bulgaria
CAP	Common Agricultural Policy
EU	European Union
GVA	Gross Value Added
IT	Italy
SAPS	Single Area Payments Scheme
SE	Sweden
UAA	Utilised Agricultural Area
UK	United Kingdom

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