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RESEARCH FOR AGRI COMMITTEE - STRUCTURAL CHANGE IN EU FARMING: HOW CAN THE CAP SUPPORT A 21st CENTURY EUROPEAN MODEL OF AGRICULTURE?

WORKSHOP - STUDIES

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RESEARCH FOR AGRI COMMITTEE - STRUCTURAL CHANGE IN EU FARMING: HOW CAN THE CAP SUPPORT A 21st CENTURY EUROPEAN MODEL OF AGRICULTURE?

WORKSHOP
Abstract

This is the reference document of the Workshop on the "Effects of the structural changes on EU farming: How to better support the European model of agriculture of the 21st century with the CAP" of 14th March 2016, organised by the Committee on Agriculture and Rural Development (COMAGRI) and the Policy Department B (AGRI Research) of the European Parliament.

It is structured in three parts:

1. Farm structural change in Western Europe and the CAP.
2. Farm structural change in Central and Eastern Europe and the CAP.
3. Food value chain in the EU - How to improve it and strengthen the bargaining power of farmers.
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RESEARCH FOR AGRI COMMITTEE – FARM STRUCTURAL CHANGE IN WESTERN EUROPE AND THE CAP STUDY
This document was requested by the European Parliament's Committee on Agriculture and Rural Development.

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Abstract
At farm enterprise level, growth is a highly differentiated phenomenon. For developing the farm and maintaining an adequate income level, a wide array of strategies is available. Contrary to the notion of structural change many small farms show substantial growth. Their contribution to total sector growth is larger than that of large farms. To meet new scarcities it is time to go beyond the notion of structural change. The EU needs an inclusive agricultural policy instead of a selective policy.
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LIST OF ABBREVIATIONS

**CAP** Common Agricultural Policy

**EU** European Union

**GVP** Gross Value of Production

**HA** Hectare

**LU** Labour Unit (Unit of Labour Force)

**LUF** Unit of Family Labour Force

**M** Average (in statistics)

**MS** Member State

**NGE** Netherlands Size Unit (an economic measure for size that is equivalent to Eurostat’s European Size Units (ESU). ESU has recently been replaced by Standard Output coefficients (SO).

**OECD** Organisation for Economic Cooperation and Development

**s** standard deviation (in statistics)

**SBE** Former Dutch unit for economic size

**VA** Value Added
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EXECUTIVE SUMMARY

Aim
This document discusses the process of structural change in the agricultural sectors of the western Member States (MS) of the European Union (EU). Conventional agro-political discourse and scientific theory (especially agricultural economics) generally understands structural change as being a uni-directional process that involves the gradual disappearance of small farms and an associated enlargement of large farms. This process is also understood as involving the continual replacement of labour by capital and technology. For decades the main focus of agricultural policies at both the national and supra-national levels has been to support and encourage structural change. At the same time structural change has generally been perceived to be an inevitable process and all the available statistical material from the Western MS seems to unambiguously support such an interpretation. This document challenges both the desirability and inevitability of structural change, as it is conventionally understood. It shows that agricultural development is, in reality, far more nuanced, and that policies that go beyond the dominant paradigm would help re-align the development of European agriculture so that it better meets societal needs.

Background
The analysis contained in this text focuses mainly, though far from exclusively, on structural change in Dutch agriculture. This is for three specific reasons. First, the Netherlands, together with Denmark, is generally thought to have one of the EU’s most modernized agricultural sectors. Here the process of structural change has been far more evident and runs far deeper than elsewhere and this allows us to clearly identify the benefits and costs, potentials and limits and strengths and weaknesses of such a process. Secondly, over the years a massive database of Dutch agriculture has been constructed; one that covers all farms and has a long term trajectory. It is known as the ‘mutation data base’ and it is unique in that it allows one to trace the development of single farms over long periods (the period used in this paper is 1980-2006). It is what is technically known as a constant data base: it follows farms through time. In this respect it differs fundamentally from the census data that are normally used to explore and understand the development of the agricultural sector on an aggregate basis. This difference allows us to confront the theoretical notion of structural change with empirical development trajectories. The analysis of the mutation data base sheds a completely new light on the assumed process of structural change. It shows that, while there is a sort of structural change, it occurs in a completely different way from what is normally assumed.

Thirdly by centring on the agricultural sector of one country (i.e. the Netherlands), more coherence can be introduced into the analysis than by ‘jumping’ from one country to another. This is especially important when the analysis shifts from the past and the present to the future and when making recommendations.

Nonetheless, we do not exclusively focus on the Netherlands. Abundant use is made of important theoretical contributions from the French school of thought and from Italian debates. Wherever needed, the empirical situation in the north-west of the EU (exemplified by the Netherlands) is supplemented with empirical data from Italy (exemplifying the Mediterranean situation). The authors of this document therefore believe that their findings are valid for the whole western part of the EU and possibly further.
Main findings

Growth is a highly differentiated phenomenon. Some farm enterprises may realize relatively modest growth, others may grow rapidly and others still may shrink. Sometimes growth is proportional to the (economic) size of the farm, in other situations it may be disproportionate. Growth may occur through a step-by-step process, or it might be realized as a one-time leap forward. Moreover, growth can follow different routes and therefore have an impact on different aspects of the farm. It is not automatically about acquiring more land or livestock and increasing output. The (economic) size of a farm may be enlarged, but it is also possible, for example, to develop the farm by increasing the value added produced by the farm while remaining at the same (economic) size. Or a farmer could reduce labour input while retaining the same economic size. And so forth.

Our empirical analysis shows growth does indeed occur over time and there is also shrinkage (in economic size and/or acreage) while some farms are completely deactivated. However, when we look at the different size classes of farms we find that these tendencies are not specifically, or narrowly, related to different size classes. It is true that some small farms do disappear, but this is also true of large farms: some of them also shrink or even close down altogether. The same thing is observed at the other end of the spectrum. Large farms may well grow further (as least some of them do), but a considerable number of small farms do so as well. Many small farms develop into medium-sized farms, and subsequently into large farms (a process that cannot be ‘captured’ from an analysis based on census data).

Thus we show that the real dynamics of the agricultural sector differ significantly from the uni-linearity assumed in the notion of structural change. It is true that on an aggregate level there is an increase in the average size of farms and a (gradual) disappearance of small farms. But translating this into a thesis that small farms will necessarily disappear as they are outcompeted and that large farms will expand further is a fallacy of the wrong level: what applies at one level (the sector as a whole) cannot be applied mechanically to another level (the individual farm enterprise). At the end of the day ‘structural change’ is the outcome of complex and partly contradictory but combined sub-processes, many of which are rather cyclical than uni-linear.

The consequence of this finding for agricultural policy and agro-political discourse is far-reaching: Instead of centering agricultural (and rural) policies on large and expanding farm enterprises in the belief that small farms will inevitably disappear, small farms should be treated as a promising category, since many of them will be tomorrows’ medium or even large farms.

The promise of small farms becomes even more evident when the contribution that they make to the overall growth of the agricultural sector is taken into account. Our data show that small and medium farms make a far larger contribution to overall agricultural growth than large farms, by many times. To mainly, or only, stimulate and support large farms is a clear case of betting on the wrong horse.

The statistical analysis in this report, provided in section 3, is accompanied by two supporting arguments that integrate the quantitative findings into a wider set of qualitative considerations. In section 2 it is argued that the nature of growth processes can greatly differ. As such it is impossible to argue that considerable growth is better than modest growth (or vice versa). There is no simple yardstick. It depends on the activity system of which farming is part, just as it depends on the style and strategy of farming adopted.
Section 4 seeks to explain why growth is so highly differentiated. It argues that alongside an economic logic there is also a social logic and these two can operate in different directions. This social logic also explains why, time and again, new small (and sometimes highly innovative) small farms are created from scratch.

The fifth section synthesises these findings and arguments. It shows how complex and partly contradictory processes together shape the dynamics of the agricultural sector as a whole.

The sixth section discusses the consequences of the recent shift from markets that were previously protected to the current situation of highly globalized and deregulated markets. One of the consequences of this shift has been the introduction of new and previously unknown levels of volatility, which create an insecure trading environment. We argue that, in this new situation, it is the large and quickly expanding farms that are the most fragile, especially when they are grounded on credit. By contrast, relatively small farms, based on a self-owned and self-controlled resource base and managed according to a low-cost strategy, increasingly represent resilience.

Section 7 builds on this finding by arguing that such low-cost farms are in line with societal needs (providing goods and service that have recently become scarce, and hence valued by society). They create employment, have the potential to deliver good income levels, help reduce fossil fuel use and are better positioned to engage in the protection of landscapes and biodiversity.

This means, in agro-political terms, that rather than being positioned at the margins of agricultural policies, these farms should be put centre-stage. Regulatory schemes and subsidies should be redesigned to stimulate patterns of growth and development at farm level that differ from mere quantitative enlargement. Multifunctionality, quality production, on-farm processing, the construction of new markets that are ‘nested’ in new relations between producers and consumers and the (co-operative) protection of landscapes and biodiversity can all make important contributions.

Section 8 focuses on an emerging new form of accelerated growth that is actually highly disruptive: this is the creation of what are known as mega-farms. Such farms are emerging in both western and eastern MS as well as in the surrounding ‘periphery’: the Maghreb, Ukraine, etc. This is a new and aggressive trajectory centred around very large, wage-labour based, farm enterprises. This process poses a huge potential menace to family farming, which even today is the main characteristic of EU agriculture.

**Recommendations**

Finally, section 9 presents our recommendations. The main one is that agricultural growth and rural development need to be re-grounded on the vast majority of small and medium family farms. Instead of mainly supporting large, high-tech farm enterprises, agricultural policy should allow all farms the possibility to unfold and develop – especially when they are following a development path that is aligned with societal needs. This is in line with the European Parliament resolution of the 4th of February 2014 on the future of small agricultural holdings (P7_TA-PROV(2014)0066 (2013/2096(INI). We also argue that such a change implies rethinking the interrelations between Pillars 1 and 2 of the CAP: Pillar 1 needs to be integrated within, and redesigned according to, the rationale of Pillar 2. These general recommendations provide the basis for a range of more specific and detailed policy recommendations.
1. ON THE DIFFICULTIES OF UNDERSTANDING ‘STRUCTURAL CHANGE’ IN AGRICULTURE

KEY FINDING

- ‘Structural change’ might have been a useful way of conceptualising past agricultural trends, but as a normative notion and/or a policy objective it is outdated and counterproductive.

European agriculture contains an impressive array of institutional patterns, levels of scale and intensity, technology use, relations with wider society, environmental pressure, levels of employment, income generated and future prospects. Moreover, there is a wide range of farming styles (or farming systems or systemes d’activité as they are called in French), each of which shows developmental tendencies that differ from, and sometimes strongly contrast with, the dynamics of others. This implies that changes at a higher level of aggregation (say Member States - MS) cannot be translated in a one-to-one way to changes at micro-level (say single farms). And vice-versa.

Nonetheless, one can detect patterns or guiding images that summarize existing, expected and/or desired trends. Over the past fifty years or so the notion of ‘structural change’ has functioned, in a relatively satisfactory way, as such a guiding image. It summarized the main empirical trends, and highlighted the trajectory to follow. This guiding image has strongly informed policy formulation (both the CAP and agricultural policies at MS level).

Central to this notion of ‘structural change’ was the thesis that, economically, large farms perform better than small farms, which implies that the former will develop whilst the latter will, sooner or later, disappear – making space for the large farms to expand further.¹ It was assumed that this ‘economic logic’ would operate continuously, making ‘structural change’ a permanent process. Little or hardly any attention was paid to the presence of a ‘social logic’² that might induce contrasting and/or countervailing tendencies.

Structural change was thought to be an adequate summary of the empirical processes resulting from the dynamics of the economy³. It also became a normative notion. Structural change was also perceived as intrinsically good. It was seen as increasing competitiveness and allowing farmers in different agricultural sectors to realize reasonable incomes. Structural change modernized agriculture: it removed traditional boundaries, barriers and inertia. It generated new dynamics and a new culture that favoured change. As such,

¹ This guiding image is explained in many publications. Overviews are given in van den Brink, 1990, van der Ploeg, 2003, Balman et al. 2006 and Bartolini and Biaggi, 2013. It has equally been contested by many individual scholars, even including the former head of the Dutch Farm Economics Institute (LEI), Dr. Jan de Veer, who argued the same conceptual framework that on the one had flows into the notion of structural change, obscures, on the other hand, the vitality and resilience of small farms (LEI, 1978). This and similar critiques did not really affect the strength of ‘structural change’ as a guiding image. It has been an institutionally embedded (and grounded) notion – functioning as the indispensable ‘Archimedean point’ around which a wide range of institutional and industrial activities (including those of farmers’ unions, state agencies, food industries, etc.) are co-ordinated.

² ‘Social logic’ is a driving force in agriculture (especially where family farms dominate). It expresses the non-economic forces that influence agricultural development. Examples of ‘social logic’ will be given further on in this document.

³ The changes in relative factor prices were thought to be especially decisive in this respect.
'structural change’ has been encouraged. It became a main objective of agricultural policies, first at the national, and then also at the communitarian, level. The Mansholt Plan was a clear expression of these views and provided a new classification scheme that distinguished farmers into three categories: those who could modernize and grow (the ‘stayers’), those too small to develop (the ‘leavers’) and those in-between (the ‘hesitating ones’). Policies were specifically tuned to support the first category. These farmers were perceived as the ‘promise for the future’. Thus, structural change became, to a degree, a self-fulfilling prophecy.

Guiding images are indispensable. They give decision-makers a sense of orientation. Nonetheless, there can be frictions at the margins. The guiding image of structural change has never corresponded perfectly with all the different realities entailed in the richly chequered morphology of EU agriculture (Saccomandi and van der Ploeg, 1995). We argue that the guiding image is increasingly at odds with certain realities. This has partly happened because the context in which EU agriculture is embedded has recently gone through drastic changes. In recent years, European agriculture has effectively moved from a highly protected system towards a liberalized sector, with a strongly orientation towards the world market. Price protection and predictability have been replaced by volatility and insecurity. In addition, income support is moving towards a flat hectare payment, and the possibility for re-distributional support has been made available. Beyond there are calls to change the very objectives of agriculture and agricultural policies. The need for agriculture to play a substantial role in mitigating climate change, the need to contribute to the efforts to move beyond the financial and economic crisis and the need to create more employment, especially for young people (more generally: the Lisbon agenda) are all new objectives that qualitatively differ from those that governed the previous modalities of the CAP.

With these changes in objectives, context and the empirical composition of agriculture in the western part of the EU we argue that the, once helpful, guiding image of structural change has reached the end of its shelf life – simply because it no longer helps us to correctly perceive the main and most important trends and no longer suggests effective ways forward. A new guiding image is needed and this document aims to provide some suggestions for constructing and operationalizing such an image.

We also need to take into account the statistical side of the issue discussed here. The available statistical methods might highlight some trends but they may well equally obscure others. New methods can bring these obscured issues to the fore, thereby enlarging and/or correcting the available body of knowledge. This document will present some of these new methods and critically discuss their implications.

This said, one should be aware that there never is a perfect match between (differentiated and dynamic) realities and statistical representations. The following vignettes illustrate this problem.

**Vignette 1: Working hard to build a farm enterprise from scratch**

Gaele and Siep became engaged and got married in the early 1970s, but could not rely on any financial support from their families to fulfil their shared dream of building their own farm. They both started to work, Gaele collected and transported milk from dairy farms to the dairy (a job that required two 3-hour shifts a day) and also worked on

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4 Precisely because they inform us about that what is (supposed to be) going on, about the expected developments (often assumed as being unavoidable) and then finally legitimize these developments.
construction sites. Siep, in her turn, worked for a farm accountancy firm and in her spare time sold kitchen utensils to farming families. In this way they build a wide network and also created some savings. When the first good opportunity arose they rented some pieces of land and bought their first milking cows. With the help of friends a small shed was constructed. This was the beginning of an ongoing development: the farm was enlarged and diversified step-by-step. In the midst of the 1990s it was a beautiful mixed farm with dairy cows and a large flock of poultry. Their son also worked with them so the farm was supporting three people on a full time basis. Gaele also became the well-esteemed president of a regional co-operative. Stories like these abound (and many have been documented). In statistical terms, the farm of Gaele and Siep first appeared as a very small farm. In successive decades it appeared in other categories (middle, large). However, what the available statistics do not show is that we are dealing here with a small farm being developed in a step-by-step way into a large farm.

**Vignette 2: The decline of ‘sitting farmers’**

When Gaele and Siep started farming, there were also several large farms in the area (the Northern Friesian Woodlands). ‘Large’ is, of course, a relative notion: it changes over time. At that time it meant having enough dairy cows (and the corresponding land) to make for a comfortable life (being even able to contract agricultural workers). Several of these farmers were locally referred to as ‘gezeten boeren’ (which translates roughly as ‘farmers who are well off and who do not have to work hard anymore’). Arend was one of them. He used the revenues of his farm to become engaged in horse breeding and trotting races, which earned him considerable prestige. He also transferred part of his capital to urban destinations, since they were far more profitable than rural ones. The farm stayed as it was and in the late 1980s it was sold – largely since Arend’s sons did not want to take it over (at that time nobody talked about the daughter taking over). It was sold in pieces that were bought by smaller farmers to enlarge their own farms a bit.

This little story differs from the previous one, but once again it is impossible to track the farm’s development trajectory (a large farm breaking down and giving rise to new small and medium farms) via the available statistics. These only show the total number of large farms and how this number is growing over the decades. They do not show that such growth is the net outcome of invisible processes of numerous entrances and exits.

**Vignette 3: The missing large farms**

The same situation exists in say Italy, although the reasons differ completely. Looking at the available statistics, Italy has many small farms. Some would say far too many and they all are far too small to be serious farm enterprises. The point, though, is that many of these small properties are used by a few local farmers through informal contracts (such as ‘fare gli sfalci’). These local farmers (who often have considerable herds) do the mowing, fertilizing, etc., of the many small fields and thus get enough feed and fodder for their herd. In turn the owners of the small plots receive a small rent whilst their plots

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5 Locally such people are referred to as ‘wrotters’. This is a Friesian word meaning ‘those who are engaged in hard work, engaged a bodily struggle in order to move ahead’. At the same time the story entailed in this first vignette belongs very much to the 1980s and the decades preceding it. Currently, the construction of new farms very much takes the route of ‘micro-enterprises’ that will be discussed further on.

6 See for the Netherlands e.g. Bock and de Rooij, 2000 and for the EU as a whole Safiliou-Rothschild et al., 2002.
are kept in good condition and they maintain their small property as insurance against times of crisis.

Here there is once again a mismatch between reality and statistical representation. The statistics only show many small farms. In reality though, the operating units are fewer and far larger\(^7\).

What these vignettes show (admittedly in an anecdotal way) is that statistics do not show everything. That is not what they are meant for. Statistics are a way of filtering out ‘noise’ – they are meant to focus on what is essential. But what is supposed to be essential might change over time. And the initial ‘noise’ might be the beginning of important processes of transition.

\(^7\) A movement in the opposite direction may also occur: large farm enterprises may be broken up into smaller units in order to allow for a smooth take-over and continuity.
2. A WIDENING ARRAY OF FARM DEVELOPMENT TRAJECTORIES

KEY FINDING

- The concept of agricultural development cannot be narrowed down to quantitative growth alone.

Farm development can involve the pursuit of different objectives. The most important are to obtain a reasonable income and ensuring that the farm can be reproduced over time (thus also securing income in the long run). Alongside these two objectives there might be several others (which will be discussed later). The balance between the different objectives might vary, thus giving rise to different strategies. As a result, farm development may well follow different paths. These are summarized in textbox 1 and discussed in more detail below.

Textbox 1: Classical farming strategies

1. Labour-driven intensification
2. Low-cost farming
3. Scale enlargement
4. High-tech farming (combining technology driven intensification with scale enlargement)
5. Pluriactivity
6. Change in productive specialization
7. Exit

1. Labour-driven intensification aims at achieving more production with a given set of resources (land, animals, labour, etc.). Theoretically speaking this is about increasing technical efficiency. This might be due to acquiring new skills, developing on-farm novelties or a steady improvement of the available resources. All these strategies can lead to higher levels of production (higher yields) being obtained from each labour object (fruit trees, dairy cows, hectares of land, etc.). This development pattern has been a main driver throughout agrarian history and it remains very important. An appropriate statistical category for catching this trend is the GVP/object of labour and its development (or VA/object of labour).

2. Low-cost farming focuses on the balance of internal and external resources used in the farm and specifically on shifting this balance towards a decreased use of external resources through improving the use of internal resources. This leads to the emergence of ‘low-external input agriculture’ (known also in some areas as the style of farming economically). Today, this trajectory is promoted under the banner of agro-ecology. It enlarges the income generating capacity of the farm. A good statistical tool here is VA/GVP and its development over time. In practice these first two patterns are sometimes combined.

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8 Objects of labour are the items from which value is derived.
3. A third strategy centres on the relationship between total production and the labour input needed. Through standardization, mechanization, automation and externalization, the labour productivity of the farm (and therefore the income per unit of labour force) can be increased considerably. The amount of labour objects per unit of labour force is increased or the labour input by a given number of labour objects is decreased (both cases translate as a scale increase). The central statistical instrument here is GVP/LU. (Gross Value of Production per unit of labour force (LU)).

4. The strategy of high-tech farming aims to strongly enlarge the resource base of the farm, while simultaneously increasing production per labour object. Since the beginning of the 1970s technologies have been developed that allow for a combination of scale enlargement and technology-driven intensification. This trend is often expressed as the outcome of a ‘battle for the future’. Only the largest farm enterprises are thought to be competitive (especially at the world market level). Thus, accelerated growth becomes a necessity. The GVP/farm enterprise, its development, its ‘distance’ from the majority of farms and, on a higher level of aggregation, the concentration of total GVP in a reduced number of large farms are all important statistical indicators. In everyday language, these farms are often identified as ‘high-tech farms’. The scientific literature mostly refers to this as the ‘industrial model’ (Bowler et al, 1996).

5. Pluri-activity occurs when a farming family is engaged in other economic activities elsewhere (mostly non-agricultural) alongside the agricultural activities on their own farm. That is to say the husband, or wife, or one or more of the children earn an income elsewhere which is combined with the agricultural income in order to obtain an adequate family income. Pluriactivity is a widespread phenomenon in the western MS of the EU. On 80% of Dutch dairy farms one of the family members has an (additional) job elsewhere and the income obtained in this way on average composes 35% of the family income. Pluriactivity is a richly chequered phenomenon. It can occur, as Irish studies have shown, to combine the best of two different worlds (the urban and the rural)(Kinsella et al., 2000). It can be a way of earning a family income so all the agrarian income can be reinvested in the farm itself (a strategy often followed by young farming families who have just taken over the farm). The wish to escape the solitude of the farm or the women’s wish to return to their former jobs once the children are grown up can also play an important role, as can the need to supplement low agrarian incomes. In Italy 25% of the men and women on all farms (regardless of size) are pluriactive. For other family members who also work in the farm the figure is 40%. Pluriactivity is a structural feature that is especially prevalent in farms where the owners are in the 35 to 55 age group. Here 50% of the men and women directly involved in farming have another job elsewhere (Ventura, 2013). Pluriactivity is encountered in all size groups, although the percentage goes down among larger farms. It is interesting to note that on large farms (> 50 ha), pluriactivity often implies work in other farms, whilst on small farms (< 5ha) pluriactivity mostly involves work in the industrial or service sectors. Over time this tendency has grown: large farmers become, through their jobs outside their own farms, an indispensable part of the agricultural infrastructure. Altogether, pluriactivity contributes some 18 billion Euros to Italian agriculture. This equals 65% of the total GVP of Italian agriculture. The best statistical category to catch and understand this type of farming would probably be non-agricultural income as a percentage of the sum of agricultural and non-agricultural income at family level.

6. Farming families might decide to change the productive specialization of their farm from, say, dairy farming to vegetable production, or from cattle breeding for meat to grain production (or whatever). Often this decision is about adapting the farm to the (changing) situation of the farming family. Sometimes it can also be part of a strategy to enlarge, or to decrease, the economic size of the farm.
7. Last but not least there is the strategy of stopping with farming altogether and selling the resources. Here it is important note that increasingly farmers who de-activate their agricultural activities still maintain control over the most important resources (notably the land). This can occur for nostalgic reasons (‘keeping the land in the family’), but also as an insurance for times of crisis and/or as opportunity for the next generations (in recent years restarting production on one’s grandfather’s land has become an important feature in several Mediterranean countries).

These strategies (which have all been documented in a variety of scientific studies)⁹ are all present in Western European agriculture and are effectively co-shaping the socio-economic reality of its countrysides. Their existence shows that the process of agricultural development does not occur as a process of convergence (see Figure 1). Structural development or structural change has been based on the supposition that farming will move to an ‘optimum’ that is defined by economics and technology and agricultural policies to facilitate this process have been designed and implemented. The Mansholt Plan was a characteristic expression of such policies. This structural change was a selective process; it only included some farms and farmers. Thus classification schemes were developed that distinguished between those relatively close to the new optimum (the ones who could ‘stay’) and others with smaller farms and lower volumes of production (those supposed to ‘leave’) (see for a general discussion van der Ploeg, Laurent, Blondeau and Bonnafous, 2009).

**Figure 1: Empirical diversity in dairy farming in the Netherlands, 1969, and the then assumed ‘structural change’**

In retrospect, however, it became clear that agricultural development has not occurred as a process of convergence. It has unfolded through a process of differentiation. Figure 2

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⁹ Differentiation in agricultural development trajectories at the level of nations is documented and discussed in Hayami and Ruttan, 1985. For EU agriculture Bowler et al. 1996 describe seven different trajectories that might even be simultaneously present within one and the same rural region. In terms of strategies, differentiation is discussed and theorized in van der Ploeg 2003, Lasseur, 2005; Commandeur et al. 2008; Sturaro et al. 2009; O’Rourke et al. 2012. Garstenauer et al. 2010 and Langthaler et al. 2012 have documented the continuity over time of these strategies and the associated developmental trajectories.
shows that, between 1969 and 1981, the overall diversity (in terms of farm size and intensity) did not decrease - as the theory of structural change would have us believe - but actually increased considerably. More importantly, the two reference years (1969 in Figure 1 and 1981 in Figure 2) are not linked through one single logic of structural change. Rather, these two points in time are linked by a wide array of farm development patterns (intensification, scale enlargement, combination of intensification and scale enlargement, large changes over time, reduced changes, etc.)\textsuperscript{10}.

**Figure 2: Empirical farm development trajectories 1969-1981 plus diversity in 1981**

The different development trajectories shown in Figure 2 are the result of farming families adopting different strategies. Thus, different farming styles emerge (see Figure 3): different ways of moulding the agricultural process of production, each entailing a specific model to ensure an adequate income.

On the whole, different farming styles result in comparable income-levels (which can fluctuate according to circumstances). There are, in short, different ways to earn an income from farming. The *economic outcomes* might well be similar. However, when it comes to levels of sustainability, employment, relations with wider society, etc., the impacts of different farming styles vary considerably. We will return to this point later.

\textsuperscript{10} Annex 1 contains an expression of differentiation based on a constant sample. The farms in the first year are exactly the same as those in the last year. By contrast Figures 1 and 2 are based on (representative) RICA data. In the RICA (now FADN) the sample farms are regularly changed.
Alongside the ‘classical’ development trajectories, discussed above, new ones have been constructed over the last three decades. These are summarized in the Textbox 2 and discussed in more detail below.

Textbox 2: New farming strategies

8. Farming as part of non-agricultural life styles
9. The creation of new micro-enterprises (especially by young people)
10. Multi-functionality
11. Agroecology

8. Having land and being involved in some ‘green activities’ is at the heart of several livelihood strategies that are not primordially agrarian. Here the work of Laurent et al. (1998) on different activity systems is extremely relevant and useful (see also Laurent and Remy, 1998). Catherine Laurent and her colleagues distinguish 11 different activity systems (see table 1). In some of these, farming is the main activity, while in several others its role is secondary. Yet farming is still relevant in as far as it is part of a wider livelihood strategy or life style. It may be linked to retirement, be oriented mainly to home consumption and/or barter, or fit in a luxury lifestyle. Empirical research in France has shown that at least 40% of formally registered farms fit within these categories. In Italy the situation is even more pronounced: some 1 million (out of a total of 1.6 million farmers belong to one of the last six types of activity systems mentioned in table 1. There is an age aspect that is related with the typical distribution of farms over different activity systems. In the activity systems 6 to 11 “43% of farmers are older than 65 and 20% are older than 75, whilst those younger than 40 compose only 7%”. In activity systems as 1 to 4 “14% are younger than 40, 25% between 40 and 50 and 34% between 50 and 65” [...]. The assumed denial of young people to engage in farming is therefore a myth [.....] It is the outcome of lumping different activity systems together” (Agriregionieuropa, 2015). An attentive reading of the most recent EU Agricultural and Farm Economic Briefs (2015) suggests that the same conclusion can be applied to the whole of EU agriculture.
9. A relatively new, and so far hardly studied, phenomenon is that of young people creating new micro-enterprises. Often these combine the production, processing and distribution of food. It is both a response to the economic crisis and an expression of entrepreneurship. At present this tendency is most pronounced in France, Spain, Italy and Greece. In some cases this movement is supported by Pillar 2 assistance from the EU. The cash investments involved in setting up are often minimal and networks are developed to use the knowledge and the infrastructure that exist in the area. The contribution that these enterprises make to the regional and local economy is often considerable (Milone, 2015).

Table 1: Farming as part of different activity systems

<table>
<thead>
<tr>
<th>Types of agricultural activities</th>
<th>Main objective of the agricultural activity for the households</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee-run companies (1%)</td>
<td>income, profit</td>
</tr>
<tr>
<td>2. Capitalistic agriculture (3%)</td>
<td>income, profit</td>
</tr>
<tr>
<td>3. Agriculture as a structured profession (20%)</td>
<td>income, taste for farming</td>
</tr>
<tr>
<td>4. Agriculture based on a traditional farmer logic (21%)</td>
<td>income, self-employing profession</td>
</tr>
<tr>
<td>5. Rural enterprises (8%)</td>
<td>associated income, patrimony</td>
</tr>
<tr>
<td>6. Non integrated multi-activity (7%)</td>
<td>associated income, to keep an inherited family farm</td>
</tr>
<tr>
<td>7. Subsistence farming for retired farmers (13%)</td>
<td>compensation for a low pension, subsistence and barter</td>
</tr>
<tr>
<td>8. Qualifying for social welfare coverage/ old age pensions (9%)</td>
<td>access to social scheme (pension scheme, etc.), subsistence and barter</td>
</tr>
<tr>
<td>9. Agricultural activity for home consumption and barter (2%)</td>
<td>subsistence and barter</td>
</tr>
<tr>
<td>10. Luxury agriculture (4%)</td>
<td>leisure, prestige, patrimony</td>
</tr>
<tr>
<td>11. Small scale recreational agriculture (12%)</td>
<td>leisure, subsistence and barter</td>
</tr>
</tbody>
</table>


10. Another new trend that has grown enormously over the last two decades centres on what Laurent et al. have identified as ‘other gainful activities’ (OGA). In current debates the most frequently used reference is to multifunctional agriculture. Instead of only delivering raw materials to food industries, food is often processed on-farm and/or marketed through short chains. Thus the VA per unit of product is increased. At the same time, non-agricultural on-farm activities are developed. Agro-tourism, energy production, water retention, care facilities, the management of landscape and biodiversity are among the many new expressions of this trend. The total income generated by a (multifunctional) farm enterprise is a good statistical criteria for

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11 For France see Morel, 2015
evaluating it. Multifunctionality has developed enormously in the Western MS of the EU. Laurent and her colleagues calculated that in France, the number of full-time farms, receiving no pensions but engaged in one or more of these ‘other gainful activities’ rose from 15.4% in 1979 to 21.4 in 2000 while the full time farms, with no pensions and no other gainful activities decreased from 31.4 in 1979 to 20.8% in 2000. So within activity systems 3 and 4 (see Table 1) there has been a decisive shift towards multifunctionality. The EU-funded research programme, IMPACT, assessed the economic significance of this shift. Looking at seven countries (Ireland, the UK, the Netherlands, Germany, France, Italy and Spain) together it showed that in 1997 multifunctionality contributed an additional net value added (or: additional income) of 6.95 billion Euro. This can never replace the agrarian income (totalling 41.1 billion in these 7 countries together), but it is an important, and in many cases a decisive addition (van der Ploeg et al, 2002). A recent Italian study (de Rooij et al., 2014) has shown that multifunctionality is also used on large farms as a strategy to safeguard and continue with the investments needed in the ‘classic’ part of the farm. Beyond that, it contributes to higher incomes and very much helps to further unfold the construction of new, ‘nested’ markets, which in turn helps to strengthen the negotiating position of these farmers in the main commodity markets (Polman et al., 2010)

11. Agro-ecology represents a strategy that aims to re-ground farming as much as possible on natural resources that are part of the farm’s internal resource base. This helps to further decrease dependency on external inputs and factors of production. This, evidently, is not a single and once-for-all step but an ongoing process that involves improving the internal resources and exploring new possibilities. In a way agro-ecology is a powerful extension of the low-cost farming strategy (van der Ploeg, forthcoming). Agro-ecology is embedded in the exchange of knowledge between farms and between farmers and research stations. Recently, France decided to develop and implement a policy to actively support agro-ecology. Beyond that, across the Western MS there are groups and associations of farmers that are experimenting with novel agro-ecological practices.12 The financial, economic and environmental crises have generated considerable uptake of agro-ecological practices and ideas.

In short, farm development is a many-sided process that can lead in many, often contrasting, directions and which is grounded on different mechanisms. These contrasting developmental processes can be aggregated, at the macro level, into one overall picture. Part of this picture is the ongoing reduction in the number of farms and the associated increase in the average size of the remaining farms. But can this picture be read as implying that, especially in the west of the EU, the large farms are further expanding whilst the small farms are disappearing?

There is an important agro-political consideration to be derived from this discussion: the size of a farm (in hectares or in economic size units13) can no longer be used to assess the probability of the farm generating an adequate income and/or being continued. The relevance and potential of a farm depends on the strategy used to manage and develop it. When accelerated growth and high levels of intensity and scale (i.e. the development of a high tech farm) are central to the strategy (strategy #4 in the classification above), a large farm (and further enlargement) is indeed indispensable. This does not mean, though, that smaller farms are necessarily ‘failed farms’ (or ‘farms that are doomed to fail’). If used in a

12 See e.g. Féderation, 2013; Lucas, 2013 and Lucas et al., a paraître.
13 The more so since the real income obtained per unit of economic size can differ considerably. This partly depends on the strategies adopted, such as 1, 2, 9 and 10 described above.
multifunctional way (#9), or combined with a job elsewhere (by one or more members of the farming family) (#5), or used in very skilful way (#1, #2 and/or #10) good incomes and promising prospects can be generated. And if strategies of type #8 dominate, agricultural income does not matter and the prospects will not depend on agricultural performance. This means, by implication, that poverty in agriculture can no longer be defined as a problem that is generic to small farms. Many of the farmers involved have learned how to deal with it (see also annex 5). There very well might be poverty (and hopelessness) in the agricultural sector but in the Western MS of the EU it is repeatedly delineated by specific situations that are embedded in e.g. unequal relations of negotiating power. It is not generic, nor is it generic to small farms. There is poverty in large farms as well (see Annex 2 for further discussion).

An analysis of RICA (FADN) data describing Italian agriculture between 2003 and 2009 shows that farms in all size categories have been confronted with negative incomes (Salvioni and Aguglia 2014). The proportion of farms with a negative income decreases with farm size, but only by a few percentage points. The same study also shows that the incomes of the largest size categories have fluctuated far more (around the average trend) than those of smaller farms. This highlights the issue of vulnerability, which is discussed later in this document. Henke (2013) has demonstrated that the incomes of large farms depend far more on CAP payments (from both the 1st and the 2nd Pillar) than those of smaller farms.

In synthesis: it is simply wrong to equate small farms with poverty.
3. GROWTH, SHRINKAGE AND EXIT: WHAT IS HAPPENING WHERE?

KEY FINDINGS

- Growth does not just occur on large farms. And it is not only small farms that close down.
- The small farms of today might be the large farms of tomorrow.
- Without small and medium farms the agricultural sector would perform worse.

Table 2 summarizes differential trends in the economic size of farms with grazing animals (these mostly specialize in dairy and meat production but farms with sheep and/or goats are also included in this category). The horizontal axis shows the economic size of these farms in 1980. Economic size is expressed here in NGE - standardized units for economic size that reflect the specificity of Dutch agriculture. The vertical axis refers to the quantitative aspects of the growth of these farms in the 1980-1990 period. Growth could be higher than 25%, between 0 and 25, equal to zero, but could also be negative: the economic size could be reduced by less than 25% or more than 25%. The table also provides information about new farms entering this category and those leaving it.

The uniqueness of the material entailed in Table 2 is that it allows us to empirically answer some specific questions: Which farms are growing? Which farms are declining (this is often seen as the ‘beginning of the end’)? What is the balance between inflow and outflow (i.e. between newly created farms and farms closing down)? It is not possible to answer such questions from farm census data that does not take dynamics at the level of single farms into account. Technically speaking, Table 2 is the result of a cohort analysis applied to a constant data base that covers 10 years. This approach is a very useful way of studying ‘structural change’, although it has not, so far, been systematically applied to agricultural data.

Table 2 shows that, during the study period large farms did indeed expand further – that is: at least a part of the large farms (at that time those with more than 100 NGE were considered to be large farms). In relative terms, of the farms larger than 100 NGE (in 1980) 12.4% realized a growth in economic size of 25% or more over the next ten years. But equally of note is that, over the same period, 17.0% of farms in this category experienced a 25% or more decrease in their economic size.

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14 I am very grateful to Paul Falkenberg, Cees van Straaten and Krijn Poppe of the Dutch Landbouw Economisch Instituut (LEI) who helped me to access and to work on this data base which has hardly yet been explored. Paul Falkenberg developed the required algorithms. I am also grateful to Florent Bidaud who organized a seminar in the French Ministry of Agriculture to discuss this analysis, its outcomes and their implications.

15 In 1980 one dairy cow equalled 0.83 NGE and one hectare of permanent grassland represented 0.70 NGE. Thus, a 15 ha. farm having 25 dairy cows (this was typically seen as a small, if not very small farm at that time) totalled 33 NGE. Due to changing price regimes in 1990 a dairy cow equalled 1.63 NGE and a hectare of grassland 1.26 NGE. To control for the effects of changing price regimes (which imply a redefinition of NGE), the analysis was repeated with hectares (instead of NGEs). This hectare based analysis renders comparable results (see also Annex 5).

16 There are some exceptions to this that can be found in the work of Luijt and Hillebrand (1992); Reinhardt et al., 1995; van der Ploeg 2003; and Boere et al., 2015. However, these four studies only partially explore the mutation data base.
When we turn our attention to the smaller farms (between 3 and 50 NGE)\(^\text{17}\) a comparable picture comes to the fore: 17.8% of this category grew by 25% or more while 20.6% decreased their economic size by 25% or more.

In synthesis: the large farms, or at least some of them, are growing. But so are small farms. The same is true of decreases in economic size. These trends occur in all size categories, and although they occur more among smaller farms than among large ones\(^\text{18}\), the differences are quite small\(^\text{19}\).

Table 2 also shows that the outflow of farms (16,250), is partially compensated for by an inflow of farms (9,359). Most of these newly created farms\(^\text{20}\) are small, but there are also larger ones. Thus the net reduction (outflow minus inflow) in the number of farms with grazing animals is 6,891.

**Table 2:** Number of farms with grazing animals, according to economic size in 1980 and change in economic size in the 1980-1990 period

<table>
<thead>
<tr>
<th>Farm type: Farms that had grazing animals in 1980.</th>
<th>NGE in 1980</th>
<th>&lt;50 nge</th>
<th>50-100 nge</th>
<th>100-200 nge</th>
<th>200-400 nge</th>
<th>&gt;=400 nge</th>
<th>Totaal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in NGE Increase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-25%</td>
<td>7298</td>
<td>5336</td>
<td>573</td>
<td>24</td>
<td>1</td>
<td>13</td>
<td>13232</td>
</tr>
<tr>
<td>0</td>
<td>20</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Total increase</td>
<td>16447</td>
<td>8163</td>
<td>846</td>
<td>37</td>
<td>1</td>
<td></td>
<td>25494</td>
</tr>
<tr>
<td>Decrease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-25%</td>
<td>9135</td>
<td>6751</td>
<td>897</td>
<td>36</td>
<td>1</td>
<td></td>
<td>16820</td>
</tr>
<tr>
<td>0</td>
<td>10574</td>
<td>2008</td>
<td>365</td>
<td>27</td>
<td>2</td>
<td></td>
<td>12976</td>
</tr>
<tr>
<td>Total decrease</td>
<td>19709</td>
<td>8759</td>
<td>1262</td>
<td>63</td>
<td>3</td>
<td></td>
<td>29796</td>
</tr>
<tr>
<td>Ended after 1980</td>
<td>15147</td>
<td>996</td>
<td>97</td>
<td>10</td>
<td>0</td>
<td></td>
<td>16250</td>
</tr>
<tr>
<td>Total in 1980</td>
<td>51303</td>
<td>17918</td>
<td>2205</td>
<td>110</td>
<td>4</td>
<td></td>
<td>71540</td>
</tr>
</tbody>
</table>

| Created after 1980 (NGE in 1990)              |            |        |             |             |             |          |        |
|                                              | <50 nge    | 50-100 nge | 100-200 nge | 200-400 nge | >=400 nge | Totaal |
| Total created                                | 7966       | 1165   | 210         | 18          | 0          |          | 9359   |

\(^{17}\) Table 2 is based on the ‘mutation data base’ built by CBS/LEI (Statistics Netherlands and the Agricultural Economics Institute). Farms of less than 10 NGE are excluded from this data-base. The table is based on all those farms that, in 1980, had grazing animals (n= 71,540). Most of these farms continued with grazing animals over the next decade. 16,250 of the initial farms were ended in this period, either because they stopped completely or fell below the 3 NGE threshold. This is 22.7% of the total. Within the remaining group, 6,347 farms switched to another productive specialization: shifting from having grazing animals into e.g. vegetable production. This category remains part of the constant sample of farms that had grazing animals in 1980.

\(^{18}\) This definitely relates to differentiated off-farm prices, higher cost levels, selective agricultural policies, etc.

\(^{19}\) If one looks at the acreage of the farm (instead of economic size) similar conclusions emerge. See annex 5.

\(^{20}\) Part of this inflow is due to changes in productive specialization (e.g. a small arable farm changing over to meat production), another part is newly constructed farms.
Generally speaking, this table shows that the phenomena of growth, decrease and exit are not tied to specific size categories. They are distributed over the spectrum as a whole, albeit in a somewhat unequal way. But there is definitely no ‘iron law’ that implies that only, or mainly, large farms grow, whilst the small farms mostly disappear. Indeed, among the small farms that grew by 25% or more, there will be some that pass the 50 NGE threshold. That means that in 1990 they will have statistically disappeared from the category of small farms and have entered the category of medium farms (50-100 NGE). It is even possible that in the next decade they will move into the category of large farms. Additional analysis shows that 5,823 small farms in the < 50 NGE category in 1980 (11.3% of all farms in this category in 1980) moved indeed into the 50-100 NGE category by 1990. In addition, in the same period, another 869 farms moved from the 50-100 NGE category to the 100-200 NGE category (4.9% of the total in 1980).

In the following decade (1990-2000) a similar picture emerges. From the category of farms with livestock with less than 50 NGE (a total of 38,299 farms in 1990) 6,990 moved to the next one (50-100 NGE). Another 13,701 farms in this size category stopped their activities (or fell below the 3 NGE threshold) while 6,156 new units were created. From the next category (50-100 NGE) 2,945 farms moved up to the next size class (100-200 NGE). Interestingly the number of farms moving to the next size class between 1990 and 2000 decade is higher than in the previous decade (6,165 vs. 5,823 moved from <50 NGE to 50-100 NGE) and 2,945 vs. 869 from 50-100 NGE to 100-200 NGE).

The new method used to construct Table 2 (applying cohort analysis to a constant sample), allows us to follow the real dynamics and reveals a complex picture. There is growth in all size categories, just as there is shrinkage and exit in all size categories. In addition, farms move from one size category to the next one and this occurs especially among small farms. This is graphically illustrated in Figure 4. (Annex 4 gives similar information for the 1990-2000 period and Annex 5 presents detailed information for size categories based on hectares used per farm).

**Figure 4: Changes in the size of Dutch farms with grazing animals (1980-1990): a disaggregated view**

Source: Own elaboration based on LEI data
There are both upward and downward movements in the total population of farm enterprises. Farms that are now small might be the medium or even large farms of tomorrow (as illustrated in Vignette 1). The large farms of today might stagnate or decline tomorrow (Vignette 2) or they may even close down (after which the resources may be bought by smaller units in order to grow). In short the promise for the future is not located exclusively in the category of large farms. Even if one favours large farms, one has to recognize that small farms are important since they ‘renew’, as it were, the category of large farms.

This leads us to another important agro-political conclusion. An agricultural policy that focuses mostly on large farms (considering them as the stronghold of EU agriculture and which allocates most of the benefits of agricultural policy to this group and loads most of the costs onto small farms) might, quite apart from all other negative consequences, well backfire on itself: as it destroys the reservoir from which new large farms are created.

There is yet another important conclusion for agricultural policy. When it comes to growth, large farms often realize ‘big jumps’ that look impressive, especially when compared with the small steps through which growth usually occurs in small farms. This supports the common assumption that big farms are indispensable for the dynamics and growth of the agricultural sector as a whole. However this, again, is a fallacy of the wrong level.

**Table 3: Number of farms according to level of growth realized and size category (Dutch farms having grazing animals, 1980-1990)**

<table>
<thead>
<tr>
<th>NGE 1980</th>
<th>&lt;50 nge</th>
<th>50-100 nge</th>
<th>100-200 nge</th>
<th>200-400 nge</th>
<th>&gt;=400 nge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;=100</td>
<td>47</td>
<td>70</td>
<td>27</td>
<td>7</td>
<td>0</td>
<td>151</td>
</tr>
<tr>
<td>50-100</td>
<td>332</td>
<td>318</td>
<td>128</td>
<td>7</td>
<td>0</td>
<td>785</td>
</tr>
<tr>
<td>25-50</td>
<td>1374</td>
<td>1206</td>
<td>178</td>
<td>13</td>
<td>0</td>
<td>2771</td>
</tr>
<tr>
<td>10-25</td>
<td>3852</td>
<td>2685</td>
<td>277</td>
<td>6</td>
<td>0</td>
<td>6820</td>
</tr>
<tr>
<td>0-10</td>
<td>10822</td>
<td>3881</td>
<td>236</td>
<td>4</td>
<td>1</td>
<td>14944</td>
</tr>
<tr>
<td>0</td>
<td>20</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
</tr>
<tr>
<td>Total increase</td>
<td>16447</td>
<td>8163</td>
<td>846</td>
<td>37</td>
<td>1</td>
<td>25494</td>
</tr>
<tr>
<td>decrease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>13601</td>
<td>4697</td>
<td>320</td>
<td>4</td>
<td>0</td>
<td>18622</td>
</tr>
<tr>
<td>10-25</td>
<td>5056</td>
<td>3021</td>
<td>451</td>
<td>11</td>
<td>0</td>
<td>8539</td>
</tr>
<tr>
<td>25-50</td>
<td>1052</td>
<td>810</td>
<td>329</td>
<td>15</td>
<td>0</td>
<td>2206</td>
</tr>
<tr>
<td>50-100</td>
<td>0</td>
<td>231</td>
<td>135</td>
<td>18</td>
<td>1</td>
<td>385</td>
</tr>
<tr>
<td>&gt;=100</td>
<td>0</td>
<td>0</td>
<td>27</td>
<td>15</td>
<td>2</td>
<td>44</td>
</tr>
<tr>
<td>Total decrease</td>
<td>19709</td>
<td>8759</td>
<td>1262</td>
<td>63</td>
<td>3</td>
<td>29796</td>
</tr>
<tr>
<td>Total in 1980</td>
<td>36156</td>
<td>16922</td>
<td>2108</td>
<td>100</td>
<td>4</td>
<td>55290</td>
</tr>
</tbody>
</table>

*Source: elaborated by LEI*

Table 3 gives details of the absolute growth realized within different size categories. Growth at the farm enterprise level with more than 100 NGE was encountered at all size levels. Making ‘big jumps’ is not restricted to large farms – small ones occasionally engage in this kind of jumping as well. In doing they certainly attract attention and admiration (and rightly so). Nonetheless, one should not overlook the fact that the these strongly growing

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21 To complicate the picture further, some large farms are not even visible in the statistics (Vignette 3): the relevance of the statistically visible small farms (at least some of them) is that they are part of, or allow for, large farms.
farms only made a marginal contribution to total agricultural growth. The bulk of overall growth resides in many farms growing a little bit, as opposed to a few growing a lot.

Table 3 shows the distribution of absolute growth in NGE per farm for different size classes. Table 4 goes yet a step further. It gives the total increase (or decrease) in NGE per cell for all farms in that cell. Thus each cell shows the total contribution (be it positive or negative) of the farms located in that cell to the overall growth of the category of grazing farms between 1980 and 1990). Table 5 gives a simplified summary and shows the net figures that result from the combined processes of growth and shrinkage. It clearly shows that the bulk of overall growth stems from smaller and medium farms and that they undoubtedly are the *engine* of agricultural development and growth.

![Table 4: Magnitude of growth and decline (measured in total nge) per size category (in nge) of Dutch farms with grazing animals (1980-1990)](image)

In short, table 5 shows that farms in the two smallest categories contributed substantially and significantly to the overall strength and dynamics of the agricultural sector and therefore to food security.
The decade between 1980 and 1990 was a somewhat strange period. Quotas were introduced (in 1984), meat prices went up and down and overall the livestock sector stagnated. Overall growth in NGE for the farms with grazing animals in 1980 only reached 17,645 NGE for the 1980-1990 period as a whole (see also table 5).

The next period (1990-2000) saw different trends emerge (see Annex 4 for detailed statistical information): All the size categories showed levels of increase that were far greater than the levels of decrease and average growth at farm level was 16.3 NGE per farm over the ten year period. Of the total growth realized in this 10 year period 25.4% was generated by farms in the smallest size category, while those in the small-medium category (between 50 and 100 NGE) contributed 58.1% of all growth. The farms larger than 100 NGE only contributed 17.5% of total growth in this decade: less than the small farms. Once again, this shows that small and medium sized farms are indispensable for the dynamics and growth of the agricultural sector as a whole.

Table 6 gives data for the whole of the 1980-2006 period and covers all Dutch farms with grazing animals. It shows the net contribution to total growth over this period from the different size categories that existed in 1980. The conclusion is clear: even over this relatively long period the contribution of small and medium farms significantly outweighs the contribution of large farms to the overall process of economic growth.

Table 6: The contribution made to total agricultural growth by different size categories of Dutch farms with grazing animals (1980-2006)

<table>
<thead>
<tr>
<th>Size category (departing from the 1980 situation) in nge</th>
<th>Net contribution to total growth (measured in nge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50 nge</td>
<td>175,416</td>
</tr>
<tr>
<td>50-100 nge</td>
<td>258,913</td>
</tr>
<tr>
<td>100-200 nge</td>
<td>37,979</td>
</tr>
<tr>
<td>200-400 nge</td>
<td>3,237</td>
</tr>
<tr>
<td>&gt;400nge</td>
<td>119</td>
</tr>
</tbody>
</table>

Source: Own elaboration based on LEI data

The same also holds true for the arable farms sector (see Annex 6 for detailed data). Over the 1980-2006 period among the category of farms of less than 50 nge there was a subgroup of 12.6% that achieved more than 25% growth in nge. For farms in the 50 to 100 nge category this was 22.8%; In the next size groups (100-200 nge, 200-400 nge and > 400 nge) the figures were 20.0%, 12.% and 7.7% respectively. The growing small arable farms (< 50) contributed 77,953 nge to the overall growth of the arable sector. Farms in the 50-100 nge category contributed 85,231 nge. For the three larger categories (100-200, 200-400 and >400 nge) the contributions were 32,656, 2,442 and 650 nge respectively. There is only one possible interpretation of such data: without small and medium farms Dutch agriculture would have been a lame duck.
4. WHY SOME FARMS DEVELOP AND OTHERS DECREASE: ON SOCIAL AND ECONOMIC LOGIC

**KEY FINDINGS**

- ‘Economic logic’ is counterbalanced by ‘social logic’. Agricultural development can only be understood by taking both into account.
- ‘Economic’ and ‘social logic’ both operate in two directions.

The total number of farms and their development is not just governed by an ‘economic logic’, there is also a ‘social logic’. Together the two can explain developmental patterns (illustrated in Figure 5) that, at first sight, seem to be impossible (with small farms growing and large farms decreasing).

Small farms are often created and developed further due to strong emancipatory drives. This has been the case throughout history and is still an important social driver in agriculture today (although the entry barriers are getting higher and small farmers face increasing difficulties, especially when they want to further develop their farms). Farming is considered by many people as an attractive job, offering independence and daily contact with nature. The farm functions as attractive *domus*, where work and living can be combined. Beyond that, it is a good place for children to grow up. These features were all highlighted in the many meetings and events that took place in the recent International Year of Family Farming (van der Ploeg, 2014). But there are more profane drivers as well. In times of crisis and (urban) unemployment, the inflow of people into the agricultural sector (and thus the construction of new farms) grows and the outflow (associated with the ending of farms) will diminish. Recently, the prospects of organic farming and new institutional arrangements as CSA (Community Supported Agriculture) have also started attracting young people into the agricultural sector.

Many mechanisms can be used to make an entry into farming. These can include: the use of savings obtained elsewhere (as in vignette 1); the combination of farming with another job outside the farm in order to be able to invest part of the external income into farm development; labour investments (for instance farmers building their own stables and sheds and/or improving soil quality in order to change to more intensive cropping schemes); and multifunctionality (undertaking multiple economic activities with the same set of resources, especially land).

But ‘social logic’ can also work the other way around. When stress and/or drudgery become too much, or chronic disease or accidents make continuity impossible, then farms might be closed. Demographic processes are especially important. In contrast to the past, most farming families in Europe have just a few children, reducing the probability of having a successor. This is magnified since taking over the farm is no longer a strongly-felt social obligation, it is a choice. Another important demographic factor relates to couples getting married earlier: this implies, in the case of a farming family, that when the children have grown up they cannot immediately take over the farm (or start to work in it). Instead, they have to find another job and only when their parents retire (after, say, 10 or 15 years) can they take over the farm – if they still want. The, albeit belated, entrance of divorces in farming communities is another mechanism through which ‘social logic’ has an impact.
The ‘social logic’ of farming can function in different ways: It can strongly drive people to further develop farming or to quit – and this applies equally to small farmers and large ones. The same applies to the ‘economic logic’ of farming. Normally understood as the driver that makes large farms develop further and small farms lag behind more and more, we have to include in our understanding of farming that ‘economic logic’ might work in the opposite way too. Through continued and economically driven growth, farms might get ‘over-dimensioned’: too big for a son or daughter to take over, or having more financial obligations than it can meet in times of low market prices (see also the next paragraph). Entrepreneurial decisions can turn out, in hindsight, to be wrong. Badly calculated projects, bad advice, animal diseases and/or unexpected events elsewhere in the value chain can also negatively affect the farm – it is all part of the game. In short: within the ‘economic logic’ of farming, a lot can go wrong (and thus contribute to the downward trends in the right-hand illustration in Figure 3). And of course, things can go the other way too. This is the case with young entrepreneurial people able to make, explore, use or even create new niches and new opportunities and enabling them to turn even a small property into a thriving asset (Milone, 2015; Morel and Leger, 2016).

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22 Both Figure 5 and the reasoning underlying it (on social and economic logics) are strongly inspired by Shanin (1990:218).

23 According to specialists the probability of animal diseases is, for mathematical reasons, higher in large herds.
5. DANCING THROUGH TIME: A SYNTHESIS

**KEY FINDING**
- Agricultural development is far from being a unilinear process. It is a jumble.

Figure 6 synthesizes the statistics and arguments made so far. It shows farming as an 'organized flow of activities through time' (Vincent, 1977). The average farm size is increasing, but there is considerable diversity around this average. Roughly speaking, the upper ceiling (the average plus, say, two times the standard deviation) is increasing a bit more quickly than the average and the lower ceiling (M -2s) lags a bit behind. As a result, the total range is also slowly increasing.

The development of the average farm size and the movements of the upper and lower ceilings are the outcome of the complex interaction of ‘economic’ and ‘social logic’. This is shown by the series of interlinked short arrows that describe particular farm development patterns.

**Figure 6: Farm development patterns and their statistical reflection**

There is growth of both small, medium and large farms (vignette 1 is, as it were, present in Figure 6: it is the growth pattern that starts at the bottom line and finally ends up as a larger than average farm). There is also decline, in all size categories. Some of the processes end up as one of the ‘activity systems’ of type 6 -11 described by Laurent, or as an exit: with the farm disappearing completely. Some farms are deactivated (as shown by the horizontal series of arrows): by doing nothing they move from being a large farm to a small farm (these evidently are the ‘well-established’ or ‘sitting’ farmers from vignette 2).
Growth at the farm level is sometimes a smooth and ongoing process that evolves in a step by step way. In other farms it occurs through ‘jumps’ that happen abruptly. Sometimes growth is proportional (to the size of the farm), sometimes it is disproportional.

Agriculture contains all these realities. It is a jumble of all kinds of partial processes that result, at the macro level, in a few clear tendencies. These tendencies reflect the conditions under which these many sub-processes occur as well as the main drivers that push them forward.

The growth of the average farm is the outcome of the relentless drive among farming families to improve both their incomes and the farm prospects in the longer run. It also reflects the situation that has existed for decades in EU agriculture: regulation that brought protected prices and, later, income support and which provided the long term security needed to make large investments, and the support given to farmers leaving the sector.

Since the turn of the Millennium these conditions have progressively disappeared and the strongly regulated and supported agricultural sector has been displaced by a deregulated constellation. This has had far-reaching consequences, some of which will be discussed in the next section.

The level of the upper ceiling shown in Figure 6 used to be governed by different factors. On the one hand agricultural R&D offered new technological possibilities that allowed for the enlargement of single farms. On the other hand, the moral economy\textsuperscript{24} that guided farmers’ communities, different mechanisms related to the ‘social logic’ of farming and a range of regulatory mechanisms\textsuperscript{25} imposed limitations on the upward movement of the upper ceiling.

The lower ceiling, in its turn is also regulated by a range of mechanisms. These include the relation between incomes earned from small farms and those obtainable in urban settings, rural employment opportunities outside of agriculture, the social position of (small) farmers and statistical conventions.

Politics generally and agricultural policies specifically interact in different ways with the crisscross shown in Figure 6. In the immediate post WW2 period many western European nations developed and imposed policies that explicitly aimed to strengthen small farms. Only later did the emphasis shift, when with the Mansholt Plan the (then) EEC explicitly opted for a policy that actively supported large farms whilst trying to move small farmers out of the sector. In many MS this was consolidated and strengthened by national regulatory schemes and policies.\textsuperscript{26}

\textsuperscript{24} For example the widely shared opinion that farms that are too large would surely end up in trouble.
\textsuperscript{25} For example, regulations to limit overproduction, environmental regulations and spatial policies.
\textsuperscript{26} In the Netherlands, for instance, it applied that spatial reorganization was only possible if at least 30% of the farms (notably the small ones) could be ended. At the level of policy design the rule was followed that small farms entering into trouble through particular regulatory schemes was not seen as a problem.
6. FARM DYNAMICS IN THE NEW ERA

KEY FINDINGS

- The new era of deregulated agricultural and food markets marks the end of structural change as it was understood in the previous decades.
- The style of low cost farming offers much promise for the future.

Agricultural development is a differentiated process that creates and reproduces different farming styles. Through a specific style the farm is moulded so as to optimally fit the conditions under which it is being operated, the needs of the farming family and the central strategic objectives that underlie the development trajectory of the farm. There are often major and mutual differences between farming styles. These can include the levels of employment and inputs used, the efficiency of input-use, yields, labour productivity, total-factor-productivity, relations with the landscape, the rural economy and wider society, emission levels, etc. When later discussing the concrete possibility of an alternative development trajectory for agriculture in Western Europe, we will return to several of these differences. Here we will focus on income levels and especially on incomes in times of volatility.

In the previous era of regulated agricultural markets different styles of farming could generate more or less similar incomes. This has been shown in a range of farming styles studies. Table 7 summarizes 1990 data from an analysis grounded on farm accountancy data of 300 dairy farms (van der Ploeg et al, 1993). The data show that average levels of income per unit of labour force (from the family) were within the range of 70,000 to 110,000 NLG (comparable to 31,800 to 50,000 Euro). The farms structured according to the style of high-tech farming (large-scale, intensive, specialized and applying the newest technologies) realized the highest incomes, but one has to take into account that their milk quota were, on average, 41% more than those of, say, the low cost farms.

At the beginning of the 1990s the findings of empirical inquiries into farming styles in the Netherlands provided the starting point for a multi-year research project at the State Research Centre for Dairy Farming in Lelystad in the Netherlands (PR-Proefstation Rundveehouderij). Two experimental farms were created: one following the style of low cost farming and one the style of high-tech farming. Each of these two farms was designed in such a way that one person could run the farm and that a similar level of income would be rendered. In order to meet these requirements the ‘high-tech farm’ had to produce 800,000 kg of milk per year – twice the volume of the ‘low cost farm’ (Kamp and Haan, 2004; Evers et al., 2007; for a more general see discussion: Biala et al., 2008). The variable costs per 100 kg milk of the high-tech farm were twice as high as those of the low cost farm (see Table 8). This was due to automated milking, higher concentrate use, higher energy use, etc. Consequently, the margin was lower but the larger scale meant that a similar income could be realized.

An overview is given in van der Ploeg, 2003.
### Table 7: A comparison of Dutch farming styles (1990)

<table>
<thead>
<tr>
<th></th>
<th>High-tech farming</th>
<th>Low cost farming</th>
<th>Intensified farming</th>
<th>Large-scale farming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hectares of land</td>
<td>65</td>
<td>46</td>
<td>59</td>
<td>52</td>
</tr>
<tr>
<td>Milk quota</td>
<td>718,000</td>
<td>508,000</td>
<td>699,000</td>
<td>544,000</td>
</tr>
<tr>
<td>Labour units (LU)</td>
<td>2.0</td>
<td>1.6</td>
<td>1.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Milk quota/LU</td>
<td>359,000</td>
<td>316,000</td>
<td>367,000</td>
<td>363,000</td>
</tr>
<tr>
<td>Sbe</td>
<td>497</td>
<td>339</td>
<td>438</td>
<td>374</td>
</tr>
<tr>
<td>Milk yield/cow</td>
<td>6464</td>
<td>6857</td>
<td>7370</td>
<td>6661</td>
</tr>
<tr>
<td>Concentrate use/cow</td>
<td>1736</td>
<td>1679</td>
<td>2118</td>
<td>2165</td>
</tr>
<tr>
<td>Labour income/LUf</td>
<td>110,000</td>
<td>72,000</td>
<td>100,000</td>
<td>70,000</td>
</tr>
</tbody>
</table>

**Source:** Ploeg et al., 1993

### Table 8: A comparison between a low cost and a high-tech farm in Dutch dairy farming

<table>
<thead>
<tr>
<th></th>
<th>Low cost</th>
<th>High-tech</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units of labour force</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Working hours/man/year</td>
<td>2500</td>
<td>2490</td>
</tr>
<tr>
<td>Hectares of land</td>
<td>32</td>
<td>35</td>
</tr>
<tr>
<td>Milking cows</td>
<td>53</td>
<td>81</td>
</tr>
<tr>
<td>Milk yield per milking cow</td>
<td>7547</td>
<td>9673</td>
</tr>
<tr>
<td>Total milk production (kg)</td>
<td>400,000</td>
<td>783,515</td>
</tr>
<tr>
<td>Concentrates per 100 kg of milk (in €)</td>
<td>3.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Calculated labour cost per 100 kg of milk (in €)</td>
<td>13.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Costs associated with technology use per 100 kg (in €)</td>
<td>5.4</td>
<td>7.1</td>
</tr>
<tr>
<td>Production costs per 100 kg (in €)</td>
<td>34.5</td>
<td>34.7</td>
</tr>
<tr>
<td>Realized income per working hour (€)</td>
<td>19.20</td>
<td>16.36</td>
</tr>
</tbody>
</table>

**Source:** Data derived from PR Lelystad experimental farms

---

This is an adaptation of table 2.1 from van der Ploeg et al., 1993:8. *Koweminsken* appear here as ‘intensified farming’, *sunige boeren* as ‘low cost farming’, *trekker boeren* as ‘large scale farming’ and *grutte boeren* as ‘high-tech farming’. *Intynsive boeren* and *fokkers* are left out here. LUf refers to labour units available to the farming family and the labour income per LUf is expressed in Dutch guilders (NLG), the currency of that time. SBE refers to standardized farming units (a weighted indicator of economic size).
The comparison was continued for several years (which coincided with the last years of stable prices) and clearly demonstrated that the more labour-intensive style of low cost farming can readily result in income levels equal to those realized in far larger, high-tech farms that generate less employment. This was the case under the protective conditions (a relatively high and stable milk price) that were provided by the previous Common Agricultural Policy. However, the shift towards a new market-regime completely reshuffled these relations (see Figure 7). In periods with low prices it are the high-tech farms that might suddenly face negative cash flows.

**Figure 7: Comparing experimental farms**

![Figure 7: Comparing experimental farms](image)

A recent research programme carried out in Italy (Menghi et al., 2015) focussed in a similar way on contrasting farming styles. It was done in the realm of the Parmesan cheese production [Parmigiano Reggiano] and thus introduces also the price differentiation associated with different quality levels into the analysis (see also table 9 below).

In this region the 'low cost' style is strongly embedded among those farmers that keep Reggian Cows (locally known as *vacche rosse* or *rosse reggiane*). This type of dairy cow is 'low cost' *par excellence*. The milk yields are low, but the fat and protein content is very high. Concentrate needs are relatively low and they live much longer (thus implying lower costs for the renewal of the herd). These aspects are combined with an overall management of the farm that is low cost in nearly every aspect. At the other end of the comparison there is a high-tech approach that centres on the use of Holstein Frisian dairy cows that have far higher milk yields but which also differ in many other respects from the approach of farmers with *Rossa Reggiana*. The income per unit of labour force and the income realized per dairy cow is superior on the low-cost farms which are better able to valorize their product (receiving 78 Euro per 100 kg. of milk compared to 53.30 Euro among the Holstein Frisian farmers. The low cost farms also show far more resilience: their break-even point is at 56% of the milk price as compared to 64% in the high-tech style (see Table 9).

In the second half of 2008 and especially in the first half of 2009 the dairy farming sector witnessed a sharp drop in milk prices (from an average level of around 32 to 36 Euro per
100 kg of milk to a level as low as 24 Euro/100 kg). This was a first clear expression of price volatility that characterizes the new era of deregulated markets.

**Table 9: Low cost farming and high-tech farming: an Italian example.**

<table>
<thead>
<tr>
<th></th>
<th>Low cost farming (Vacche Rosse)</th>
<th>Intensive farming (Parmigiano Reggiano)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hectares of land</td>
<td>39</td>
<td>58</td>
</tr>
<tr>
<td>Milk quota</td>
<td>340,876</td>
<td>643,327</td>
</tr>
<tr>
<td>Labour units (LU)</td>
<td>2.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Milk quota/LU</td>
<td>154,944</td>
<td>183,808</td>
</tr>
<tr>
<td>Sbe (economic size units)</td>
<td>221</td>
<td>285</td>
</tr>
<tr>
<td>Milk yield/cow</td>
<td>5729</td>
<td>7468</td>
</tr>
<tr>
<td>Concentrate use/cow in euro</td>
<td>1,228</td>
<td>1,393</td>
</tr>
<tr>
<td>Labour income/LU</td>
<td>34,629</td>
<td>29,946</td>
</tr>
<tr>
<td>Production cost/cow in euro</td>
<td>3,132</td>
<td>3,118</td>
</tr>
<tr>
<td>Revenue/cow in euro</td>
<td>4,468</td>
<td>3,978</td>
</tr>
<tr>
<td>Income/cow in euro</td>
<td>548</td>
<td>117</td>
</tr>
<tr>
<td>Family Income/cow in euro</td>
<td>1,987</td>
<td>1,359</td>
</tr>
<tr>
<td>Break-even point (%)</td>
<td>56</td>
<td>64</td>
</tr>
</tbody>
</table>

**Source:** CRPA-UNIPG data

The consequences differed considerably. The income levels of high-tech farmers, intensive farmers and large-scale farmers fell dramatically. Yet, the average income of low-cost producers fell far less (see Table 10) and was, on average, more than twice as high as that of the far larger high-tech farmers\(^29\).

**Table 10: Labour income per full-time labour unit (in Euro/year) for 2009 and 2010 for different farming styles**

<table>
<thead>
<tr>
<th></th>
<th>2009 (bad year)</th>
<th>2010 (good year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-cost farmers</td>
<td>32,300</td>
<td>69,300</td>
</tr>
<tr>
<td>High-tech farmers</td>
<td>13,170</td>
<td>57,350</td>
</tr>
<tr>
<td>Intensive farmers</td>
<td>16,760</td>
<td>68,050</td>
</tr>
<tr>
<td>Large-scale farmers</td>
<td>15,500</td>
<td>74,110</td>
</tr>
</tbody>
</table>

**Source:** (Dirksen, 2013: 18 table 4.3)

---

\(^{29}\) Such a result could have been predicted using the outcomes of the experimental farms discussed above. The introduction of a price level of say 25 Euros in the diagram immediately shows a meagre but still positive income in the low-cost farm and a negative cash flow in the high-tech one.
Farms structured according to the low-cost style are better placed to face adverse circumstances than the more entrepreneurial ones –in the new market regime they represent resilience (Darnhofer et al., 2010) whereas the far larger high-tech farms suddenly demonstrate increased vulnerability.

A similar conclusion can be drawn from another study (Oostindie et al., 2013) that covered a four year period (2007-2010) and was based on a total of 1362 farms. Departing from the average net result in 2009, four income categories were distinguished. The category with a far below average net result per 100 kg milk faced a dramatic situation. Their average net financial result amounted to – 9.70 Euro per 100 kg of milk. In other words they were experiencing a negative cash-flow and were no longer able to meet their financial obligations to the banks. It was only because the banks were, at that time, willing and still able to re-finance these farms that they were able to survive. In Denmark, this first wave of volatility (2008/2009) caused a range of large high-tech dairy farms in Denmark to close down: they were de facto unable to face up to and deal with volatility (the more so since the price of land, their prime asset, decreased at the same time).

With the elimination of the quota system (in 2015), the dairy farming sector definitely entered a new period: the era of deregulated and considerably volatile markets. This new era marks the end of structural change as it was thought to occur in the EU (and as it empirically happened in the form of a developmental trajectory that was followed by some farmers whilst other chose other trajectories (as shown in Figures 1 and 2). Large and highly intensified farms of the high-tech type have high variable costs and relatively low margins. This makes them very vulnerable to abrupt increases in costs or decreases in off-farm prices. This applies even more when such farms have been or are engaged in accelerated growth: then the debt-related financial costs are high and the margin is, consequently, even smaller (Oostindie et al, 2013).

At the moment the dairy sector is again facing a long downward wave. Many large farms are in crisis. This is also happening in Denmark. Susanne Clausen from the Danish Seges Institute recently commented that “half of the dairy farmers are currently facing problems with their cash flow. Especially large farms experience difficulties. They recently invested a lot [....these] are the farms with more than 200 cows. The problem relates as well to the very high debts. Technically speaking some 30% of these farms are broke. Their debts exceed their assets” (Clausen, 2016, p.5).

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31 This category showed the highest variable costs per 100 kg of milk. The same was true for depreciations and interest paid per 100kg of milk. In other words, this category resembled, far more than the others, the high-tech style of farming.

32 Of course, not all large, high-tech type of farms are highly indebted. There are exceptions to the rule (due to expropriation for instance). However, on the whole it applies that large and quickly expanding farms do have relatively high debt levels (debts expressed per 100 kg of milk).
7. ‘STRUCTURAL CHANGE’ IS INCREASINGLY AT ODDS WITH EMERGING SOCIETAL NEEDS

**KEY FINDING**
- The style of low cost farming helps agriculture to meet new societal needs.

So far this document has mainly focussed on *quantitative* growth in agriculture. Here we turn our attention to the *qualitative* aspects: Which direction(s) are growth and development going? What mechanisms are they based on? What is their impact?, etc. This again implies bringing the issue of farming styles to the fore. The notion of ‘structural change’ does much to explain (and drive) growth in the style of high-tech farming. However, growth can also occur in, and through, other styles. They also develop, but their development trajectories differ, in many respects, from that of high-tech farms.

Table 11 summarizes data on levels of nitrogen use in different farming styles in the Dutch dairy farm sector. The data are taken from the year 2011 and are derived from Dirksen *et al.*, (2013).

**Table 11: Nitrogen use and efficiency in different farming styles**

<table>
<thead>
<tr>
<th></th>
<th>N in fertilizer /ha</th>
<th>N in concentrates /ha</th>
<th>N in manure /ha</th>
<th>Total N input /ha</th>
<th>N use efficiency</th>
<th>N surplus /ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low cost farmers</td>
<td>124</td>
<td>98</td>
<td>231</td>
<td>453</td>
<td>38%</td>
<td>144 kg</td>
</tr>
<tr>
<td>High-tech farmers</td>
<td>149</td>
<td>179</td>
<td>307</td>
<td>653</td>
<td>32%</td>
<td>227 kg</td>
</tr>
<tr>
<td>Intensive farmers</td>
<td>139</td>
<td>190</td>
<td>298</td>
<td>627</td>
<td>35%</td>
<td>217 kg</td>
</tr>
<tr>
<td>Large scale farmers</td>
<td>145</td>
<td>159</td>
<td>282</td>
<td>585</td>
<td>32%</td>
<td>210 kg</td>
</tr>
</tbody>
</table>

*Source:* Dirksen *et al.*, 2013

There is a clear difference between the different styles. The largest difference is encountered between the style of low cost farming (farming economically) and the one of high-tech farming. The latter uses far more nitrogen, entailed in both chemical fertilizer and in concentrates. They also add more nitrogen from animal manure to the soil. Total N application per hectare is 653 kg/ha. This is 44% higher than total N application in the style of low cost farmers. Beyond this, the N use efficiency, for the farm as a whole, is lower: 32% vs. 38%. Together this implies an N-surplus/ha in high-tech farming that is 56% higher than in the style of low cost farming. It is also interesting to note that similar differences were found in farming styles studies undertaken more than 20 years earlier (van der Ploeg *et al.*, 1992; Antuma *et al.*, 1993). At that time the average levels were higher in every style. All the styles have achieved considerable reductions in the N-surpluses/ha (due to different generations of agro-environmental policies). It is notable,
though, that the difference between the two extremes (the high-tech and the low cost styles) has grown over time: It was 32% in 1987 and grew to 56% in 2011. The style of low cost farming was already achieving the lowest levels in the 1980s but still decreased the N-surplus/ha more than the other styles. Similar differences and trends apply to other environmental indicators, such as phosphate and energy use (Pimentel 2009 a and b; Dirksen et al, 2013). This applies as well when the use per 100 kg of milk is taken into account.

The use of fossil energy also depends on the style of farming. As suggested by de Wit (1975, 1992) the overall relation between fossil and non-fossil energy can be represented by a substitution curve (see Figure 8). The overall position and inclination of this curve will evidently depend on the farm’s resource endowments, resource quality, technological level and the design of the farm and its activities. In formal terms, the position of farms on the curve depends on the relative costs of energy from fossil and non-fossil sources. When fossil energy becomes cheaper, farms will increase its use and use less non-fossil energy. However, considerable differentiation is possible here because the assessment of opportunity costs for different types of non-fossil energy is subjective – it depends on the strategy of the producers.

**Figure 8: Substitution curve**

![Substitution curve](image)

Source: Own elaboration

Figure 9 is the outcome of a farming styles analysis applied to a sample of 300 well-documented dairy farms in the province of Friesland (1990). It shows different, style-specific substitution curves. These curves show the amount of labour (understood here as a proxy for non-fossil energy) and the total costs of mechanization (a proxy for fossil energy) needed to produce 500,000 kg of milk. Statistically, the substitution curves are significantly different. In high-tech farming (line G) a relatively high level of mechanization combines with a relatively low level of labour input. In contrast with this, the style of farming 33

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33 These empirical data on N, P2O5 and energy use per 100 kg of milk (which have been confirmed in a range of farming styles studies) strongly contradict the theory of ‘optimal’ farming at the highest levels of intensity and within the largest farms.

34 See van der Ploeg 2003: 211 and especially note 10.
intensively and the low cost style of farming (lines K and S) use far less mechanization and more labour in order to produce the same amount of milk. The large scale farmers (line T) are lowest of all in terms of labour input. In short: energy-use, and especially the balance of fossil and non-fossil energy, are style dependent.

Figure 9: Substitution curves for different farming styles

![Substitution curves for different farming styles](image)

Source: van der Ploeg, 2003

Table 12 gives data on employment levels for 1987 and 2010. Again one notes differential development trends, the most marked contrast being the one between the style of farming economically and the high-tech style. In 1987, in the style of low cost farming, 3.5 labour units were required to produce 1 million kg of milk, 40% more than in the high-tech style. Nearly 25 years later (2010) this difference had grown to 73% (1.9 LU versus 3.3 LU). In the style of low-cost farming the ratio between total production and labour input decreased by just 6% between 1987 and 2010. In high-tech farms it decreased by 24%.

When we compare both samples, we see that low-cost farmers developed their farms in a step-by-step way. Their average quotas grew from 406,000 kg of milk to 461,100 kg. The

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35 Figure 9 contains more lines than those discussed in the main text. These refer to specific combinations. For a full discussion see van der Ploeg, 2003:113-121.

36 This can also be explained theoretically. In the style of farming intensively and in the low cost style of farming labour is considered to be the decisive factor of production. It is, in the case of farming intensively, the carrier of craftsmanship, skill, practical knowledge and fine-tuning needed to achieve high yield levels and the associated high margins per milking cow. In the low cost style, labour is needed to optimize the use of internal resources (in order to reduce the use of external inputs). By contrast, in the large scale style (of the 'machine men') farmers try to reduce labour input as much as possible. In the high-tech style, investment in new technologies is understood as a necessary investment in the future of the farm. Typically, high-tech farms will engage in summer feeding, and there is no more pasturing (thus considerable amounts of fossil fuel energy are needed for the daily mowing and transportation of grass). In the low cost style pasturing is the favoured option.
high-tech farms, by contrast nearly doubled their volume of production: from 635,000 kg of milk per farm in 1987 to 1,130,000 kg in 2010.

Table 12: Employment levels for different farming styles in the Dutch dairy farming in 1987 and 2010

<table>
<thead>
<tr>
<th></th>
<th>To produce 1 million kg of milk, 1987</th>
<th>To work 100 ha of land, 1987</th>
<th>To produce 1 million kg of milk, 2010</th>
<th>To work 100 ha of land, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low cost farmers</td>
<td>3.5</td>
<td>3.6</td>
<td>3.3</td>
<td>3.2</td>
</tr>
<tr>
<td>High-tech farmers</td>
<td>2.5</td>
<td>3.5</td>
<td>1.9</td>
<td>2.6</td>
</tr>
<tr>
<td>Intensive farmers</td>
<td>2.9</td>
<td>3.5</td>
<td>2.9</td>
<td>2.4</td>
</tr>
<tr>
<td>Large scale farmers</td>
<td>----</td>
<td>-----</td>
<td>1.8</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Sources: Ploeg et al., 1992 and Oostindie et al., 2013. Employment expressed in Full Time Labour Units: LU.

In synthesis: if the qualitative dimension of growth at the farm level is taken into account, the style of low cost farming emerges as being far closer to current societal needs and expectations (Regt and Kuiper, 2006). Its development allows more farms to remain. This is a positive contribution to the regional rural economies. It generates more employment – without the remuneration per unit of labour force being lower. In societies that are wrestling with high and persistent unemployment, this is another important, positive contribution. Beyond that, the farms that unfold along the lines of the style of low cost farming are more resilient.

From an environmental point of view, the growth of low cost farms is also more attractive than the growth of other styles: it contributes more to the reduction of greenhouse gas emissions, and these farms make a relatively larger contribution to mitigating global warming. This is especially the case when low-cost farming follows agro-ecological practices.

37 The bold dot on the different curves indicates the style-specific average level of mechanization and labour input.
8. ONGOING CONCENTRATION: HOW, WHY AND WHICH IMPACT?

**KEY FINDINGS**

- Mega-farms block the development of small and medium farms
- Mega-farms are at odds with societal needs

Over the last fifty years or so, the persistent, but partial, trend towards larger farms has resulted in a slow process of concentration of resources in a small group of large and very large farms that produce a growing portion of total agricultural production\(^\text{38}\) (see textbox 3 with some data concerning the Italian situation).

**Textbox 3: Concentration in Italian agriculture**

In Italy 71% of all farms are of 5 hectares or less. Those with more than 50 hectares represent just 3% of all farms but they control 42.5% off all used agricultural land. When we look at the Gross Value of Production (GVP) per farm 17.6% of all farms generate a GVP of between 15,000 and 50,000 Euro: they produce 17.5% of the total GVP of Italian agriculture. Farms with a GVP in excess of 500,000 Euro represent 0.5% of all farms and produce 23.3% of total GVP. However the real difference is less accentuated when one looks at contributions to the total Value Added of Italian agriculture. The small farms contribute 18.8%, the large ones 20.5%. This is because the variable costs are far higher in the large farm enterprises.

In the early 1990s, an analysis of the Italian Agricultural Census of 1990 showed that there was a strong concentration of total GVP in the top decile of farms (according to GVP/farm). Barberis and Siesto (1993). This was referred to as the “eminent decile” [il decimo eccellente]. At that time most scientists thought that this decile was composed of large, modernized farms. However, Saccomandi (1995) soon demonstrated that it was a rather complex and contradictory configuration composed of capitalist farms and family farms, large and small farms, professional and part-time farms - all with completely different characteristics. The only feature that they really shared in common was being in this statistical category. Saccomandi explained this as being a result of the capacity of small farmers to compensate for having a small farm by adopting organizational solutions that nonetheless allowed them to produce considerable revenues. More recent micro-economic studies of dairy farms also demonstrate that small farms realize yield levels that are superior to those of large dairy farms and are also more flexible in their resource-use (including labour) (Milone et al., 2000 and Milone, 2009).

\(^{38}\) At first sight the notion of concentration of resources and production in the subgroup of large farms seems to be completely at odds with the phenomenon of small and medium farms strongly growing as well. In annex 7 this apparent riddle is resolved.
Currently, though, there is an unprecedented acceleration. A small but growing group of farms are ‘breaking through’ the upper ceiling (as illustrated in Figure 10). Throughout the western MS this has generated a heated debate on the benefits and drawbacks of ‘mega farms’ (van der Ploeg, Franco and Borras, 2015).

The Dutch Council for the Rural Areas quantified the notion of mega-farm. The lower limits are 320 milking cows on a dairy farm, 3.5 ha for a greenhouse and 340 ha for arable farming. Between 2005 and 2013 the number of mega farms grew from 301 to 803. In 2015, 62 dairy farms had more than 500 animals. In Italy the number of farms with more than 500 milking cows grew from 17 to 663 between 2005 and 2015.39

In the past the trend towards concentration was supported (if not partly induced) by differentiated price regimes introduced by agro-industries, the selective nature of national and communitarian agricultural policies and the biased nature of agricultural R&D. It is currently grounded in and supported by the abundant availability of very cheap credit, deregulation at the level of national and communitarian agricultural policies and the constant quest of food industries and large retail chains to find the lowest possible farm gate prices. The consequences of this search are threefold. The very large farms have become favoured suppliers – having a few, very large, suppliers considerably reduces transaction costs. This translates into a tendency to exclude smaller producers (some are literally pushed out of the market). Taken together these two effects can result in a third one: many (especially smaller) producers may get de-motivated and de-activate or even close their farm.

**Figure 10: Struggles at the upper ceiling (forcing others out)**

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39 The number of mega-farms is probably underestimated. Mega-farms are often composed by separate administrative units each having its own unique identification code. This makes that they appear in statistics as a certain number of seemingly independent farm enterprises of, say, medium size.
The accelerated growth of mega-farms is perceived by other farmers as highly problematic since these mega-farms are appropriating and then monopolizing nearly all the ‘developmental space’ in the agricultural sector. This term describes the aggregated possibilities to develop individual farms. This ‘space’ is increasingly limited by environmental policies (especially those regarding nitrogen and phosphate use), spatial policies, the capacity of the market to absorb more production, etc. Consequently, there frequently is, in practice, a zero-sum game. The appropriation of the ‘scarce’ developmental space by mega-farms is pushing ever more smaller family farms out of agriculture. Mega-farms also tend to consume the lion’s share of the direct aid available to agricultural producers (European Commission 2012, 2015a, 2015b).
9. FROM STRUCTURAL CHANGE TO INTEGRATED RURAL DEVELOPMENT

KEY FINDINGS

- Europe needs an inclusive agricultural policy rather than a selective one.
- Therefore, a radically transformed CAP is needed.
- The first expressions and indications of such a transformation can be noted everywhere.

Agricultural development needs to be re-designed, both at farm level and at the level of agriculture as a whole. At farm level one can build on the strategy of low-cost farming and the associated repertoire of practices, insights and experience. The point is that low-cost farming (especially when it follows the agro-ecological route) should be encouraged, whilst other styles should be discouraged. This requires a re-design of agricultural, environmental and fiscal policies.\(^{40}\)

Agriculture as a whole (or, the ‘rural’) needs to be regarded, and dealt with, as a precious constellation\(^{41}\) that harbours millions of family farms, sustains considerable employment and allows people to engage in attractive and autonomous work. It is also the custodian of beautiful landscapes and their reproduction, of cultural heritage and offers the promise of making a strong and positive contribution to the mitigation of climate change. It is where biodiversity is located and where ‘rural natures’ are the basis for food production (de Castro, 2012). The rural and the agricultural activities embedded also provide a space that is accessible to, and cherished by, urban people who use and enjoy it in a myriad of ways. To protect and further develop this agriculture, the EU needs a new policy. And a new policy needs a new guiding image that clearly demarcates the rupture with the previous period when ‘structural change’ was central.

There are several ‘candidates’ here. ‘Agricultural turn’ (like the German Agrarwende) could be possible. Or ‘agro-ecological change’. Another option is ‘integrated rural development’. Up until now ‘rural development’ has been related to the 2\(^{nd}\) Pillar of the CAP. It existed alongside agriculture and its development (which was mostly governed by the 1\(^{st}\) Pillar). Instead ‘\textit{integrated} rural development’ explicitly integrates agriculture in the development of the rural. It ensures that agriculture will positively contribute to maintaining high levels of well-remunerated and attractive employment and to the continuity of as many farms as possible (whatever specific ‘activity system’ they engage in). In this respect ‘integrated rural development’ is an \textit{inclusive} process (as opposed to the strongly \textit{selective} and exclusive nature of ‘structural change’). ‘Integrated rural development’ will help to reduce the use of chemical inputs and fossil fuels and assure the maintenance of landscapes and the protection of biodiversity. In short, ‘integrated rural development’ (maybe ‘rural development 2.0’ is more catchy) helps to protect and develop the rural.

\(^{40}\) Fiscal reductions in investments that favour loans and high levels of indebtedness, etc.
\(^{41}\) As opposed to perceiving the sector as solely having the function of producing cheap raw material for the food processing industries.
Whatever the new, guiding image, the needed turn should depart from considerations listed below.

1. Despite agricultural policies, which for decades aimed at strengthening structural change, small and medium farms did not disappear from the rural landscapes of the western MS of the EU. They are, and remain, the stronghold for food security and food sovereignty. They can contribute to the overall process of agricultural growth and should be at the heart of regional rural economies.

2. With agriculture in western Europe entering into a new era of deregulated and globalized markets, the category of large high-tech farms (especially those that have incurred high levels of indebtedness in order to accelerate growth at farm level) has entered into a chronic crisis: they are over-dimensioned and unable to face the new conditions. By contrast, small and medium (especially of the low cost type) are much more resilient.

3. In this situation, the continuation of income payments (related to historical volumes of production) is an unacceptable anachronism. Distributing roughly 80% of the budget to the 20% of large farms is, under the current conditions, like trying to get a dead horse to pull a cart.

Agricultural growth and rural development need to be redefined so they are both grounded on small and medium family farms, which still, despite fifty years of promoting structural change, make up the vast majority of farms. Instead of aiming at a (largely imaginary) jump towards ‘competitive farms’ (always situated at considerable distance from the real family farms – see Figure 1), agricultural policy needs to be grounded on the reality of a sector that is composed of millions of small holdings and allow them the possibilities to unfold their farms in ways that correspond with societal needs. This will be an abrupt and definitive adieu to a policy that essentially excludes and marginalises the majority of these farms. This move is however already at the heart of the European Parliament Resolution of the 4th of February 2014 on the future of small agricultural holdings (P7_TA-PROV(2014)0066 (2013/2096(INI)). Such a policy is far from philanthropic – it corresponds with new socio-economic realities and it helps to address the economic, financial, environmental and energy crisis.

One essential aspect of reforming CAP involves undoing the historically-created separation of Pillars 1 and 2. Pillar 1 needs to be redesigned so that it fit into Pillar 2 and supports ‘integrated rural development’. This new policy framework needs to at least contain the following elements.

1) Instead of being highly exclusive, it will be essentially democratic allowing access to everybody involved in agricultural and rural activities.

2) It will contain a range of new incentives that strongly and explicitly support the style of low-cost farming.

3) It will help to develop and disseminate agro-ecological knowledge so as to reground the style of low cost farming as much as possible on locally available natural resources (including the local ecosystem as a whole). Support is to be given to farmers so they can exchange their experiences and experiment on their farms. This can be achieved through existing associations (such as the CUMAs in France).

4) Movable upper ceilings on farm size need to be imposed on a regional basis: farms will not be allowed to exceed a specified limit, for instance, M + 2s. Farms that exceed the
upper ceiling will only be allowed to continue if the ratio between labour objects and labour input is equal to, or lower than, that of the average farm. Thus, large rural estates might continue, provided that they generate enough employment. If this condition is not met they should be disaggregated\(^{42}\) through newly-designed mechanisms for land reform.

5) Income payments related to historical production are to be eliminated. New flat rate payments should be made and be conditional upon meeting criteria for landscape management and biodiversity protection.

6) The maintenance of landscapes and the protection of biodiversity will be delegated to autonomous territorial co-operatives that will provide new forms of local and regional self-regulation (the possibility to do so is already entailed in the Rural Development Regulation no. 1305/2013 of the European Parliament and the Council).

7) Support will be given to construct new markets that are nested in direct relations between food producers and consumers and the provision of appropriate and adequate regulation schemes.

8) Support will be given to enhance the multifunctionality of farms. Special support will be given to farms that engage in on-farm processing and for constructing new and/or developing existing small cooperatives that process and market food products.

9) The inflow of young people into the agricultural sector (from both agricultural and non-agricultural background) will be stimulated further. The reform of over-sized farms (see point 4 above) should be used to make land available for young people wanting to start farming.

10) New EU food supply chain legislation is urgently needed to accompany the new ‘integrated rural development’ policy – and should be an integral part of such a policy.

11) There is a need to develop more appropriate techniques for representing the income-generating capacity of family farms (of whatever size). Current farm accountancy techniques are biased and particularly misrepresent smaller and medium farms managed according to a low-cost strategy. The techniques used to express the ‘economic size’ of farms also misrepresent such farms (see Annex 8 for a further discussion).

In the architecture of the current CAP one can already detect several ‘movements’ that anticipate, in one way or another, the needed (and in a way unavoidable) integration of Pillar 1 within Pillar 2: the proposed ‘modulation’ explicitly aimed at moving funds from Pillar 1 to Pillar 2, and the ‘redistributinal payments’ aim in the direction of a democratization of the CAP (better balancing the payments made under Pillar 1). On the other hand the greening of Pillar 1 implies drawing Pillar 2-type activities into Pillar 1. The problem, however, with all these and other, potentially promising changes is that they are optional: it is down to the MS to decide whether or not to implement. This makes the needed reforms into unfinished reforms.

\(^{42}\) There are historical antecedents here. In the post WW2 land reform in Italy, the man/land ratio was a decisive criterion.
10. CONCLUSIONS

There is a wide spectrum of different ways to develop a farm and to maintain and/or improve the level of income that a farm provides. Over recent decades this spectrum has grown considerably wider. Quantitative growth (an increase of acreage and/or economic size) is just one, albeit very important, factor that contributes to the widening of this spectrum.

The notion of structural change that has guided agro-political discourse and practice for the last fifty years or so has narrowed down the notion of development to something that can only be achieved through quantitative growth. The notion of structural change is also problematic as it historically carries the message that growth in the agricultural sector mainly stems from large farms and that small farms play just a marginal role.

However, empirical analysis grounded on new methods shows that small and medium farms contribute far more to agricultural growth than large farms. In addition, it shows that the small farms of today are often the large farms of tomorrow.

The notion of structural change might have had positive functions in the past. Today, however, and in the future, this guiding principle is no longer able to orient agricultural development and growth. This is partly because markets have become more volatile and large, indebted, farms are extremely vulnerable in this environment. It is also because agriculture is facing new scarcities. It needs to produce more food, with fewer resources and in a sustainable way. It needs to contribute to the creation of employment, the reduction in the use of fossil fuels and sweet water, the strengthening of regional rural economies and the maintenance of scenic landscapes and biodiversity. These objectives require new styles of farming and new developmental trajectories.

New rural and agricultural policies need to be inclusive. That is: they need to offer all types of farms and all size-categories the opportunity to develop further. They also have to offer opportunities to (young) people who want to start a farm.

In order to protect this inclusiveness (which should be considered as an expression of democracy), the rise of mega-farms needs to be halted, since they threaten to push family farms out of the market and move farming further away from meeting the societal objectives described above.

In order to achieve these objectives the CAP needs to radically alter the interrelation of its Pillar 1 and Pillar 2. It needs to move from juxtaposing these two elements to an integration of Pillar 1 within the wider framework of Pillar 2.
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ANNEXES

Annex 1: Divergent farm development trajectories in the Frisian dairy sector (based on a constant sample, n=127; period 1967-1991)

Source: De Bruin (1997a)

Detailed farm accountancy data (gathered by AVM/CCLB) from 127 farms, covering the 1967-1991 period were used to demonstrate that agricultural development occurs through, and as, differentiation.
Annex 2: On poverty in farming

Poverty is not unknown in farming circles in the western MS of the EU. But it is not widespread or generalized. Nor is it exclusively linked to any clearly delineated category of farm (e.g. small farms or mountain farms).

Off-farm prices are under continuous downward pressure whilst cost levels (for inputs and factors of production) are tending to rise. This is known as the ‘squeeze on agriculture’ and this squeeze is intensified through the dynamics of agro-food industries and the markets they operate in. Climate, local scarcities, unexpected events and speculation can further complicate the picture.

Many farms have responded to this situation and developed strategies and ‘activity systems’ that enable them to better face this potentially very threatening situation. Pluriactivity, multifunctionality (especially when combined with the construction of new, nested markets) and low cost farming/agroecology are all important elements in this.

Large farms (with some exceptions) are often too large (the relation between the objects of labour and the available labour force is too high) to engage in pluriactivity, multifunctionality or low/cost farming. They are locked into path-dependency and have hardly any opportunities to change trajectory. This path-dependency is often further strengthened through investments (sunk costs) and adapted technology (for example having Holstein cattle means that it is very difficult, if not impossible, to substantially decrease concentrate use). When confronted with lower market prices such farms easily find themselves trapped in negative cash flows. If they have not any in-built buffering capacity this can easily translate into poverty.

Poverty can also emerge in medium-sized family farms that, until recently, were able to obtain adequate incomes. Confronted with deregulated markets, and the volatility and the long periods of low prices they bring, such farms can now suffer extreme poverty. This is especially the case for young people who have recently taken over a farm.

This highly differentiated situation implies that politically induced price increases (which are impossible under current conditions) or even measures aimed at placing upward pressures on market prices (such as opening stock facilities) will have highly unequal effects. They may alleviate problems for farmers in some situations, will fall short in others and bring windfall profits to yet others.

If poverty does emerge and persist in specific situations well-targeted interventions are needed. Large farms (and specialized pig-breeding and chicken-breeding farms) should receive specific support that helps to re-dimension them, making them smaller, more sustainable, less dependent (on banks) and more robust. Small and medium farms could be assisted through support for constructing new, nested markets. Decentralized support for agroecology and/or the maintenance of landscape and biodiversity might have a similar effect.

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43 These include farms that have been expropriated for urban expansion or nature development that subsequently re-invested in a new, large farm, as well as large organic farms and farms that have always been large and whose size does not incur high financial costs.
Table 2.1 shows that the situation in so-called full-time farms is, when it comes to the contribution of farming to family income, hardly different from the situation in so-called part-time farms.

Table 2.1: Contribution to family income according to time dedicated to the farm

<table>
<thead>
<tr>
<th>Contribution of the farm to the overall income</th>
<th>Marginal</th>
<th>Substantial but less than 50%</th>
<th>Equal to 50%</th>
<th>&gt;50%</th>
<th>Close to 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>43%</td>
<td>18%</td>
<td>8%</td>
<td>0%</td>
<td>15%</td>
</tr>
<tr>
<td>Part-time &gt;=50%</td>
<td>26%</td>
<td>18%</td>
<td>30%</td>
<td>21%</td>
<td>4%</td>
</tr>
<tr>
<td>Part-time &lt;50%</td>
<td>80%</td>
<td>15%</td>
<td>4%</td>
<td>1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: Ventura 2013
Annex 3: On statistical misrepresentation

Table 3.1 shows the standard type of statistical representation based on agricultural censuses and applied throughout Europe. Here we use Dutch data for farms with grazing animals. They are given for four years covering a 26 year period. The data for 1980 coincides with that given in table 2.

Table 3.1: How an agricultural census represents the dynamics in the agricultural sector

<table>
<thead>
<tr>
<th>Size categories</th>
<th>&lt;50 nge</th>
<th>50-100 nge</th>
<th>100-200 nge</th>
<th>200-400 nge</th>
<th>&gt;400 nge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>51,303</td>
<td>17,918</td>
<td>2,205</td>
<td>110</td>
<td>4</td>
</tr>
<tr>
<td>1990</td>
<td>38,299</td>
<td>17,118</td>
<td>2,711</td>
<td>169</td>
<td>5</td>
</tr>
<tr>
<td>2000</td>
<td>23,764</td>
<td>13,721</td>
<td>8,672</td>
<td>801</td>
<td>17</td>
</tr>
<tr>
<td>2006</td>
<td>19,893</td>
<td>13,125</td>
<td>8,702</td>
<td>820</td>
<td>76</td>
</tr>
</tbody>
</table>

Source: Own elaboration based on LEI data

This standard type of statistical representation (as entailed in Table 3.1) seems to point to just one conclusion: that small farms are disappearing and large farms (>100 nge) are increasing in number. And that is the way censuses are mostly read. The following figure combines the overall dynamics in the agricultural sector (as discussed in this document, see also Figure 6) with the dates when censuses have been organized.

Figure 3.1: Development and its reflection in Censuses

When looking at this census data, the (small) farms that make up the lower shaded triangle seem to disappear. At the same time the number of medium farms (50-100 nge) seems to increase and there is the emergence of a new group of large farms (the upper shaded triangle). What the censuses do not show is that the ‘disappearance’ of the smallest
category of farms is partly due to an outflow (farms being deactivated or shrinking below the economic threshold) and partly to a throughflow (small farms moving towards the next size category. The same is true of medium-sized farms. The censuses are not able to show the relative contribution made by these two very different processes.
Annex 4: Development trends on farms with grazing animals in the 1990-2000 period

Table 4.1: Number of farms with grazing animals by economic size (in 1990) and change in economic size (between 1990 and 2000)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 nge</td>
<td>11027</td>
<td>3677</td>
<td>2894</td>
<td>6991</td>
<td>13701</td>
<td>38299</td>
<td>6156</td>
</tr>
<tr>
<td>50-100 nge</td>
<td>10689</td>
<td>2192</td>
<td>687</td>
<td>1729</td>
<td>1821</td>
<td>17118</td>
<td>1369</td>
</tr>
<tr>
<td>100-200 nge</td>
<td>1567</td>
<td>395</td>
<td>182</td>
<td>279</td>
<td>288</td>
<td>2711</td>
<td>905</td>
</tr>
<tr>
<td>200-400 nge</td>
<td>78</td>
<td>26</td>
<td>13</td>
<td>30</td>
<td>22</td>
<td>169</td>
<td>190</td>
</tr>
<tr>
<td>&gt;=400 nge</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>23363</td>
<td>6292</td>
<td>3776</td>
<td>9029</td>
<td>15833</td>
<td>58302</td>
<td>8535</td>
</tr>
</tbody>
</table>

Source: Own elaboration based on LEI data

**Source:** elaborated by LEI
Annex 5: Development patterns of farms according to their acreage (in hectares)

Table 5.1: Size categories and growth of total area per farm 1980-2006

Percentage of farms with grazing animals, by size category, expanding their absolute size in hectares by 25% or more over different periods.

<table>
<thead>
<tr>
<th>Size category</th>
<th>&lt;20 ha</th>
<th>20-50 ha</th>
<th>50-75 ha</th>
<th>&gt;=75 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980-1990</td>
<td>19.0%</td>
<td>25.3%</td>
<td>20.9%</td>
<td>17.2%</td>
</tr>
<tr>
<td>1990-2000</td>
<td>15.9%</td>
<td>24.6%</td>
<td>21.0%</td>
<td>19.0%</td>
</tr>
<tr>
<td>2000-2006</td>
<td>14.9%</td>
<td>22.6%</td>
<td>18.4%</td>
<td>19.7%</td>
</tr>
</tbody>
</table>

Source: elaborated by LEI

Percentage of farms with grazing animals, by size category, expanding their absolute size in hectares by 100% or more between 1980 and 2006.

<table>
<thead>
<tr>
<th>Size category</th>
<th>&lt;20 ha</th>
<th>20-50 ha</th>
<th>50-75 ha</th>
<th>&gt;=75 ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980-2006</td>
<td>9.1%</td>
<td>11.5%</td>
<td>7.2%</td>
<td>5.2%</td>
</tr>
</tbody>
</table>

Source: elaborated by LEI
### Annex 6: Changes in arable farming over time

**Table 6.1:** The number of arable farms by size category (in nge) in 1980 and change (in nge) in between 1980 and 1990.

<table>
<thead>
<tr>
<th>NGE in 1980</th>
<th>&lt;50</th>
<th>50-100</th>
<th>100-200</th>
<th>200-400</th>
<th>&gt;=400</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>change in NGE between 1980 and 1990</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase</td>
<td>2597</td>
<td>1140</td>
<td>193</td>
<td>8</td>
<td>3</td>
<td>3941</td>
</tr>
<tr>
<td>&gt;25%</td>
<td>1712</td>
<td>1425</td>
<td>282</td>
<td>18</td>
<td>2</td>
<td>3439</td>
</tr>
<tr>
<td>0-25%</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Decrease</td>
<td>1413</td>
<td>1037</td>
<td>278</td>
<td>30</td>
<td>8</td>
<td>2766</td>
</tr>
<tr>
<td>&gt;25%</td>
<td>1314</td>
<td>375</td>
<td>143</td>
<td>22</td>
<td>10</td>
<td>1864</td>
</tr>
<tr>
<td>0-25%</td>
<td>4073</td>
<td>530</td>
<td>88</td>
<td>12</td>
<td>3</td>
<td>4706</td>
</tr>
<tr>
<td>Outflow since 1980</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11115</td>
<td>4508</td>
<td>984</td>
<td>90</td>
<td>26</td>
<td>16723</td>
</tr>
</tbody>
</table>

**Source:** elaborated by LEI

**Table 6.2:** The number of arable farms by size category (in nge) in 1990 and change (in nge) between 1990 and 2000.

<table>
<thead>
<tr>
<th>Farm size in 1990 in nge</th>
<th>&lt;50 NGE</th>
<th>50-100 nge</th>
<th>100-200 nge</th>
<th>200-400 nge</th>
<th>&gt;=400 nge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change between 1990 and 2000 in nge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase &gt;25%</td>
<td>1648</td>
<td>1403</td>
<td>499</td>
<td>61</td>
<td>6</td>
<td>3617</td>
</tr>
<tr>
<td>0-25%</td>
<td>1054</td>
<td>1240</td>
<td>380</td>
<td>36</td>
<td>2</td>
<td>2712</td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Decrease 0-25%</td>
<td>1066</td>
<td>669</td>
<td>236</td>
<td>24</td>
<td>6</td>
<td>2001</td>
</tr>
<tr>
<td>&gt;25%</td>
<td>1216</td>
<td>475</td>
<td>185</td>
<td>30</td>
<td>4</td>
<td>1910</td>
</tr>
<tr>
<td>Outflow since 1990</td>
<td>4868</td>
<td>909</td>
<td>200</td>
<td>29</td>
<td>8</td>
<td>6014</td>
</tr>
<tr>
<td>Total in 1990</td>
<td>9855</td>
<td>4697</td>
<td>1500</td>
<td>180</td>
<td>26</td>
<td>16258</td>
</tr>
</tbody>
</table>

**Source:** elaborated by LEI
Table 6.3: The number of arable farms by size category (in nge) in 2000 and change (in nge) in the 2000-2006 period.

<table>
<thead>
<tr>
<th>Farm size in 2000 in nge</th>
<th>&lt;50 nge</th>
<th>50-100 nge</th>
<th>100-200 nge</th>
<th>200-400 nge</th>
<th>&gt;=400 nge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change between 2000 and 2006 in nge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>increase &gt;25%</td>
<td>720</td>
<td>367</td>
<td>190</td>
<td>37</td>
<td>5</td>
<td>1319</td>
</tr>
<tr>
<td>0-25%</td>
<td>451</td>
<td>355</td>
<td>272</td>
<td>68</td>
<td>5</td>
<td>1151</td>
</tr>
<tr>
<td>0</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Decrease 0-25%</td>
<td>1463</td>
<td>1091</td>
<td>656</td>
<td>140</td>
<td>17</td>
<td>3367</td>
</tr>
<tr>
<td>&gt;=25%</td>
<td>1837</td>
<td>893</td>
<td>477</td>
<td>100</td>
<td>21</td>
<td>3328</td>
</tr>
<tr>
<td>Outflow since 1990</td>
<td>3571</td>
<td>636</td>
<td>286</td>
<td>68</td>
<td>13</td>
<td>4574</td>
</tr>
<tr>
<td>Total in 1990</td>
<td>8048</td>
<td>3342</td>
<td>1881</td>
<td>413</td>
<td>61</td>
<td>13745</td>
</tr>
</tbody>
</table>

Inflow after 2000 (nge in 2006)

<table>
<thead>
<tr>
<th>&lt;50 nge</th>
<th>50-100 nge</th>
<th>100-200 nge</th>
<th>200-400 nge</th>
<th>&gt;=400 nge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3322</td>
<td>448</td>
<td>302</td>
<td>77</td>
<td>14</td>
</tr>
</tbody>
</table>

Source: elaborated by LEI

Table 6.4: The number of arable farms by size category (in nge) in 1980 and change (in nge) in the 1980-2006 period.

<table>
<thead>
<tr>
<th>Farm size in 1980 in nge</th>
<th>&lt;50 nge</th>
<th>50-100 nge</th>
<th>100-200 nge</th>
<th>200-400 nge</th>
<th>&gt;=400 nge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change between 1980 and 2006 in nge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>increase &gt;25%</td>
<td>1390</td>
<td>1026</td>
<td>199</td>
<td>11</td>
<td>2</td>
<td>2628</td>
</tr>
<tr>
<td>0-25%</td>
<td>335</td>
<td>367</td>
<td>91</td>
<td>7</td>
<td>0</td>
<td>800</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Decrease 0-25%</td>
<td>439</td>
<td>423</td>
<td>125</td>
<td>9</td>
<td>2</td>
<td>998</td>
</tr>
<tr>
<td>&gt;=25%</td>
<td>865</td>
<td>638</td>
<td>171</td>
<td>24</td>
<td>8</td>
<td>1706</td>
</tr>
<tr>
<td>Outflow since 1980</td>
<td>8,086</td>
<td>2,054</td>
<td>398</td>
<td>39</td>
<td>14</td>
<td>10,591</td>
</tr>
<tr>
<td>Total in 1980</td>
<td>11,115</td>
<td>4,508</td>
<td>894</td>
<td>90</td>
<td>26</td>
<td>16,723</td>
</tr>
</tbody>
</table>

Inflow after 1980 (nge in 2006)

<table>
<thead>
<tr>
<th>&lt;50 nge</th>
<th>50-100 nge</th>
<th>100-200 nge</th>
<th>200-400 nge</th>
<th>&gt;=400 nge</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5,616</td>
<td>864</td>
<td>558</td>
<td>131</td>
<td>17</td>
</tr>
</tbody>
</table>

Source: elaborated by LEI
Annex 7: On the apparent contradiction between the concentration of production and the continued predominance of small farms

In 1980 there were 71,540 Dutch farms with grazing animals which taken together had a calculated economic size of 3,248,850 NGE. Their distribution was as follows:

<table>
<thead>
<tr>
<th>Economic size category (NGE)</th>
<th>Farms</th>
<th>Total economic size</th>
<th>Distribution (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>51,303</td>
<td>1,539,090</td>
<td>47.3%</td>
</tr>
<tr>
<td>50-100</td>
<td>17,918</td>
<td>1,344,010</td>
<td>41.5%</td>
</tr>
<tr>
<td>&gt;100</td>
<td>2,319</td>
<td>365,750</td>
<td>11.2%</td>
</tr>
</tbody>
</table>

Source: Own elaboration based on LEI data

Twenty years later the situation was quite different. The total economic size of all farms with grazing animals was 3,290,095 (own calculation), almost the same as in 1980. This lack of growth reflects the quotas imposed on dairy farms in this period and the overall stagnation, if not decline in rearing animals for meat.

However, the number of farms declined radically, by almost two thirds, to 26,029. A large part of this decline was due to farms stopping keeping grazing animals and moving into another specialization.

In the year 2000 the distribution was as follows:

<table>
<thead>
<tr>
<th>Economic size category (NGE)</th>
<th>Number of farms</th>
<th>Total economic size</th>
<th>Distribution (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>23,764</td>
<td>712,920</td>
<td>21.4%</td>
</tr>
<tr>
<td>50-100</td>
<td>13,721</td>
<td>1,029,075</td>
<td>31.6%</td>
</tr>
<tr>
<td>&gt;100</td>
<td>9,544</td>
<td>1,548,100</td>
<td>47.0%</td>
</tr>
</tbody>
</table>

Source: Own elaboration based on LEI data

When we compare the distribution of farm sizes in 2000 and 1980 it is clear that only the category of large farms had numerically grown. This is largely due to the through-flow of small and medium farms into this category. Many of these farms grew so much that they shifted to the category of >100 NGE farms. This also resulted in a concentration of production: the category of farms of >100 NGE increased its economic share from 11.2 to 47.0% in this period (reference here?).

This concentration is not due (or only to a minor degree) to small farms disappearing and large farms growing in size. It is (mainly) the outcome of small and medium farms growing in economic size and thus becoming large farms.

This, then, is how two phenomena, that at first sight seem contradictory, co-exist.
Annex 8: How farm accountancy misrepresents the profitability of small farms

Farm accountancy is not just an instrument for the farmer to know in detail the economic situation of his/her farm and plan its development – it is also a tool for comparing farms. This latter function is essential for national and international agricultural statistics (such as RICA) that aim to represent the overall situation in the agricultural sector. It is also strategic for policy makers: it can help them to take informed and rational decisions. To achieve comparability all the factors of production need to be introduced into the farm accountancy records as if they were mobilized on the relevant markets. That is: according to the reigning price level.

Firstly, this means that a calculated interest rate (identical to the average interest rate for loans) needs to be attached to all the assets owned by the farmer himself (or that financial costs are not taken into account, as is the case in the RICA/FADN approach). Second, a uniform depreciation horizon needs to be introduced. This horizon basically depends on fiscal legislation. Thirdly, depreciation needs to be linked, not to the existing machinery and its value, but to its replacement value (under the assumption that the newest technologies will be acquired). Fourthly, the value of the land and buildings is equalized by assuming lease prices for each farm. And, if profitability is to be calculated as well, then labour costs, that reflect the wage level of well-trained and experienced workers in the industry, also need to be introduced.

In some ways applying all of these rules makes farms comparable. But the image that is constructed in this way can very easily deviate from the ‘real situation’ as perceived and defined by farmers themselves. Assume that a farm has very little dependency on loans. Most of the capital is ‘family capital’. The prevailing market interest rate does not apply here. Assume also that the farmer mostly buys second-hand machinery and instruments and is skilled at maintaining them. Thus machinery might already be ‘fully depreciated’, but still functions very well with no need to replace it soon. And, when it is replaced, it will be with second-hand equipment. The fixed horizon for depreciation and the replacement value are only virtual data: the ‘economic life’ of machines and their technical life are quite different things. Finally, assume that the farm property was inherited and was passed onto the next generation for a ‘price’ agreed within the farming family. Here again, we can see that lease levels are only virtual parameters.

If these assumptions apply (and they do apply to many small and medium farms) then it follows that their real income is far above the calculated income that results from farm accountancy techniques.

An additional problem is the calculation of economic size. This is based on the assumption that a specific amount of factors of production renders a ‘standard income’. Thus land, animals, crops, fruit trees, vineyards, etc. can be grouped together in order to give one indicator for the economic size of a farm. This indicator again seeks to make farms comparable. The problem, though, is that small farms often obtain an income that is superior to the ‘standard income’ assumed to be a derived from a specific amount of factors of production. This relates to strategies 1 and 2 mentioned in this document). On the other hand, the higher financial costs faced by some large farms often mean that their real income is below the ‘standard income’.
RESEARCH FOR
AGRI COMMITTEE - FARM STRUCTURAL CHANGE IN CENTRAL AND EASTERN EUROPE AND THE CAP

STUDY
Abstract
Farm structure changes in the EU-10 Member States since European Union accession are investigated to explain the drivers of change, to identify development paths and to outline future policy options for balanced territorial development. Official data were used to illustrate differences in farm structures among the EU-10 and the EU-15 Member States. Recommendations relate to proposals to change the Common Agricultural Policy to enhance the ability of farms to adapt to future economic, environmental and social challenges.
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**LIST OF ABBREVIATIONS**

**CAP**  Common Agricultural Policy

**COP**  Cereals, oilseeds and protein crops

**DEA**  Data Envelopment Analysis

**EAA**  Economic Accounts for Agriculture

**EC**  European Commission

**EU**  European Union

**EU-15**  Grouping of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Spain, Sweden and the United Kingdom

**EU-10**  Grouping of Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia

**EU-12**  Grouping of EU-10 and Cyprus and Malta

**EU-27**  Grouping of EU-15 and EU-12

**EUR**  Euro

**FADN**  Farm Accountancy Data Network

**FAO**  Food and Agriculture Organization of the United Nations

**FSS**  Farm Structure Survey

**F&V**  Fruits and vegetables

**GAEC**  Good Agricultural and Environmental Condition

**GBAORD**  Government Budget Appropriations or Outlays for Research and Development

**GDP**  Gross Domestic Product

**LFS**  Labour Force Survey
OECD  Organisation for Economic Co-operation and Development
PG    Producer Group
PO    Producer Organisation
PPS   Purchasing Power Standards
R&D   Research and Development
RDP   Rural Development Programme
SAPS  Single Area Payment Scheme
SFS   Small Farmers’ Scheme
SGM   Standard Gross Margin
SO    Standard Output
SPS   Single Payment Scheme
TFP   Total Factor Productivity
UAA   Utilized Agricultural Area
USD   US dollars
VCS   Voluntary Coupled Support
WB    World Bank
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FIGURE 3
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FIGURE 4
Distribution of the UAA in the EU-10 member states by the different economic farm size classes in 2013, and changes in % point, 2005 versus 2013 (on the right). 102

FIGURE 5
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EXECUTIVE SUMMARY

Background

Structural change in the agricultural sector of the European Union (EU) broadly trends towards fewer, larger and more capital-intensive farms, and a declining farming population of an increasing average age. Structural change, however, is a complex phenomenon which occurs at a different pace across the regions of the EU (EC, 2011a). The organisation, size and specialisations of agricultural holdings as well as their mix of production factors are important parameters for the designing of agricultural policies, therefore understanding their development and its drivers is of core importance for policy makers. This study on ‘The CAP faced with farm structural change in Central and Eastern Europe’ has been prepared for the Committee on Agriculture and Rural Development (COMAGRI) of the European Parliament within the frame of Procedure IP/B/AGRI/IC/2015-191.

Aim

The aim of this study has been to analyse the changes in farm structures in the post-socialist Central and Eastern Member States of the EU (EU-10) through the period since their accession to the EU, to explain the drivers of these changes, to evaluate the different development paths of these countries, and to outline future policy options to promote a more balanced territorial development within the EU. The research has been focused on achieving better understanding of farm dynamics and their implications for EU agricultural policy, as set out in the Terms of Reference.

For the analysis of structural changes in agriculture in the EU-10 Member States, the relevant literature was reviewed and EUROSTAT databases were used extensively. Trends in farm structures have been presented mainly through the changes in Common Agricultural Policy (CAP) context indicators retrieved from the 2005 and 2013 Farm Structure Survey (FSS) databases. Three basic physical and economic size categories of agricultural holdings have been defined and used in the analysis, which correspond to the farm structure indicators defined by the European Commission (EC). The FSS has important limitations, both at the country and the aggregated level, which have been explained and taken into account as far as possible in order to avoid misinterpretations.

Data from the Economic Accounts for Agriculture (EAA) were used to compare the economic size and efficiency of the agricultural sectors of the EU-10 and the EU-15. To show the differences in the application of investment support from EU Rural Development funds in the post-socialist countries, data from the Farm Accountancy Data Network (FADN) were used.

As the call explicitly referred to the EU-10, Croatia which also belongs to the post-socialist Central and Eastern European bloc of post-socialist countries but became an EU Member State only in 2013 was not included in the analysis. The EU-10 comprises of Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Thus the EU-10 differs from the EU-12 (the classical typology for the New Member States until the accession of Croatia) in that it excludes Cyprus and Malta, which do not belong to the post-socialist Central and Eastern European block of Member States.
Overview of structural changes

In the EU-10, the number of farms declined by 27.7% in the period 2005-2013, compared to 24.1% in the EU-15, but in many of the EU-10 Member States, the changes were far more substantial. The concentration process in land use was more pronounced in the EU-10 than in the EU-15 during this period, with the proportion of large farms in the UAA increasing around twofold, while that of small farms decreased most rapidly.

Although family labour force in agriculture declined in the EU-10 during the period 2005-2013, it still represented around 90% of total regular farm labour force. About two thirds of this family labour force was still employed on small farms in 2013; however, their employment on medium-sized and large farms increased.

In 2013, the proportion of women in the regular farm labour force was higher in the EU-10 than in the EU-15. The distribution of female labour in agriculture between the farm size categories was more balanced in economic terms than in physical terms both in all EU-10 Member States and in the EU-15 on average.

The proportion of farm managers younger than 35 declined, while that of farm managers aged over 55 grew in the EU-10 during the period 2005-2013; however, the age structure improved on large farms due to the positive developments in Romania. Agricultural productivity in the EU-10 became closer to the EU-15 average as the result of the exit of less productive and/or inefficient farms, but the efficiency of production technologies still lags behind the EU-15. The post-socialist bloc became a net exporter not only of agricultural commodities but of primarily and secondary processed, higher value added goods as well.

Agricultural incomes grew faster in the EU-10 than in the EU-15, but are still lagging behind other sectors of the economy and this may further discourage young and skilled labour from entering agriculture. Agricultural production has been providing a significant share of household income on subsistence and semi-subistence farms, thereby contributing to decreasing poverty as well as to slowing the process of land concentration. In most of the EU-10 Member States a growing proportion of farmers have been supplementing their incomes from other gainful activities in predominantly urban areas.

Minor restrictions on the land markets and land rental markets in most of the EU-10 Member States, together with relatively low land prices and rental fees compared to the EU-15 attracted both domestic and foreign investors to acquire ownership. Demand for agricultural land is expected to intensify and land concentration will accelerate.

In the post-socialist countries, development has focused on the modernisation and establishment of production resources and infrastructure, while investment in human capital has received less attention. The lack of human and financial capital, and of mutual trust, the high fragmentation of small farms, as well as the large size of the black market hamper collective actions. All these factors severely hinder the ability of farms in the EU-10 to adapt to economic, environmental and social challenges, and to manage appropriately the risks associated with these changes.

The introduction of EU direct payments has had a positive impact on farm incomes and the access to capital, and a negative impact on the intensity of labour use in the EU-10. These impacts have not been uniform across the regions due to the differences in unit amount of
the payments, or across the businesses due to the differences in their physical size and specialisation. EU direct payments and market measures, along with market developments, have induced changes in agricultural production structures in the EU-10 Member States, and the decoupling of those payments has further accelerated the reduction in the intensity of labour use. By contrast, environmental and diversification measures applied in the national Rural Development Programmes (RDPs) have increased the labour demand of agricultural production, thereby placing a brake on structural change in agriculture.

During the period 2007-2013, social and gender-specific issues have received only modest attention in the RDPs of the EU-10 Member States. While the measures of Pillar II of the CAP supported the rejuvenation of the farming society in the EU-10, direct payments have contributed to maintaining the older generation in subsistence and semi-subsistence farming. Owing to demographics, large numbers of uneducated, elderly people can be expected to leave farming. This process will lead in the longer term to the proportional increase of specialised holdings with greater resources of human capital.

Policy recommendations

In the light of these processes a policy decision is needed on whether to continue applying the current system of direct payments and Rural Development after 2020, or whether there should be a comprehensive reform of the CAP. An effective policy intervention would reduce disparities between EU-15 and EU-10 agriculture. It is also important to enhance the capacity to absorb the available funds in the EU-10 at national, regional and local levels.

Direct payments have the potential to mitigate not just the differences between the regions but also the differences between agricultural sectors and farms. In the case of large farms the policy is well targeted in the direction of structural change; these farms can use concentrated sources of direct support for extending their operation, modernisation and for investment purposes. In the case of small farms, direct payments have rather had only an income supplement effect.

The structural change effect of direct payments could be intensified by providing for actual services, and by mitigating the imbalances in financial support between the regions and the businesses. For enhancing structural change the strengthening of the environmental and/or social aspects of farming of the ‘greening’ component may be considered, and Voluntary Coupled Support (VCS) could be focused indifferently on sectors creating employment opportunities, and even produce processed and consumed locally. The core of stimulating specialisation is the increase of productivity which can be expanded through the utilisation of economies of scale. Land concentration could accelerate structural change with the involvement of farmers, legal entities and citizen investors from the EU-15. This would result in farm structural change with more rapid land and rental price growth.

Rural Development has been targeting a more competitive farm structure and encouraging more efficient production with farm and infrastructure modernisation in order to speed up structural change. Large farms have benefited most from the development resources because the enhancing of competitiveness of small farms required resources in excess of their financing capacity, since labour productivity development would require a change to more intensive production and increasing the size of operation supplemented by considerable technical advancement. Quality of life measures can accelerate structural changes through off-farm diversification and also contribute to social sustainability.
Objectives of future Rural Development Policy could include enhanced value added, and more innovation and cooperation to facilitate further structural change. Support for R&D and innovation, and human capital development need to take into consideration the tension between further farm modernisation toward structural change and the employment demand of agriculture on the skilled labour force. Since the measures which were available under Pillar II encouraged the generational renewal and therefore improved demographics of farming between 2007 and 2013, they efficiently promoted the rejuvenation of the farmers’ society in the EU-10, therefore it is recommended to continue using these types of interventions.

By inducing structural changes in the EU-10, agriculture policy also has to consider the social welfare effects representing the achievements of the European model of agriculture. The risk of a major agricultural restructuring in the EU-10 is the loss of the living of a significant immobile population and the strengthening of further migration of younger and skilled generation to cities and abroad, leaving prolonged structural unemployment behind in the rural areas, with raising political tensions.

Finally, the quality of structural indicators needs to be improved in order to better support the designing, planning and implementation of agricultural policies.
1. **DATA SOURCES AND METHODOLOGICAL EXPLANATION**

**KEY FINDINGS**

- **In Poland, Slovakia and the Czech Republic**, changes in the FSS thresholds in 2010 affected trends in indicators using data on labour force and the number of holdings, and consequently indicators related to holding characteristics, and also impacted on specific livestock and land use categories.

- **In Bulgaria, common land**, which has been covered in the FSS from 2010, has caused a significant increase in the UAA, also distorting trends in indicators.

- **The overwhelming weight of Romania and Poland in the number of farms, UAA and AWU**, is strongly biasing farm structure indicators for the EU-10 as whole.

For the analysis of structural changes in EU-10 agriculture, the relevant literature was reviewed and EUROSTAT data databases were used extensively. The main basis for the analytical work was provided by the 2005 and 2013 EUROSTAT Farm Structure Survey (FSS). Important methodological issues concerning the use of the FSS are discussed below.

The FSS databases are the **harmonised sources** for most of the structural indicators of EU farming. In this report, mostly Common Agricultural Policy (CAP) **context indicators** are used for the analysis of structural changes. As the European Commission (EC) explains¹, CAP context indicators describe the general context in which policy measures are designed, planned and implemented.

The choice of 2005 as the base year for comparison is justified by the fact that 2005 was the first survey year for which the Standard Output² (SO), introduced in 2010 according to Regulation (EC) No 1242/2008 to classify agricultural holdings by type of farming and by economic size, was calculated retrospectively³. 2013 is the most recent FSS and it should be noted that the figures presented in this report are **provisional**.

The FSS has important limitations which deserve careful attention in order to avoid misinterpretations. For each country, the FSS database contains **projections from a representative sample** to holdings above specific physical thresholds⁴ (area and number of livestock species) therefore the FSS data may not mirror real-life agricultural activities entirely. The selection of the representative samples for the FSS are based on the preceding Agricultural Census (full-scale survey). The longer the time gap between the Census and the FSS, the less representative the sample may be.

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² The Standard Output is the average monetary value of the agricultural output at farm-gate price, in euro per hectare or per head of livestock.

³ SO values for 2005 were calculated using 2007 data while SO values for 2013 were calculated using 2010 data.

⁴ Physical thresholds limit the survey population and thereby the survey sample and costs.
The physical thresholds have not remained constant over the past decade. According to Eurostat (n.d.) the coverage of the FSS was changed from 99% of the Standard Gross Margin⁵ (SGM) before 2010, to **98% of the UAA** and **98% of the livestock** from 2010 onward. Parallel to this, new and more detailed physical thresholds were defined in Annex II of Regulation (EC) No 1166/2008. Countries were allowed to set **alternative thresholds** to exclude very small holdings from the Surveys as long as the minimum coverage was guaranteed. This led to changes in the thresholds in a number of countries, and thus also in the coverage of the subsequent Surveys. Of the EU-10, in the case of Poland and Slovakia, the minimum UAA of holdings surveyed was increased from 0.1 hectares to 1 and 2 hectares, respectively, and also in the Czech Republic, the threshold was raised from 1 hectare to 5 hectares. As Eurostat (n.d.) explains, changes in the thresholds in these countries mainly affected trends in indicators using data on **labour force** and the **number of holdings**⁶, and consequently indicators related to **holding characteristics**. In the cases of the Czech Republic and Slovakia, changes in the thresholds also impacted on **specific livestock** and **land use categories** for which analysing trends would require the application of the 2010 thresholds for 2005. However, it is not possible to filter the 2005 FSS data according to these new thresholds. In addition, such a correction would have disregarded a considerable proportion of the small holdings in the past. In contrast to the countries above, Romania for instance, with the largest number of farms among the postsocialist countries by far, has not applied any FSS thresholds.

Another change in the FSS methodology in 2010 which bears importance for the analysis was that data on **common land**⁷ were collected from all EU Member States for the first time. Of the EU-10, common land was covered in the preceding Surveys in Romania alone. According to EC (2013), in the case of **Bulgaria**, common land which has been covered in the FSS from 2010 onward accounted for 859 thousand hectares or 18.5% of the UAA managed by FSS farms. This common land was used by 191 thousand agricultural holdings. Common land has been covered in the FSS since 2010 also in Hungary and Slovenia. According to Eurostat (n.d.), in these countries common land consisted of common grassland and meadows totalling 74 thousand and 8 thousand hectares respectively, causing negligible changes to the surveyed UAA. There is no common land in the other EU-10 countries. There is no information on the distribution of common land by farm size categories in the FSS.

Since farm structures vary widely across the EU and there is a lack of consistent statistical data, no commonly agreed definition of small or large farms exist (EC, 2011b). In this report, **three basic physical and economic size categories of agricultural holdings** are defined and used in the analysis of structural changes (Table 1).

These size categories correspond to the farm structure indicators defined by the European Commission (EC, 2014a). It is important to distinguish between physical and economic size categories since those farms which are specialised in horticulture, pigs or poultry often have small UAA; however, many of these are economically strong. In terms of the physical farm size, agricultural holdings with fewer than 5 hectares of UAA can be regarded as semi-

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⁵ The Standard Gross Margin is a measure of the production or the business size of an agricultural holding based on its separate activities or 'enterprises' and the relative contribution of these to the overall revenue.

⁶ According to Eurostat (n. d.), if the same thresholds had been applied to the Survey in 2005 as in 2010, in Poland 24.9%, in Slovakia 48.3%, and in the Czech Republic 42.2% of the farms would have been not covered.

⁷ Common land is the UAA on which, although managed by an agricultural holding, common rights apply. Common land can consist of pasture, horticultural or other land.
subsistence farms (EC, 2013). In terms of the economic size categories, agricultural holdings in the EU below EUR 4,000 SO can also be regarded as semi-subsistence farms (Davidova et al., 2013). Semi subsistence farms are defined by Regulation (EC) No 1698/2005, for the purpose of Rural Development support and without any specific threshold, as those agricultural holdings which produce primarily for own consumption and also market a proportion of their output. The term ‘small farm’ used in this report implicitly includes subsistence farms besides semi-subsistence farms, farms which produce only for own consumption.

Table 1: Physical and economic size categories of agricultural holdings.

<table>
<thead>
<tr>
<th>SIZE CATEGORIES</th>
<th>PHYSICAL</th>
<th>ECONOMIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>&lt; 5 hectares UAA</td>
<td>&lt; EUR 4,000 SO</td>
</tr>
<tr>
<td>Medium</td>
<td>5 &lt; 50 hectares UAA</td>
<td>EUR 4,000 &lt; 50,000 SO</td>
</tr>
<tr>
<td>Large</td>
<td>&gt; 50 hectares UAA</td>
<td>&gt; EUR 50,000 SO</td>
</tr>
</tbody>
</table>

Defining economic size categories based on the SO has some drawbacks. As van Everdingen (2014) explains, the SO relates less to farm results, value added and labour input than the SGM did. The physical size of farms corresponding to a certain SO level vary widely between the EU Member States due to the differences in, for example, market prices, yields and produce quality, but not due to the differences in the profitability of agricultural production. The heterogeneity of farms within each of these economic size categories makes it difficult to assess trends in farming structures. Many policy questions cannot be answered based on the SO, such as: What size of a farm can provide a living for a farmer?

Within the EU-10, Romania and Poland, with 3.6 and 1.4 million agricultural holdings respectively, represented 58.5% and 23.1% of all FSS farms in 2013. Furthermore, Romania and Poland had 27.0% and 29.8% share respectively, in the 48.3 million hectares total UAA managed by FSS farms in the EU-10, and 32.9% and 40.7% share in the total number of Annual Work Units8 (AWU) employed by these farms. Owing to the overwhelming weight of these two countries, farm structure indicators for the EU-10 as whole are biased to a considerable extent.

Apart from the FSS, to compare the economic size and efficiency of the agricultural sectors of the EU-10 and the EU-15, data from the Economic Accounts for Agriculture (EAA) was used. The EAA is mandatory for all EU Member States, and every country applies the same methodology, thus the results of the EAA are comparable across the EU and are suitable for both comparative analysis and short-term projections. Therefore they are widely used by policymakers at both the national and the EU levels.

Finally, data from the Farm Accountancy Data Network (FADN) were used to show the differences in the application of investment support from EU Rural Development funds in the post-socialist countries. The FADN is the source of microeconomic data based on harmonised bookkeeping principles. It is used for evaluating the income of agricultural holdings in the EU and the impacts of the CAP. The FADN covers only those agricultural

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8 Annual Work Unit corresponds to the work performed by one person occupied in an agricultural holding on a full-time basis (1,800 hours a year or a minimum number of hours required by the relevant national provisions governing contracts of employment).
holdings which, due to their economic size, could be considered commercial. The annual FADN sample consists of more than 80 thousand agricultural holdings which represent around 5 million farms in the EU, covering approximately 90% of the total UAA and accounting for about 90% of the total agricultural production. **The limitations of the FADN are similar to those of the FSS in respect of the use of the SO** according to which economic thresholds are defined for sample farms.
2. OVERVIEW OF STRUCTURAL CHANGES

KEY FINDINGS

- In the EU-10, the number of farms declined by 27.7% in the period 2005-2013, compared to 24.1% in the EU-15. In many of the EU-10 Member States, the changes were more substantial; however, Romania where the number of farms decreased at a slower pace depressed the average of the EU-10.

- While the physical thresholds of the FSS remained unchanged between 2010 and 2013, farm numbers in the EU-10 as whole showed only an 8.0% decline, compared to 15.0% in the EU-15.

- Changes in the distribution of farms by physical size classes appeared to be more pronounced in the EU-15 during the period 2005-2013; however, within the EU-10 the physical size structure in Romania showed almost no change, and this influenced the average for the post-socialist countries.

- The concentration process in land use was more pronounced in the EU-10 than in the EU-15 during the period 2005-2013, with the proportion of large farms in the UAA increasing around twofold, while that of small farms declining most rapidly.

- Large farms in the EU-10 tend to specialise in less intensive agricultural activities.

- Although family labour force in agriculture declined in the EU-10 during the period 2005-2013, it still represented around 90% of total regular farm labour force.

- About two thirds of this family labour force was still employed on small farms in 2013; however, their employment on medium-sized and large farms increased by 4.3%-points and 1.5%-points respectively during the period 2005-2013.

- In 2013, the proportion of women in the regular farm labour force was higher in the EU-10 than in the EU-15.

- The ratio of males to females within the total regular farm labour force employed in the agricultural sector increased in each EU-10 Member State during the period 2005-2010, except for Poland, as a consequence of which the gender ratio appears to have remained relatively stable in the EU-10 as whole.

- The distribution of female labour in agriculture between the farm size categories was more balanced in economic terms than in physical terms both in all EU-10 Member States and in the EU-15 on average.

- The proportion of farm managers younger than 35 declined, while that of farm managers aged over 55 increased in the EU-10 during the period 2005-2013; however, the age structure improved on large farms due to the developments in Romania.
The number of farms **specialised in field crops** increased in the EU-10, while of those **specialised in mixed livestock, and in mixed crops and livestock decreased** during the period 2005-2013. The decline in the number of farms with mixed crops and livestock was greatly exceeded by the decrease in their share of UAA.

The share of farms **specialised in field crops** in the UAA exceeded the EU-15 average in almost all of the EU-10 Member States in 2013, while farms **specialised in COP** had an exceptionally high share in the UAA in many of these countries.

**Farms specialised in horticulture, mixed cropping and permanent crops** retained their low shares both in the number of farms and the UAA.

The share of **mixed livestock farms** in the total number of farms declined in all of the EU-10 Member States. The decrease in the share of UAA was much higher for farms with mixed livestock/mainly grazing.

Although the proportion of **grazing livestock and granivores farms** remained relatively stable in the EU-10 as whole, the average hides considerable changes in a number of countries.

The share of **grazing livestock farms** in the total number of farms exceeded the **EU-15 average** in half of the EU-10 Member States; however, the share of **specialised dairy farms showed a strong decline**, while the share of farms with sheep, goats and other grazing livestock increased.

While the **decrease in the granivores livestock and specialised pig farms** affected only a few of the EU-10 Member States, the **decrease in the number of specialised poultry farms** was evident in half of these countries.

### 2.1. Developments in the number of farms and the utilized agricultural area

#### 2.1.1. Number of farms

According to FSS data, in 2013, there were 10.7 million agricultural holdings in the EU-27, managing 173.0 million hectares of UAA in total. Between 2005 and 2013, 26.2% of the farms disappeared while the UAA remained almost stable. This change in the number of farms was in part due to revisions to the FSS methodology in 2010 as explained above; however, comparing the 2013 FSS data with those of 2010, farm numbers still show an 11.1% drop in just a few years during which the physical thresholds of the FSS remained unchanged. From this the concentration process in agriculture is evident for the EU as whole. In 2013, the average UAA per farm in the EU-27 totalled 16.2 hectares compared to 11.9 hectares in 2005 and 14.4 hectares in 2010 (see Annexes 1-3).

In the EU-10, the number of farms declined by 27.7% between 2005 and 2013 compared to 24.1% in the EU-15. But in many of the EU-10 Member States, the changes seemed more substantial, ranging up to 37.9% and 42.3% in the cases of the Czech Republic and Poland respectively, or even to 52.4% and 65.6% for Bulgaria and Slovakia. In contrast to this, the number of farms decreased with a much lower pace, by...
14.7% in Romania, pulling the average of the EU-10 down, closer to the average of the EU-15. In Poland, Slovakia and the Czech Republic, the spectacular decrease in farm numbers between 2005 and 2013 can be attributed mainly to the changes in the physical thresholds of the FSS in 2010. This observation is underpinned by the fact that between 2010 and 2013, only 5.2% of Polish and 3.6% of Slovak FSS farms disappeared, and as for the Czech Republic, the number of FSS farms even increased by a remarkable 14.8%. In the latter, several large farms were divided while the number of agricultural holdings passing the physical thresholds for qualifying as small or medium-sized farms increased. For the other EU-10 Member States, including Romania and Bulgaria, the concentration process is illustrated more realistically by the figures for 2013 versus 2005. Bulgaria deserves particular attention since the decline in farm numbers has been the fastest by far in this country: just between 2010 and 2013, 31.3% of Bulgarian agricultural holdings ceased to exist. Many of these were small farms specialised especially in livestock production with no or less than 2 hectares of UAA. For small farms, according to Nikolov et al. (2014), the reasons for quitting agriculture include limited access to the market, weak bargaining power, high transaction costs and the unwillingness to cooperate. In Bulgaria, many of the small farms have been cultivated by pensioners (Bijman et al., 2012) which also explains the rapid decline in their number.

While the physical thresholds of the FSS remained unchanged between 2010 and 2013, farm numbers in the EU-10 as whole showed only an 8.0% decline versus 15.0% in the EU-15. Notwithstanding the case of Bulgaria, this phenomenon can be explained in part by the fewer alternative employment opportunities in many of the rural areas of post-socialist countries (Swinnen et al., 2001).

Figure 1: Distribution of farms in the EU-10 Member States by the different physical farm size classes in 2013, and the changes in % point, 2005 versus 2013 (on the right).

Although changes in the distribution of farms by physical size classes (Figure 1) appeared to be more pronounced in the EU-15 during the period 2005-2013, within the EU-10 the physical size structure in Romania showed almost no change (the same holds true for Slovenia), biasing the average for the post-socialist countries. In contrast, with
the exception of Lithuania, all of these countries experienced a drop in the proportion of small farms, in particular the Czech Republic, Slovakia and Poland where this change was rather significant, in part due to the changes in physical thresholds of the FSS in 2010. In these latter countries, the proportion of medium-sized farms increased considerably, while in the Czech Republic and Slovakia, where the average farm size was 133.0 and 80.7 hectares respectively in 2013, the largest in the EU-10 by far, evidently the same holds true for the proportion of large farms.

**Figure 2:** Distribution of farms in the EU-10 Member States by the different economic farm size classes in 2013, and changes in % point, 2005 versus 2013 (on the right).

![Figure 2](image)

In terms of the economic size structure (Figure 2), changes in the EU-10 seem similar. However, careful examination reveals the case of Latvia to be salient, where the share of farms with medium SO increased by far more during the period 2005-2013 than their weight in the physical farm size classes while farms with small SO showed the opposite trend. The same holds true in particular for Poland and Slovakia; however, in these countries, this phenomenon can be explained in part, again, by the changes in the physical thresholds of the FSS in 2010.

Comparing Figures 1 and 2, it can be concluded that in the **EU-15** a significantly larger proportion of the farms qualified for being medium-sized in economic terms in 2013 than in the **EU-10**, thereby placing the medium-sized category in economic terms first while it was only second in physical terms. As for the EU-10, attention should be paid to the Baltic countries, in particular to Estonia and Latvia, where the status of medium-sized farms was exactly the opposite, hinting at the larger weight of extensive production in this group.
2.1.2. Utilised Agricultural Area

Although the total UAA managed by FSS farms remained almost stable in the EU-27 between 2005 and 2013, in the EU-10 it increased by 3.1% during this period. This was primarily driven by increases in the FSS UAA in Bulgaria (70.4%), already explained, in Estonia (15.5%) and Latvia (10.3%) where demand for agricultural land intensified after EU accession in response to the introduction of the CAP, in particular of direct support which also attracted foreign investors in the Baltic countries, and in Hungary (9.1%). However, in the case of the latter, this growth was overwhelmingly due to the inclusion of UAA in the FSS which could not be identified with farms before 2010. It should be noted that in Bulgaria the total UAA managed by FSS farms increased by only 3.9% between 2010 and 2013, a moderate and more realistic change which can be explained by land of very small farms, excluded from the Surveys, ceasing to exist and taken over primarily by large tenant farms specialised mainly in cereals and oilseeds production. In Hungary the total UAA managed by FSS farms even declined by 0.6% between 2010 and 2013. In the other EU-10 Member States FSS UAA either decreased or increased only by a fraction between 2005 and 2013.

Figure 3: Distribution of the UAA in the EU-10 Member States by the different physical farm size classes in 2013, and changes in % point, 2005 versus 2013 (on the right).

In the EU-15, 72.1% of the UAA was managed by large and 3.3% by small farms in physical terms in 2013. In the EU-10, large farms managed 56.9%, and small farms 13.5% of the UAA. The concentration process seemed more pronounced in the EU-10 during the period 2005-2013 (Figure 3), and it differed from that observed in the EU-15 insofar that while the proportion of farms managing more than 50 hectares UAA increased by a pace of around twofold, the proportion of farms under 5 hectares UAA declined the most. In the EU-15, the proportion of mid-sized farms decreased by far more compared to that of the small farms. In the EU-10, while changes in the management structure of UAA

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9 For example The European Times (2009) quotes the minister of agriculture of Estonia explaining that there were some 300 to 400 thousand hectares of unutilised agricultural area in the country at that time available for foreign investors. Foreign investors comprised of both small farmers, and investors who created larger agricultural enterprises.
by physical farm size classes were limited in the Czech Republic and Slovakia, all other post-socialist countries experienced a considerable increase in the share of large farms on the expense of the other size categories (also in absolute terms, especially in Bulgaria, Poland and Romania). Again, the Baltic countries deserve special attention due to the far above average drop in the share of medium-sized farms in managing UAA. For instance in the case of Lithuania, Melnikiene and Volkov (2013) explain this trend by large farms becoming financially stronger compared to medium-sized farms due to CAP direct support which enabled these to invest more into modernising production technologies and to expand by buying or leasing land. In contrast to the Baltic countries, in Bulgaria and Romania it was the share of small farms that declined above average. Romania, where no physical thresholds were applied for the FSS, deserves particular attention in this respect: the UAA managed by Romanian small farms dropped by almost 1.4 million hectares or 27.0% between 2005 and 2013 parallel to the disappearance of almost 524 thousand such holdings.

**Figure 4:** Distribution of the UAA in the EU-10 Member States by the different economic farm size classes in 2013, and changes in % point, 2005 versus 2013 (on the right).

![Distribution of the UAA in the EU-10 Member States by the different economic farm size classes in 2013, and changes in % point, 2005 versus 2013](image)

In terms of the economic size structure, changes in the EU-10 seem similar, and more marked compared to the EU-15 (Figure 4). The weight of farms with large SO increased above the EU-10 average in Latvia, Lithuania and Poland while of those with medium SO dropped considerably in Latvia between 2005 and 2013, in line with the reasoning of Melnikiene and Volkov (2013). The proportion of farms with small SO declined above the EU-10 average in Latvia and Romania. In all countries, farms which were large in physical terms managed more UAA in total than farms which qualified for being large in economic terms. This hints at large farms tending to specialize in less intensive agricultural activities such as the production of field crops. The opposite holds true in the case of medium-sized farms in physical and economic terms, with the exception of Latvia and Poland where the intensity of agricultural production in mid-sized farms reduced over time.
2.2. Developments in the characteristics of farm labour

2.2.1. Number of farm labour force

In the EU-10, the equivalent of 4.7 million people worked on farms, and represented 50.5% of total labour force in agriculture in the EU-27 in 2013. During the period 2005-2013, the farm labour force (expressed in AWU) in the EU-10 declined by 29.6%, compared to 23.1% in the EU-15 (Annex 4). This change was in part due to revisions to the FSS methodology in 2010. However, comparing the data of the 2013 FSS with those of 2010, the regular farm labour force (expressed in AWU) showed a 2.5% decrease in the EU-10 and a 6.2% decrease in the EU-15.

Poland and Romania utilised the most labour for agricultural production in 2013, 1.9 and 1.6 million AWU respectively. As these two countries account for 73.6% of all EU-10 agricultural labour in 2013, they have an overwhelming influence on agricultural labour force indicators in the EU-10. Together with Hungary and Bulgaria, the share of these two countries reached 89.6%. During the period 2005-2013 total labour force in agriculture declined in each of the EU-10 Member States; Slovakia and Bulgaria suffered the highest losses, 48.8% and 48.75% respectively, while the most moderate decrease occurred in Hungary (-6.3%). In Poland and Romania, total labour force in agriculture declined by 15.6% and 40.2% respectively (Annex 4).

According to the data of the Economic Accounts of Agriculture (EAA), the share of salaried labour input in the agricultural labour force was 14.5% in the EU-10 and 32.2% in the EU-15 in 2013. The long-term trend is that labour use in agriculture is declining across the EU; however, the use of salaried labour is decreasing more slowly than non-salaried labour, and its share in the total labour input is therefore increasing. During the period 2005-2013 the share of salaried labour in the total labour force in agriculture increased by 2.2% points in the EU-10, and 2.0% points in the EU-15. Among the EU-10 Member States, there are substantial differences in the shares of salaried and non-salaried labour inputs in agricultural labour force. In the Czech Republic and Slovakia the share of salaried labour was over 70% in 2013, while in Poland and Slovenia it was less than 10%. The most significant change in the share of salaried labour could be observed in Estonia (+16.0% points) and in the Czech Republic (-8.5% points) (Annex 5, 6).

EU-10 agriculture is dominated by family farms, where family labour force represented 90.3% of the total regular labour force in agriculture in 2013, compared to 75.0% in the EU-15. The family labour force (expressed in AWU) decreased by 31.4% on average in the EU-10 during the period 2005-2013, and by 30.7% in the EU-15 in the same time (Annex 7, 8). This can be explained by the drop in the number of sole holders’ holdings – the main employer of the family labour force in agriculture – due again to the changes in the FSS thresholds. This statement is confirmed by the fact that between 2010 and 2013, the decrease in family labour force reached only 3.4% in the EU-10 and 9.4% in the EU-15.

Within the EU-10, Slovenia, Poland and Romania are characterised by a high proportion - 97.3%, 96.4% and 95.5%, respectively – of family farmers in the total labour force in agriculture; at the other end of the scale are the Czech Republic and Slovakia with shares of less than 30%. This latter can be attributed in part to the nearly 70% proportion of the total farm labour force in agriculture working in corporate farms, and also to the changes in
the physical thresholds of the FSS in 2010. During the period 2005-2013, the family labour force in agriculture declined significantly in three of the EU-10 Member States, by 54.9% and 56.4% in Bulgaria and Estonia respectively, and by 66.8% in Slovakia. However, in Poland the family labour force in agriculture – which represented 44.4% of the EU-10’s in 2013 – decreased by 16.2% during the period 2005-2013 (Annex 7, 8).

In the EU-15, 45.8% of family labour force in agriculture worked in medium-sized farms, and 33.3% in farms up to 5 hectares UAA in 2013. In contrast, in the EU-10 the share of family labour force in agriculture working in small farms were almost double (62.0%) that working in medium-sized farms (35.0%). Countries where family farm labour force was employed predominantly in small farms were Bulgaria (84.6%), Romania (84.1%), Hungary (76.1%) and Slovakia (55.8%), while the same holds true for medium-sized farms in Latvia (58.8%), Estonia (54.3%) and the Czech Republic (54.6%). In the Czech Republic the second largest employer of family labour force in agriculture were farms over 50 hectares UAA (28.9%) in 2013 (Figure 5).

**Figure 5:** Distribution of family labour force (in AWU) in the EU-10 Member States by the different physical farm size classes in 2013, and changes in % point, 2005 versus 2013 (on the right).

During the period 2005-2013, comparing the EU-15 and the EU-10, the changes in the distribution of family labour force in agriculture in different farm physical size classes showed dissimilarities regarding medium and large farm sizes. In the EU-15 the change observed on medium sized farms was negligible, while it increased by 4.7% points on large farms. In the EU-10 the proportion of family labour force in agriculture grew by 4.3% points on medium-sized farms and by 1.5% points on large farms. Poland and Romania, both of which strongly influenced the average for the EU-10, showed almost no change (the same holds true for Slovenia). The most significant change occurred in the Czech Republic and Slovakia in each of the different size classes, which cannot be directly interpreted as the impact of the change in thresholds significantly affects the results of labour force in agriculture in both countries. In the Baltic States, in particular Estonia and Latvia, the changes were similar to the EU-15 during the period 2005-2013. In contrast, the proportion of family labour force in agriculture in the medium-sized farms showed a
significant drop (-7.9% points) in Lithuania, due to the decrease in the number of farms (Figure 5).

In respect of the economic size structure of farms, in Slovakia, medium-sized farms replaced small farms as the most important in economic terms. In contrast, in the Baltic States, especially in Lithuania and Latvia, exactly the opposite occurred: the medium-sized farms, which had led in physical terms became second, after small farms, in economic terms. This hints at an efficiency deficit.

2.2.2. Age structure

Of the 6.2 million farm managers in the EU-10 in 2013, those younger than 35 accounted for only 6.7%, although this figure is a little higher than the EU-15 average of 5.2%. On the other hand, some 3.5 million farm managers, or 56.3%, were aged 55 years or older and thus close to or beyond the regular retirement age. During the period 2005-2013, in the EU-10, the proportion of farm managers younger than 35 years old in the total number declined by 0.9% points on average, compared to 0.7% points in the EU-15. At the same time the proportion aged over 55 years old increased by 2.1% points in the EU-10 (cf. EU-15: +0.9% point) (Annex 9 and 10).

Of all the EU-10 Member States, only Poland (12.1%) recorded more than 10% of farm managers younger than 35 years old. Romania (64.4%), Bulgaria (61.9%), Hungary (59.5%) and the Czech Republic (56.8%) registered shares of managers aged over 55 years old above the EU-10 average. During the period 2005-2013, the proportion of farm managers younger than 35 years old decreased by 5.4% points and 2.8% points in the Czech Republic and Latvia respectively, and increased by 2.2% points and 3.7% points in Bulgaria and Slovakia respectively (Annex 9 and 10).

As regards the EU-15, as well as the EU-10 and most of the individual Member States, the larger the farm physical size, the higher the ratio of young (below 35 years old) to elderly (over 55 years old) farm managers in 2013. **The number of farm managers aged over 55 years old per those younger than 35 years old was twice as high in the EU-15 as in the EU-10** (Annex 11). This could be in correspondence with the greater proportion of medium- and large-sized farms in the EU-15.

Within the post-socialist Member States, the agricultural farm management is the most elderly in the Czech Republic, as the ratios of young to elderly farm managers were the lowest here in each size category, and remained under 0.2 in 2013. At the other end of the scale was Poland, where the ratio was above 0.2 in each size category, even for the medium and large farms the ratios were close to 0.6. This can be attributed in part to the different proportion of family labour in total regular farm labour force in these two countries. Regarding large farms, attention should be paid to Romania, where the ratio reached 1.7 in 2013, i.e. there were almost twice as many farm managers younger than 35 years old as there were over 55 years old. The same holds true in Lithuania and Slovenia, although the ratio in each country was below 1 (0.81 and 0.62) (Figure 6).

During the period 2005-2013 the ratio of young to elderly farm managers in agriculture decreased in all farm size categories in the EU-15, whereas **in the EU-10, the age structure in agriculture improved on large farms**. This latter could be explained by the trends in Romania, as in this country, which represents a significant weight in the average of EU-10, the ratio increased nearly nine-fold during the period 2005-2013 (Figure 6). This is in part the result of the subsidising of young farmers in the frame of Pillar II of CAP 2007-2013.
2.2.3. Gender structure

In the EU-27, 64.9% of the total labour force in AWU was male in 2013. This figure was 73.1% in the EU-15, but only 57.5% in the EU-10 (Annex 7, 12). The ratio of males to females working in agriculture was almost stable in the EU-10 during the period 2005-2013, while increased by 10.0% – namely the proportion of males in total regular farm labour force grew – in the EU-15 (Annex 14).

The highest proportion of female labour in the total regular farm labour force could be found in Latvia (46.3%), Romania (45.8%) and Lithuania (45.3%), and the lowest in Slovakia (27.4%) and the Czech Republic (30.1%) in 2013 (Annex 7, 13). The ratio of males to females in agriculture decreased only in Poland (-8.5%) during the period 2005-2013; in the other EU-10 Member States it increased. The growth rate of the share of males in agriculture was the highest in Slovakia (35.0%), Latvia (20.2%) and Estonia (19.8%) (Annex 14). In Slovakia, the increase can be explained in part by the significant drop in the number of small family farms, caused by the change of FSS thresholds in 2010.

Regarding farm physical size classes, the larger the farms, the more males were employed in 2013. In the EU-10, the ratio of males to females in agriculture in each size category was below the equivalent value in the EU-15. So in the post-socialist countries the proportion of female labour in the agricultural labour force was higher on average. Moreover, regarding farms up to 5 hectares UAA, the gender ratio was almost 1:1, due to the high share of family labour in the total regular farm labour force. As for the EU-10 Member States, in Slovakia, in all farm physical size categories, the ratios of males to females engaged were higher than the average, especially in small and medium-sized farms, where the ratio was almost twice as high as the average for the EU-10. In Bulgaria, Hungary and Romania the ratio in the large size category was significantly higher (above 3.3) than the EU-10’s average (2.7). In contrast, regarding Poland, Estonia, Lithuania and Latvia, the gender ratio was below the average in all size classes, which the Baltic countries
turned to the benefit of female work force in farms up to 5 hectares UAA (ratio: 0.9, respectively) (Figure 7).

**Figure 7:** Gender ratio in the EU-10 Member States by the different physical farm size classes in 2013, and changes in % point, 2005 versus 2013 (on the right).

During the period 2005-2013, the ratio of males to females in agriculture increased in each farm physical size category as an average of the EU-15, whereas in the EU-10 an increase occurred only on large farms. Within the EU-10, Poland and Hungary were the only countries where the male to female ratio decreased in all physical size categories. The same holds true in Slovenia for large- and medium-sized farms, and in the Czech Republic for small farms.

In respect of economic size structure, the ratio of males to females in agriculture on the large farms, in all post socialist countries, as well as in the EU-15, was lower than in physical terms in 2013, respectively. In the same time the gender ratio on medium and small farms showed little change in economic and physical terms as well. This suggests that **the distribution of female labour in agriculture between the size categories was more balanced in economic terms**, hinting at females being involved more in producing higher value products (e.g. in horticulture). Within the Member States, attention should be paid to Estonia, where medium-sized farm category changed position with the large farm category and became first in economic terms. This refers again to an efficiency deficit.
2.3. Developments in the specialization of farms

2.3.1. Number of farms by specialisation

Nearly one third of the 6.2 million FSS farms in the EU-10 were specialised in field crops (33.2%) in 2013, and farms with mixed crops and livestock (19.7%), granivores livestock (14.8%) and grazing livestock (12.9%) also represented high shares. Only 6.7% of farms were specialised in mixed livestock, 5.3% in permanent crops and 4.5% in mixed cropping, while horticultural farms accounted for only 1.2% (Annex 15). During this period, certain types have been represented by very different figures in the EU-15 compared to the EU-10: the shares of farms with mixed crops and livestock (5.5%), granivores livestock (2.2%), field crops (24.9%) and mixed livestock (1.2%) were significantly lower, while those of farms specialised in permanent crops (34.0%) and grazing livestock (23.3%) were much higher than the EU-10 average. Major differences cannot be observed in the other specialisations.

It has already been pointed out that in the FSS in 2010 methodological changes have been implemented in several countries regarding the threshold value (Poland, Slovakia, the Czech Republic) and common land (Bulgaria), which can hide the changes that have occurred in specialisation. Across the EU-10 a notable increase occurred in the share of farms with field crops (7.8% points), together with decreases in farms with mixed livestock (-6.5% points) and mixed crops and livestock (-3.0% points) between 2005 and 2013. The rate of change was only around 1% point in the other groups (Annex 16). In the same period much smaller changes occurred in the EU-15: the shares of farms with field crops (2.4% points) and grazing livestock (2.2% points) increased the most, although the decrease concerned more specialised groups, it reached only around 1% point.

Figure 8: Total number of holdings by specialization in agriculture in 2013, and changes in % point, 2005 versus 2013 (on the right).

The nature of agricultural farm specialisation does not only show significant differences in the EU-15 but in the EU-10 as well (Figure 8, Annex 16). The shares of EU-10 farms with field crops have been high in Poland (49.2%) and Latvia (43.8%), and the figures in
Slovakia (37.9%) and Lithuania (35.7%) were also higher than the EU-10 average (33.2%) in 2013. However the equivalent figures in Bulgaria (21.4%) and Slovenia (20.7%) have been very low and have not even reached the EU-15 average (24.9%). Except in Latvia (15.8%) the number of farms specialised in cereals, oilseed and protein crops (COP) general field cropping has been almost evenly divided. As an effect of the introduction of CAP direct payments the share of farms with field crops has increased in all Member States except in Estonia (-9.3% points) between 2005 and 2013, and the rate of increase was higher than the EU-15 average (2.4% points) except in Romania. The rate of increase is very high in Lithuania (25.0% points), Slovakia (23.3% points) and Poland (17.8% points), but Hungary (11.4% points), Bulgaria (10.5% points), Slovenia (9.9% points) and Latvia (9.7% points) have also recorded higher figures than the EU-10 average. While the number of farms specialised in COP production has increased in all Member States except in Romania, the figure of general field cropping farms has only shown growth in Lithuania, Hungary and Slovenia. The reason for the decrease in Estonia is presumably the increasing share of non-classified holdings.

The shrinking proportion of farms with mixed livestock (-6.5% points) may have contributed to the increase in field crops specialisation in the EU-10. Decreases in all ten Member States have only occurred in this group of farms and the rates of changes have exceeded the EU-15 average (-0.9% points) except in Hungary (-0.3% points). Between 2005 and 2013 the decrease has been much higher than the EU-10 average in Lithuania (-16.0% points), Bulgaria (-12.7% points), Latvia (-11.1% points) and Poland (-8.5% points), which mainly resulted in a decreasing share of mixed livestock/mainly grazing farms. However significant decreases in the shares of mixed livestock/mainly granivores farms have only occurred in Poland and Bulgaria. Based on these changes it seems that mixed livestock farms in Lithuania and Poland have changed to growing field crops, those in Latvia have transferred to raising sheep, goats and other grazing livestock, or dairying, while those in Bulgaria have moved into raising sheep, goats and other grazing livestock, or growing field crops. Presumably this resulted in a slight increase in the specialisation of grazing livestock. The share of mixed livestock specialisation has been higher in all EU-10 Member States than the EU-15 average (1.2%), and Bulgaria (9.9%), Lithuania (8.0%) and Romania (7.5%) have greatly exceeded the EU-10 average (6.7%). In the latter two countries the share of mixed livestock/mainly grazing farms within the number of mixed livestock farms was very high, 89% and 85% respectively in 2013.

Although the increase in farms specialised in grazing livestock is not remarkably high in the EU-10 (1.3% points), the share of the number of farms has significantly increased in Slovakia (14.7% points), the Czech Republic (9.2% points) and Latvia (8.6% points) in 2013. The shares of sheep, goats and other grazing livestock farms and specialist cattle-rearing and fattening farms have increased in Slovakia and the Czech Republic, while in Latvia the shares of specialist dairying farms and sheep, goats and other livestock farms have grown. However, a decrease can be observed in Lithuania (-2.5% points), Slovenia (-4.9% points) and Estonia (-7.9% points), which mainly resulted in a decline in the share of specialised dairy farms. It should be noted that the share of grazing livestock farms in Slovenia (39.4%), the Czech Republic (33.7%) and Slovakia (28.7%) far exceeded the EU-15 average (23.3%), while this figure is very low in Hungary (4.8%) due to the strong concentration.

The share of granivores livestock farms has increased in some EU-10 Member States (Romania, Estonia, Lithuania, Latvia) by 2013, but decreased in Poland (-6.1% points), Bulgaria (-8.0% points), Hungary (-12.6% points) and Slovakia (-19.2% points). While the share of specialised pig, poultry and various granivores combined farms has decreased due
to concentration, it increased in Romania and Lithuania. In Estonia only the share of poultry farms, and in Latvia only the specialised pig and poultry farms have increased. Presumably the holdings of these countries have not been transformed to mixed crops and livestock but simply stopped livestock farming or changed to field crops production. The share of granivores livestock farms is significantly high in Romania and Hungary, far exceeding the EU-10 average (14.8%), therefore further concentration can be expected.

The share of mixed crops and livestock farms has decreased in all the countries except in Poland and Hungary (stable) and exceeded the decline of the EU-15 (-1.1% points). The figures in Slovakia (-8.4% points), Latvia (-9.0% points) and Lithuania (-9.1% points) have greatly exceeded the EU-10 average (-3.0% points), resulting in a decline of the share of various crops and livestock combined farms. The share of farms specialised in mixed crops and livestock has changed within the range from 9.9% to 20.6% in the Member States of the EU-10 – by exceeding the EU-15 average (5.5%) -, the highest figures (19-20%) have been in Romania, Bulgaria, Lithuania and Slovakia.

The share of farms specialised in horticulture has remained stable between 2005 and 2013, and there were no major differences in the shares of specialisation of Member States either. A higher share than the EU-15 average (2.9%) can only be observed in Bulgaria (3.7%) and Estonia (3.0%); these were the only two countries where any changes occurred, the shares increased by 1.9 and 1.0% points. The share of permanent crops farms is high only in three EU-10 Member States: Hungary (14.6%), the Czech Republic (11.4%) and Slovenia (10.0%), however these figures are far below the EU-15 average (34.0%). Although there has only been a 1% point increase in the EU-10 (1.2% points decrease in the EU-15), the increase in the share of farms with vineyards and fruit and citrus has been higher than the average in Bulgaria (5.1% points) and Romania (2.1% points), and a decrease in farms with vineyards can only be observed in Slovakia (-8.2% points). The share of farms with mixed cropping exceeds the EU-15 average (5.0%) in Lithuania (9.2%) and Slovenia (8.3%), and Romania and Bulgaria have higher figures than the EU-10 (4.5%) average. The rate of specialisation has not changed regarding the EU-10 average (0.7% points), only the change in Latvia (-5.0% points) is notable. According to FSS data farms with mixed cropping have not contributed to the increase in the share of field crops farms.

2.3.2. Utilised agricultural area by specialisation

According to the Farm Structure Survey (FSS), in 2013 farms in the EU-10 possessed 48.3 million hectares Utilised Agricultural Area (UAA) of which 88.2% was used by three specific type of farming, namely field crops (54.5%), grazing livestock (16.9%) and mixed crops and livestock (16.8%) (Annex 17). Although the aggregated UAA of the holdings with same type of farming is very similar to the figure for the EU-15 (84.1%), differences between the shares of certain types of farming can be observed: in the EU-15 field crops (37.7%) and mixed crops and livestock (9.3%) farms accounted for a lower, and the grazing livestock (37.1%) farms a higher, share of UAA. The share of the UAA used by permanent crop farms was lower in the EU-10 than the EU-27 (1.9% vs. 7.8%), but no significant differences in share of UAA could be observed regarding the other farming types.

Together with the changes in the numbers of holdings, the share of the UAA also changed between 2005 and 2013. The share of the field crops farms has increased by 14.7% points, while in case of mixed livestock farms it decreased by 8.2% points, followed by mixed crops and livestock farms where this share declined by 6.0% points until 2013. The share of UAA of permanent crop farms and grazing livestock farms increased by less than 1% point, while granivores livestock farms recorded a decline of
1.6% points and the share of mixed crops and horticultural farms has remained almost unchanged (Annex 18). The UAA of field crop farms in the EU-15 has increased by 4.6% points, however the number of grazing livestock farms increased by 2.2% points while the share of UAA decreased by 1.1% points. In other types of farming the change has been less than 1% point.

**Figure 9:** UAA of holdings by specialization in agriculture in 2013, and changes in % point, 2005 versus 2013 (on the right).

The share of UAA in field crop farms has been extremely high for Bulgaria (85.6%), Hungary (63.7%) and Romania (61.4%), it exceeded the average share of the EU-10 (54.5%), but was lower than EU-15 (37.7%) in the Czech Republic (33.4%) and Slovenia (16.2%). While COP crops farms have possessed 58.8% and 72.4% of the total UAA of field crop farms in Romania and Bulgaria, in Hungary this share amounted for 84.5%, which is the highest rate in the EU-10. Similarly to Hungary a significantly high share of the COP farms can realised in Slovakia (83.9%), Lithuania (81.0%), Estonia (76.6%), the Czech Republic (74.6%), while it is quite equally divided in Poland (58.9%) and Slovenia (44.8%).

The change in the share of field crop farms relating to UAA showed increase in every Member State of the EU-10 between 2005-2013 and exceeded the increase of the EU-15 (4.6% point). More significant change can be stated in Lithuania (25.1% point) and Poland (16.6% point) than in the EU-10 (14.7% point), but the change was lower in Slovenia (6.4% point) than the average of the EU-27 (7.5% point). Except in Bulgaria (-2.6% point) the share of COP farms UAA has increased in every Member States of the EU-10, the change was significant in Lithuania, Latvia, Poland, Hungary, Estonia and Romania (24-10% point). The share of general field cropping increased by 16 and 4% point in Bulgaria and Poland (Figure 9).

The decrease in the share of the number of mixed-livestock holdings by 6.5% points has resulted in a considerable decrease in the UAA (from -2.2% to -13.9% points). The decrease in the share of UAA remained lower than the average of the EU-10 with the exceptions of Latvia (-9.8% points), Lithuania (-12.4% points) and Poland (-13.9% points). The change has primarily effected utilisation of agricultural area of livestock/mainly grazing holdings in Latvia and Lithuania, while in Poland it had an influence on the mixed
livestock/mainly grazing holdings. In the other Member States the change in the share of UAA has been between -2.2 and -6.8% points. In 2013 the share of UAA of holdings with mixed livestock in the EU-10 exceeded the average of the EU-15 (1.7%) with the exception of Estonia (1.7%) and Bulgaria (0.5%). The values for the Czech Republic, Portugal, Romania and Slovenia (5.2%-4.7%) were above the EU-10 average (4.0%).

Between 2005 and 2013 the share of UAA regarding **the mixed crops and livestock holdings decreased by 1.6-8.7% points across the EU-10 Member States with exception of Slovenia** (1.0% point increase). The changes were below the EU-10 average (-6.0% points) in Poland (-1.6% points), Estonia (-2.1% points) and Hungary (-4.6% points), while they were above the average in Slovakia, Romania and Lithuania (all more than 8% points). While the share of UAA for field crops-grazing livestock combined specialisation decreased considerably only in Bulgaria and Romania (from -3.1% points to -4.8% points), the changes for the various crops and livestock combined farms were remarkably high in every Member State (3-8% point). The share of UAA utilised by mixed crops and livestock farms has been has been above the EU-10 average (16.8%) in the Czech Republic (34.4%), Slovakia (26.8%), Poland (21.0%) and Lithuania (18.6%). At the same time the shares in Estonia (9.0%) and Bulgaria (3.7%) were below the EU-15 average.

Since there have not been any changes in case of **horticulture holdings, changes in UAA cannot be observed in any of the Member States. The share of UAA for mixed crops holdings has not changed much,** except in Latvia and Bulgaria where the decrease was relatively high (-2.8 and -3.4% points respectively). The share of UAA utilised by mixed crops holdings exceeded the EU-15 average (2.8%) only in Slovenia (4.3%) and Romania (3.2%), while the EU-10 average amounted to 2.5%. Although **the shares of UAA for grazing livestock** (a 0.7% point increase) and **granivores livestock** (-1.6% point decrease) **holdings have not changed remarkably,** opposite changes can observed in the Member States. The share of UAA for grazing livestock holdings showed a significant decrease in Lithuania (-3.1% points), Slovenia (-4.9% points) and Estonia (-10.3% points), while the shares have slightly increased in the Czech Republic (3.2% points), Slovakia (3.4% points) and Latvia (7.1% points). The specialised dairy farms have been affected by the decrease in all three countries, while the specialised cattle-rearing and fattening holdings have been affected by the increase. The share of UAA for grazing livestock holdings resulted in extraordinary high figures that exceeded the EU-15 average (37.1%) in Slovenia (54.4%) and Estonia (40.0%), while the share was below the EU-10 average (16.9%) in Romania (13.2%), Hungary (9.7%) and Bulgaria (6.1%). The share of UAA for granivores livestock holdings has not changed in Romania and Latvia, while it declined by 0.1-4.2% points in the other Member States. Hungary (-2.4% points) and Poland (-4.2% points) exceeded the average decrease of the EU-10 (-1.6% points). The share of UAA for granivores livestock holdings was between 0.5% and 3.3% in 2013; only the figures of Poland (3.2%) exceeded the EU-15 average (2.7%).
### 3. DRIVERS OF STRUCTURAL CHANGES

**KEY FINDINGS**

- **Productivity of agriculture** in the EU-10 became closer to the EU-15 as the result of the *exit of less productive and/or inefficient farms*, but the *efficiency of production technologies still lags behind* the EU-15.

- The post-socialist bloc became a *net exporter* not only of *agricultural commodities* but of primarily and secondary processed, higher value added goods as well. However, the positive balance of the latter is due to only a few countries.

- **Agricultural incomes grew faster in the EU-10** than in the EU-15, but are still lagging behind other sectors of the economy and this further encourages the *outflow of young and skilled labour* from farming.

- Besides low wages, the *limited quantity of agricultural land offered for sale or rent* and the *poor access to capital* make it difficult for the younger generation in the EU-10 to enter farming, while the high proportion of older farm operators *moderates long-term return investments*.

- As a result of *ageing demography*, the *migration to cities and abroad*, the rural population is continuously *decreasing* in the EU-10. Nevertheless, labour with *low skills* and *outdated knowledge* still concentrates in the rural areas, and it does not meet the demand of rural enterprises, including commercial agricultural holdings which tend to *replace human labour with machines* as well as to *alter their product structure* – also in response to global market developments.

- Agricultural production provides a *significant share of household income in subsistence and semi-subsistence farms*, thereby contributing to decreasing poverty as well as to slowing the process of land concentration. In most of the EU-10 Member States a *growing proportion of farmers supplement their incomes* from other gainful activities in predominantly urban areas.

- **Minor restrictions on the land markets and land rental markets** in most of the EU-10 countries, together with relatively low *land prices and rental fees* compared to the EU-15 attracted both *domestic and foreign investors* to acquire ownership.

- In the post-socialist countries, development has focused on the modernisation and establishment of production resources and infrastructure, while *investment in human capital has received less attention*.

- The *low educational level of farmers* in the EU-10 severely hinders the ability of farms to *adapt to economic, environmental and social challenges*, and to *manage appropriately the risks* associated with these changes.
• **Bad memories of cooperatives** in most of the post-communist Member States exist. The **high fragmentation of small farms**, the **lack of human and financial capital**, and of **mutual trust** as well as the **large size of the black market** hinders the establishing of marketing cooperatives.

### 3.1. Macroeconomic context

The following brief analysis of the main macroeconomic indicators for agriculture is based on data of the EAA.

The EUR 449 per hectare average **Gross Value Added**\(^{10}\) (GVA) of the EU-10 Member States in 2013 was only 42.1\% of the value of the EU-15 (Table 2). In this respect there has been a **catching up over time**, as the growth rate in the EU-10 Member States from 2005 to 2013 was around 10\% based on deflated real prices, while this value remained constant in the EU-15. Among the EU-10, the **GVA/UAA** decreased significantly in five countries, there was no change in the Czech Republic, and it increased in Hungary, Poland, Lithuania, and to a lesser extent in Romania. In the case of the latter four countries, this growth can be explained mainly by the dynamics of specialization in field crops. The best performing EU-10 Member States in 2013 were Slovenia, Hungary and Poland with an average GVA of more than EUR 650 per hectare, while Lithuania, Slovakia, Estonia and Bulgaria produced less than EUR 250 per hectare GVA in that year. (Note that in Hungary, Romania and Bulgaria, the volatility of agricultural output and GVA is the highest in the EU, primarily due to the high share of extensive field crops.) Generally, apart from Slovenia, the **differences in GVA production increased in the EU-10, more productive countries improved while less productive ones weakened in real terms between 2005 and 2013.**

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\(^{10}\) The Gross Value Added indicates the productivity of an economy or industry, it is the difference between the value of output and the value of intermediate consumption.
**Table 2: Major macroeconomic indicators for agriculture, 2005 versus 2013.**

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<tbody>
<tr>
<td>BG</td>
<td>566</td>
<td>250</td>
<td>6.6</td>
<td>4.2</td>
<td>1,498</td>
<td>1,512</td>
<td>196.8</td>
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<td>CZ</td>
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<td>282</td>
<td>1.0</td>
<td>1.0</td>
<td>1,150</td>
<td>1,269</td>
<td>146.1</td>
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<tr>
<td>EE</td>
<td>264</td>
<td>232</td>
<td>2.0</td>
<td>1.8</td>
<td>236</td>
<td>279</td>
<td>199.8</td>
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<tr>
<td>HU</td>
<td>519</td>
<td>671</td>
<td>2.5</td>
<td>3.0</td>
<td>2,077</td>
<td>3,816</td>
<td>215.9</td>
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<tr>
<td>LT</td>
<td>216</td>
<td>268</td>
<td>2.9</td>
<td>3.1</td>
<td>493</td>
<td>712</td>
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<tr>
<td>LV</td>
<td>165</td>
<td>91</td>
<td>2.2</td>
<td>1.1</td>
<td>328</td>
<td>282</td>
<td>143.1</td>
</tr>
<tr>
<td>PL</td>
<td>413</td>
<td>576</td>
<td>2.5</td>
<td>2.4</td>
<td>5,573</td>
<td>9,824</td>
<td>208.6</td>
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<tr>
<td>RO</td>
<td>445</td>
<td>482</td>
<td>7.8</td>
<td>5.4</td>
<td>4,970</td>
<td>4,986</td>
<td>166.5</td>
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<tr>
<td>SI</td>
<td>989</td>
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<td>1.7</td>
<td>1.2</td>
<td>421</td>
<td>358</td>
<td>92.5</td>
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<tr>
<td>SK</td>
<td>239</td>
<td>174</td>
<td>1.2</td>
<td>0.8</td>
<td>403</td>
<td>378</td>
<td>171.4</td>
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<tr>
<td>EU-10</td>
<td>407</td>
<td>449</td>
<td>2.9</td>
<td>2.6</td>
<td>17,148</td>
<td>23,415</td>
<td>192.7</td>
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<tr>
<td>EU-15</td>
<td>1,061</td>
<td>1,066</td>
<td>1.3</td>
<td>1.2</td>
<td>110,393</td>
<td>119,480</td>
<td>126.8</td>
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<tr>
<td>EU-27</td>
<td>884</td>
<td>895</td>
<td>1.4</td>
<td>1.3</td>
<td>127,955</td>
<td>143,263</td>
<td>144.2</td>
</tr>
</tbody>
</table>

**Source:** EUROSTAT

Economic accounts for agriculture - values at real prices [aact_eaa04], Agricultural Labour Input Statistics: absolute figures (1 000 annual work units) [aact_ali01], GDP and main components - Current prices [nama_gdp_c]

With respect to the contribution of agriculture to the economy, the **GVA/GDP** in the EU-10 in 2013 was 2.6%, 12.2% lower than in 2005. Comparing this to the EU-15 (1.2% in 2013, a 5.3% decrease from 2005), the agricultural sector still accounts for a larger share of the economy of the EU-10. The agricultural productivity of the EU-10 became closer to the EU-15 but the approach was faster in other sectors of the economy. Among the EU-10 Member States the contribution of agriculture is the highest in Romania, Bulgaria, Lithuania and Hungary, and the lowest in Slovakia, the Czech Republic, Lithuania and Slovenia. Among the EU-10 Member States, during the period analysed the GVA/GDP grew only in Hungary and Lithuania.

**Factor income**, a measure of the remuneration of production factors (land, capital and labour) in agriculture was, owing to the size of the country, the highest in Poland among the EU-10 Member States, totalling over EUR 9.8 billion in 2013 after a 76.3% increase in real terms since 2005. Romania had the second highest factor income in agriculture of the EU-10, but its value remained unchanged in real terms between 2005 and 2013. Hungary, in third place, also recorded a very big increase: the real value of factor income in agriculture grew by 83.7% to more than EUR 3.8 billion by the end of the period 2005-2013. **Poland, Romania and Hungary together accounted for 79.5% of the total factor income of EU-10 in 2013. While the EU-10 as whole contributed 13.4% of the total factor income of the EU-27 in 2005, its share grew to 16.3% in 2013. (Note that this relatively small proportion is in part due to the EU-10 having a share less than one third in the total UAA of the EU-27.)**
Examining factor income in respect of the utilised labour, the most labour productive countries in EU-10 were Estonia and the Czech Republic. In these countries the factor income exceeded EUR 12 thousand per AWU, although this figure was still only around half of the EU-15 average. The factor income/AWU in the EU-10 nearly doubled between 2005 and 2013 to EUR 4,920, in part due to the more rapid outflow of labour from the sector. Nevertheless, it still remained very low compared to the nearly five times higher average of the EU-15 which signals the relative inefficiency of agricultural production technologies. The gap narrowed between the EU-10 and the EU-15 as in these latter countries labour productivity increased only by 26.8% during the period 2005-2013.

Indicator A, an index of the changes in real agricultural income per AWU was 193% for the EU-10 and 144% for the EU-15 over the period 2005-2013. This means that agricultural incomes grew faster in the post-socialist countries than in the other EU Member States. The increase was significant in all but one of the EU-10 Member States, ranging from 216% in Hungary to 143% in Lithuania. The only exception was Slovenia, where real agricultural income per AWU declined between 2005 and 2013.

Parallel to the increase in the value of production, total intermediate consumption (made up of total specific costs and overheads) increased too, and there was no significant difference in this between the EU-10 and the EU-15 in 2013.

The overall agro-food trade balance (intra and extra EU) of the EU-10 changed from negative to positive between 2004-2006 and 2012-2014. This means that the accession of these countries to the EU impacted positively on the competitiveness of their agricultural and food processing sectors and/or it enhanced the market access of their producers in general (Figure 10). An outstanding difference between the structural development in the agro-food trade balance of the EU-10 and the EU-15 during this period is that the post-socialist bloc became a net exporter not only of agricultural commodities but of primarily and secondary processed, higher value added goods as well. The EU-15 Member States could only slightly improve their agro-food trade balance between 2004-2006 and 2012-2014: the trade saldo of agricultural commodities and primary processed products declined while net exports of highly processed products increased. Among the EU-10 Member States the overall agro-food trade balance improved the most in Poland, Hungary, Romania and Bulgaria, while in Slovakia and Slovenia slight reductions took place. Poland and Lithuania differ from the other EU-10 Member States in that their trade balance of secondary processed food products grew significantly between 2004-2006 and 2012-2014. In Romania, Bulgaria and Hungary, however, the improvement in the overall agro-food trade balance was mainly due to the boost in exports of agricultural commodities, primarily cereals and oilseeds. Note that the continuous depreciation of the national currencies against the EUR in the EU-10 countries outside the Euro Zone, either since accession to the EU (e.g. Hungary) or the financial and economic crisis in 2008 (e.g. Poland and Romania), also had an effect on trade dynamics.

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11 No internationally accepted unified classification for the processing rate of the different agricultural and food products exists. In this analysis the classification developed by AKI, Budapest, Hungary was applied (see Annex 26 for details).
3.2. Off-farm employment opportunities

The factors driving restructuring in agriculture, such as technological development, market power relations and the institutional and political environment, are all interpreted in the context of the macroeconomic environment. The macroeconomic environment, in turn, determines off-farm employment opportunities. In times of economic growth, when unemployment is low, labour is usually drained from agriculture, generating technological development in the sector, and thus the process of mechanisation becomes faster. This has been the prevailing trend in the more developed EU-15 Member States, resulting in a declining role for agriculture in the national economy and as a source of employment (Figure 11). In times of economic slowdown or recession, the fewer urban job opportunities and the moderate expansion or the contraction of the industrial sector reduce the flow of labour from agriculture and thus the demand for technological investments (Chavas, 2001; Davidova et al., 2013).
In 2013, the share of agriculture in employment was extremely high in Romania (25.4%) and Poland (11.2%), while in the Czech Republic (2.7%) and Slovakia (3.5%) the figure was close to the average of the EU-15 (2.6%). The development of employment by sector shows the effects of the economic crises in the late 2000’s, when the decrease of agriculture’s role in employment came to a halt and then, with the exception of a few countries (Bulgaria, the Czech Republic, Slovakia, Poland and Slovenia), it started to increase slightly again. Meanwhile the share of employment of the tertiary (services) sector has been rising continuously since 2000 both in the EU-10 and the EU-15. The share of employment in the service sector reached 57.1% in the EU-10 the average of the EU-15 was 74.6% in 2013.

In many rural areas, the increase of employment opportunities in other sectors outside agriculture is limited by underdeveloped technological and social infrastructures and by low market demand for services (Swinnen et al., 2001). The main reason for limited opportunities to generate income is the low level of demand, in particular in less favoured, sparsely populated and poverty-stricken rural areas. The share of employment in the tertiary sector in predominantly rural areas was therefore considerably lower in the New Member States (46.2%) than in the EU-15 (66.3%) in 2011 (EC, 2013a).

One of the key driving factors of structural change is the level of incomes attainable in agriculture (measured by entrepreneurial income per full-time non-salaried AWU) compared to other sectors of the economy. In the EU-15, agricultural incomes were around half of the average of wages in the whole economy in 2013 (Annex 19). In the EU-10, the difference was smaller: in the post-socialist countries, agricultural incomes
equalled 78.9% of the average of the national economy. However, the EUR 4.8 per hour average wage in agriculture in the EU-10 was just 40.5% of the EU-15 average in 2013. Agricultural entrepreneurial incomes in the EU-10 increased by 89.6% between 2007 and 2013, while in the EU-15 they grew by only 9.6%. Among the EU-10 Member States, agricultural incomes lagged behind the average in Slovenia and Slovakia the most, while in Estonia and in the Czech Republic, they were much higher than the average for the EU-10. In both of these countries labour productivity in agriculture was significantly higher than the EUR 6,984 per AWU average of the EU-10 (in Estonia EUR 12,374 and in the Czech Republic EUR 12,601 per AWU).

Many holders of small farms are part-time farmers (working less than 1,800 hours a year in agriculture) involved in other gainful activities due to the low profitability of the sector. In the EU-10, 77.2% of the family farm managers were part-time farmers in 2013 while in the EU-15, the figure was 46.5%. The proportion of part-time farmers was particularly high, over 80% in Romania, Latvia, Slovakia and Hungary. Approximately one third of all farmers in the EU-27 were pluri-active (Annex 20).

While in the EU-15 there were no differences between rural and urban areas in 2013, in the EU-12 and Croatia, in predominantly urban areas the share of farmers with major other gainful activity was 4.8% higher than in rural areas (EC, 2013a). This is related to the fact that urban areas can be characterized by more developed infrastructure, higher demand for services and a lower unemployment compared to rural areas. These differences are often more pronounced in the EU-10 than in the EU-15.

3.3. Productivity

There have been few comparisons of EU-15 and EU-10 Member States in terms of their agricultural productivity development. Such works include the study by Brümmer et al. (2002) about dairy farms in Germany, the Netherlands and Poland, that by Rungsuriyawiboon and Lissitsa (2007) on differences in agricultural productivity of EU-15 and EU-10 Member States, one by Fogarasi and Latruffe (2009) comparing the efficiency and technology of French and Hungarian dairy farms, a paper by Latruffe et al. (2012) about metafrontier productivity analysis of French and Hungarian COP farms and dairy farms, a study by Domanska et al. (2014) of agricultural productivity in the EU-27, and a contribution by Bojnec et al. (2014) about the technical efficiency in agriculture in the EU-10.

The Total Factor Productivity (TFP) measures the efficiency of all inputs to a production process. TFP of the EU-27 agriculture increased by 2.4% per year between 2007 and 2011. This performance is influenced by the rising technical efficiency (3.5%) and the decreasing technological change (-1.0%). The progress of technical efficiency is entirely due to the scale efficiency change (3.5%). The productivity change in the EU-27 was positively affected by the share of farm managers with higher agricultural education, average farm agricultural area and ratio of total export to total import (Domanska et al., 2014). Productivity increase is a key factor of structural change in EU agriculture: the concentration process, manifested in the growth in the average farm size and in the decline in agricultural employment, is the result of the exit of less productive and/or inefficient farms.

The highest productivity increase in the EU-10 occurred in the Czech Republic (2.7%), and positive productivity changes took place in Slovakia (0.8%), Slovenia (0.3%) and Estonia (0.3%). The outstanding productivity increase in the Czech Republic
is due to technological advancement (3.5%), as the technical efficiency has decreased (-0.8%) in spite of a 0.7% increase in scale efficiency. In Slovenia the productivity increase is influenced by positive technical change (3.3%) as the technical efficiency is decreasing (-2.9%). In those EU-10 Member States where productivity is decreasing, the driving force of negative performance is technical change not appreciated by the market.

Box 1: Factors influencing technical efficiency in the EU-10

The Data Envelopment Analysis (DEA) efficiency scores in the EU-10 are determined by the transition process, institutional and policy reforms, and by the technological changes (Bojnec et al., 2014). The diversity in farm structures in terms of farm size and farm specialisation is also important. Small-farm structures contribute to the DEA efficiency scores in agriculture in the EU-10 in a positive way. Small farms are likely to specialise in different outputs than large farms, thus are complementary rather than substitutes for large farms, which contribute to the average farm size. Farm specialisation as the share of crop output in total agricultural output had a positive impact.

According to Domanska et al. (2014), the ratio of total exports to total imports has the highest impact on productivity change, and reflects the degree of the openness of the economy. An open economy favours scale economy achievement by accessing foreign markets, which allows cost reduction.

The level of agricultural education of farm managers also has a positive effect on the improvement of productivity. This human capital proxy reveals the role of efficient management and organisation in the assessment of production performance. Farm managers with a higher agricultural education usually have better knowledge of new technologies and the ability to optimise the use of available resources.

Of the three factors mentioned above, average farm size has the weakest effect on productivity increase in the EU-27. In contrast, farm size is still a predominant productivity determinant in developing countries (Rahman and Salim, 2013). Production scale increases as farm size increases, which is a result of the more efficient utilisation of available resources. Domanska et al. (2014) estimated a negative impact on productivity for farm managers aged above 55 years.

3.4. R&D and innovation

As an investment in knowledge, agricultural research and development (R&D) in most EU Member States is financed both from public and private sources. R&D for instance contributes to the creation and diffusion of innovative technologies (e.g. precision farming) and produces inputs to the emerging knowledge-based economy, considering economic, social and environmental requirements at the same time.

Since there are no data on private investments, only public spending on agricultural research and development can be analysed (EC, 2011).

According to EUROSTAT data, public funding of agricultural R&D per inhabitant, expressed in purchasing power standards (PPS), an artificial currency unit at 2005 constant prices, has historically been higher in the EU-15 than in the EU-10; however, it increased in the

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14 Government Budget Appropriations on Research and Development (GBAORD) refer to budget provisions. Data include both current and capital expenditures and also government-financed R&D in the private sector.
post-socialist block during the period 2006-2013 from PPS 4.4 to 4.8, while it declined in the EU-15 from PPS 7.6 to 6.6 (Figure 12).

It is true however, that between 2006 and 2013 the average share of agricultural R&D within total R&D spending decreased both in the EU-15 (from 3.5% to 3.2%) and in the EU-10 (from 6.1% to 5.7%). This shows that although other sectors can have higher priority in the public budget concerning R&D, agriculture is still an area considered worthy to support from public money. Increased public spending in the EU-10 indicates governmental intentions towards knowledge-based structural change.

**Figure 12: Public spending on agricultural R&D in 2006 and 2013.**

![Figure 12: Public spending on agricultural R&D in 2006 and 2013.](image)

**Source:** EUROSTAT

**Note1:** Instead of 2005 public spending data are available only for 2006 (*in the case of Bulgaria for 2007).

**Note2:** PPS that is the abbreviation of the purchasing power standard is an artificial currency unit.

Technological innovation contributes to structural change in agriculture. It reduces the per-unit costs and increases productivity and the profits of the first adopters. As others follow, prices of agricultural products decrease and firms that are not able or willing to innovate, lose their income and might need to exit farming (Zimmerman, 2009; RIRDC, 2007).

New farm machinery can be an indicator for agricultural innovation. Calculating new farm machinery as a change in the value of machinery per utilized agricultural area (UAA) can give us a picture of one aspect of farm innovation. Based on FADN data on the average value of farm machinery increased between 2005 and 2013, both in the EU-10\(^{15}\) and in the EU-15. In Bulgaria, for instance, there is an outstanding growth up to 208% but Slovenia (185%), Estonia (185%) and Latvia (183%) are also above the average in this respect. On the other hand, in Romania a 20% decrease can be observed in the value of farm machinery per hectare (Figure 13).

\(^{15}\) Since data for Romania and Bulgaria are available only from 2007, these were used when calculating EU-10 figures for 2005 and 2006.
The increase in the value of farm machinery is probably more relevant in the case of larger farms since the proportion of smaller farms (0-4.9 ha) decreased in total number of farm machinery\textsuperscript{16} from 2005 to 2013 (from 32.6% to 27.1%) in the EU-10 based on FSS data. At the same time both in the 5-49.9 hectares and in the 50+ hectares category an increase can be observed (from 56.2% to 59.4% and from 11.2% to 13.5% respectively) which can be considered as a sign of farm concentration.

**Figure 13: The value of farm machinery per UAA in the EU-10 Member States in 2005 and 2013.**

\[\text{Value of farm machinery per UAA (EUR/ha)}\]

- **Source:** Own calculation based on FADN data.
- **Note 1:** Farm machinery includes machines, tractors, cars and tracks, irrigation equipment (except when of little value or used only during one year).
- **Note 2:** Data are for an average farm (differences in size are not analysed).
- **Note 3:** Data for Romania and Bulgaria are available only from 2007.

\textsuperscript{16} Four-wheel tractors, track-laying tractors, tool carriers belonging exclusively to the holding; cultivators etc. belonging exclusively to the holding; combine harvesters belonging exclusively to the holding; other fully mechanised harvesters belonging exclusively to the holding (FSS).
3.5. Concentration in land use

The agricultural sector in the EU-10 is undergoing long-term restructuring, and this is reflected in the evolution of the size structure of agricultural holdings (Zdrahal and Bečvářová, 2013). Allocation of land as a production factor is important for efficient agricultural production, which is adapted to structural changes. Beyond its productivity, land may be used to store wealth and may be acquired as an asset for speculative purposes. People also hold land for family traditions, lifestyle and prestige value, leading some wealthy and politically connected households to accumulate large tracts (Ciaian et al., 2012).

The privatisation of agricultural land during the transition to a market economy from 1989 onwards was to a large extent responsible for the emergence of the dual farm structure in the EU-10\(^{17}\). It resulted in a fragmented, small-scale ownership structure in most of the countries. A considerable share of the land has become property of non-farming owners who rent it out. The fragmented land ownership structure decreases productivity. The fragmented land ownership and the large weight of small farms hinder structural change with constraining the availability of land for transaction market. The restitution of small-scale farming has become successful only due to the high proportion of agricultural population, the rising unemployment and the low production efficiency of the former agricultural state farms as well as the government financial support for restitution in Bulgaria and in Romania (Burgerné, 2003).

Figure 14: Concentration of land use in selected EU Member States, 2010.

\(^{17}\) With regard to the farming structure, significant differences existed before privatization. For example in the former Czechoslovakia, large farm structures (cooperatives or state-owned farms) dominated. Other countries such as Poland or Slovenia were traditionally dominated by individual and relatively small-scale farming. In Hungary a mixed structure with the mutual production benefits of large state-owned and small-scale household farming was operating (Buchenrieder and Möllers, 2011).
Concentration of farm structure can be measured using the Gini coefficient. In the EU-10, average land use concentration in 2010 (0.27 Gini coefficient) was considerably higher than in the EU-15 (0.17) due to the higher share of large farms. In the EU-10 (and also in the EU-15) there were huge differences between the Member States (Figure 14). Land use was the most concentrated in Slovakia (0.94), Hungary (0.91) and in the Czech Republic (0.84), while in Poland (0.62) and in Slovenia (0.52) it was more equitable.

The general trend in the EU-10 shows the slow land concentration process, in terms of farm structure change the number of small farms is decreasing and the numbers of medium and large farms are rising. There has been a constant decline in the number of small farms alongside relative stability in the number of medium sized farms in the EU-15 and a growing number of medium size farms with redistribution of the land of large farms in the EU-10. The shifts in number and size of farms differ considerably in the EU-10 and in the EU-15. The concentration process in terms of farm numbers has been more pronounced in the EU-10 during the period 2005-2013 (for details see notes to Figure 3 in Chapter 2.1.1).

The slow rate of land concentration is also characteristic in the increase in the average size of the small and medium sized farm groups and land reallocation (deconcentration) among large farms. The average size of the small farms was 1.3 hectares in the EU-10 and 2.0 hectares in the EU-15 in 2013 (Annex 3). Among the EU-10 it was the highest in Latvia (2.8 hectares) and the lowest in Hungary (0.6 hectares) in 2013. The average size of small farms in the EU-10 remained constant between 2005 and 2013, while in the EU-15 it increased by 11.6% to 2.0 hectares. In the EU-10 the average size of small farms grew notably in Poland (63.3% to 2.4 hectares), Bulgaria (18.7% to 0.8 hectares) and the Czech Republic (14.6% to 1.7 hectares), but declined in Romania (-15.6% to 1.1 hectares) in the period examined.

In 2013, the average size of a medium farm was 12.6 hectares in the EU-10 and 17.6 hectares in the EU-15. Among the EU-10 it was the largest in the Czech Republic (17.2 hectares), Bulgaria and Hungary (15.4 hectares) and Slovakia (15.1 hectares), and the smallest in Romania (9.6 hectares). The size increased by 9.3% in the EU-10 between 2005 and 2013, while in the EU-15 the increase was just 1.2%. Among the EU-10 the average size of medium farms increased considerably in Bulgaria (30.6% to 15.4 hectares), Latvia (13.9% to 15.1 hectares) and Romania (10.2% to 9.6 hectares), and declined only in Slovakia (-1.3% to 15.1 hectares) in the period examined.

The average size of the large farms was 264.1 hectares in the EU-10 and 145.7 in the EU-15 in 2013. Among the EU-10 it was the largest in Slovakia (572.6 hectares) and smallest in Slovenia (117.0 hectares). The average size of the large farms decreased in the EU-10 (-10.6%) between 2005 and 2013, while in the EU-15 it increased by 7.3% to 145.7 hectares. Among the EU-10 average size of large farms increased in Latvia (28.2% to 211.7 hectares) and Bulgaria (10.9% to 448.9 hectares), and declined in Slovenia (-23.5% to 117.0 hectares), Romania (-16.7% to 334.6 hectares), Poland (-16.1% to 140.8 hectares) and Slovakia (-15.6% to 572.6 hectares) in the period examined.

Mobility of agricultural land through its reallocation from less productive to more productive farms facilitates structural change (Swinnen et al., 2008). The low volume of land market transactions hinders structural change in the EU-10 and in the EU-15 as well. The market for agricultural land is relatively small, only a couple of percent of all productive
land is transacted each year. For the EU-15 the share of agricultural land sold on the market is basically stable in most countries. For the EU-10, in some Member States the market for agricultural land is strongly affected by public sales under ongoing land privatisation programmes, especially in the Czech Republic and Lithuania, while strong variation prevails in the land sales market. In Poland the number of private sales of agricultural land is consistently declining, while in other countries, such as Bulgaria, Romania, Slovakia and Lithuania, land market transactions have increased substantially since the accession of these countries to the EU (Swinnen and Vranken, 2009 and 2010).

The low land prices in the EU-10 also slow down the process of structural change. Agricultural land sales and rental prices vary strongly within the EU-10 and in the EU-15. Land sales and rental prices are also much lower in the EU-10 than in the EU-15 (Figure 15). Between Estonia and the Netherlands the difference in the average land price is seventyfold. In 2006 the lowest average agricultural land prices in the EU-10 could be observed in the Baltic countries (EUR 450-800 per hectare), followed by Romania and Bulgaria (EUR 879 and 1,007 per hectare).

Figure 15: Sales prices of agricultural land in selected Member States in the period 2006-2011 (EUR thousand per hectare).

Source: EUROSTAT
Note: For 2011 land prices in Belgium, Denmark, the United Kingdom and Germany (Künzel, 2014); in Hungary (KSH, 2013), and in the Netherlands (Berkhout, 2015).

The highest average agricultural land prices in the EU-10 were observed in Poland (EUR 2,050 per hectare) followed by the Czech Republic and Hungary (EUR 1,625 and 1,512 per hectare). In the EU-15 average agricultural land prices were the lowest in France (EUR 4,370 per hectare), due to sales price regulation, and Finland (EUR 5,979 per hectare), while the highest prices occurred in the Netherlands (EUR 31,276 per hectare). Average agricultural land sales prices increased steadily in the 2006-2011 period in both the EU-10 and the EU-15. The highest increases in the EU-10 occurred in Poland, Hungary and Romania, and in the EU-15 in the Netherlands, the United Kingdom and Germany.
Increases can be attributed mostly to the general economic development of Member States. The sales price for land appears to be typically higher than the productive value of land (Binswanger et al., 1995). It is expensive and difficult for efficient producers to buy land, and market imperfections reduce the attraction for less efficient producers to sell their land (Ciaian et al., 2012). High land prices and low turnover of ownership have encouraged the development of the land rental market.

Drivers of other factors underpinning agricultural land sales prices are highly heterogeneous but their impacts are considerably stronger in the EU-15 than in the EU-10. The most common factors are urban pressures, infrastructural expansion, agricultural productivity, agricultural subsidies, and their capitalisation in land prices. In the EU-10, Direct Payments are considered to be a particularly important driver for the increase in land prices (DG Internal Policies, 2013).

The development of the land rental market (and the volume of the rental fee) plays a key role in flexible land allocation to efficient agricultural production and thus in structural change in the EU-10. One of the main advantages of renting rather than purchasing land is that farmers in the capital intensive production systems can invest in new technologies rather than in land.

Land rental markets are not fully yet developed in the EU-10. The average proportion of land that is rented was 39.8% in the EU-10 and 43.8% in the EU-15 in 2007. The prevalence of land renting varies significantly among EU-10 Member States, ranging from 29% in Poland and 33% in Slovenia up to 96% in Slovakia. The share of rented land is the highest in Slovakia, Bulgaria and the Czech Republic (more than 80% of the total UAA). In other EU-10 Member States (e.g. Hungary, Estonia, Lithuania and Romania) the proportion of land that is rented is between 40% and 60% (DG Internal Policies, 2013). In some EU-10 Member States, corporate farms use the large majority of the rented area. In the Czech Republic and Slovakia, more than 70% of all agricultural land area is used by corporate farms. In Hungary, Estonia and Bulgaria, corporate farms still use around half of all agricultural land (Vranken et al., 2011). The correlation between the prevalence of land rental and the proportion of corporate farms in total land use is striking (Swinnen et al., 2006).

The low land rents in the EU-10 slow down structural change considerably, since the less efficient farms can maintain their production for a longer period, and the large farms also have strong bargaining power to keep land rental fees lower (Herck et al., 2014). The annual rent farmers have to pay for one hectare of land is typically considered as the best proxy for the price of land. The level of land rents depends on several factors such as land use efficiency of farms, the scarcity of land, and the degree of competition between farmers in the local land market (EC, 2013b). Average land rent in the EU-27 has changed little since 2007, standing at around EUR 150 per hectare. The level of land rents in the EU-15 increased gradually to around EUR 175 per hectare in 2009. This trend was more pronounced in the EU-10 during the period 2004-2009: land rent rose by more than 45% to around EUR 50 per hectare. Average land rents differ markedly across the whole EU with very similar patterns to average agricultural land prices. Rental prices are much lower in the EU-10 than in the EU-15. In 2009 the highest average land rent per hectare in the EU-15 was observed in the Netherlands, Denmark and Germany (around EUR 500 per hectare) (DG Internal Policies, 2013). In the EU-10 in 2011, high average land rents occurred only in Hungary and Poland (EUR 110-130 per hectare). Yearly land rents were moderate in Slovakia and the Czech Republic (EUR 40-50 per hectare) and the lowest in the Baltic Member States (EUR 30-40 per hectare).
Regulation restrictions on investment in agricultural land, and protecting agricultural producers in most EU-10 countries only minor, basically do not apply. Only Hungary maintains significant restrictions to the exclusion of legal persons from the land market in connection to the land ownership. Regulations protecting land ownership of agricultural producers (e.g. pre-emption rights, administrative authorisation of land acquisition, limits on the amount of land as well as price regulations) are significant in Hungary and in Poland in the EU-10 and in Austria and Denmark in the EU-15. The regulations protecting land use of agricultural producers (e.g. leasehold rights, administrative authorisation of land lease, rental fee and time regulations) are more pronounced in the EU-15 in France, Belgium and the Netherlands, while in the EU-10 in Slovakia regulations protect the operation of large corporate farms.

In other Member States, the land market regulations are less restrictive from the perspective of prevailing contractual freedom on the land sale and rental market (Swinnen et al., 2014). Beyond regulations, transaction costs also apply on the land market to influence structural change through efficient allocation of land. High sales transaction taxes on agricultural land moderate structural change via the relocation of agricultural land from less productive to more productive farms in Poland, Bulgaria, Lithuania and Romania in the EU-10 (Swinnen and Vranken, 2009).

Restrictions on foreigners buying land were especially important in the EU-10 to support local farmers (Swinnen and Vranken, 2009), but these restrictions slowed down structural change. Local farmers feared that EU-15 farmers and real estate investors would acquire large parts of their land. The most frequently found restriction for foreign investment in agricultural production related to land ownership, but in many cases foreign investors are allowed to lease land. Foreign investors were attracted by low land prices while local farmers had much lower incomes, lower farm subsidies and higher capital costs with poorly functioning rural capital markets (Swinnen et al., 2014). The World Bank (WB, 2010) pointed out some notable positive aspects of land grabbing – including increased efficiency, innovation and development. Land grabbing has negative effects on the development of rural communities; among social costs it increases unemployment in rural areas. Although official data on foreign investment in agricultural holdings usually do not exist, because of the low land prices and presence of large-scale farms with concentrated land use, farms in Slovakia, the Czech Republic Bulgaria, Romania, Hungary and Estonia in the EU-10 are the most exposed to domestic and foreign investors18.

3.6. Social context

Restructuring in agriculture has been influenced by several contradictory social factors. As a consequence of the outmigration of skilled rural population of active age within and outside agriculture, the decrease in the prestige of agricultural jobs, and the change of lifestyle and consumption habits, the number of farmers exiting farming is increasing more rapidly, while the lack of jobs, high unemployment, low wage levels and the high rate of inactive

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18 TNI (2013) mentions Romania, Hungary, and Bulgaria some foreign investment examples connected to the phenomenon of land grabbing. At a conservative estimate at least 10% of total agricultural land in Romania is under foreign operation, with considerable Italian influence mentioned. In Hungary while farmland grabbing is statistically insignificant (foreigners bought officially 700 hectares between 2005 and 2007), land could be acquired legally and with the so-called illegal 'pocket contracts' before EU accession, it is estimated that around 200-400 thousand hectares (5-10% of total UAA) of land is under foreign operation. In Bulgaria land grabbing was rather used to get sites for mining projects and tourist and urban development. Foreign investors now can directly lease or buy consolidated agricultural land. Several Investment Funds are also operating for the purpose of acquisition of agricultural land.
population living below the poverty line inhibit the restructuring process in the sector (EC, 2010). The global financial and economic crisis has considerably increased the role of agriculture in compensating the loss of income of rural households in the EU-10 Member States (Potorić et al., 2011).

High shares of disadvantaged, poor and long-term unemployed people in the population are typical for the majority of the EU-10 Member States, especially in rural areas dominated by agriculture. While the proportion of people at risk of poverty in the EU-15 Member States slightly exceeded 23% on average in 2013, in the EU-10 it was around 30%, although it declined by 8 percentage points since 2004. The poverty rate was the highest in Bulgaria (48.0%), Romania (40.3%) and Latvia (35.0%), and the lowest in Slovenia (20.4%), Slovakia (19.8%) and Czech Republic (14.6%) among the EU-10 Member States in 2013. There is significant territorial fragmentation of the social inequalities. Among the EU-10 Member States, people living in rural areas are especially exposed to poverty in Bulgaria (61.2%), Romania (54.8%) and Latvia (40.9%), and also to social exclusion in this context. The low level of per capita GDP indicates the lagging behind of the EU-10 Member States, in particular of Bulgaria (with 46.0% of the EU average in 2013), Romania (54.0%) and Latvia (62.0%).

While there are similar economic trends in EU-10 and EU-15 agriculture, the dynamics of restructuring with regard to social trends differs. In the EU-10 the role of agriculture in employment is bigger, the number of small farms is higher and, owing to the lower income and limited opportunities for income supplementation, subsistence or partly semi-subsistence farming is considerably more important (Davidova et al., 2013). EU-10 Member States have a much higher share of small farms (71.6%) than the EU-15 (29.9%). More than half (52.0%) of the small farms under EUR 4000 SO in the EU-27 are located in Romania. These small farms utilised only 13.3% of the EU-10 UAA in 2013, but engaged 43.2% of labour in fulltime equivalents (Annex 21). The role of small farms is much stronger in the EU-10 than in the EU-15, as is reflected in their share of SO. While this share is only about 1% in the EU-15 it is more than 10% in the EU-10.

In conjunction with the exit of labour from agriculture, part-time farming is increasingly widespread in the EU. Part-time farming works as a kind of survival strategy in many small farms where off-farm income can support the farm operations (Hambrusch, 2008; Bedrač et al., 2008). In 2013, 20.7% of farmers in the EU-15 and 27.0% in the EU-10 had other gainful activities in addition to farming. The proportion of small farm owners that have full-time employment in addition to farming is very high in the EU-10, especially in Bulgaria (79.0%), Poland (46.5%) and the Czech Republic (46.4%) (Annex 22). In Romania, where the share of number of small farms is 83.1%, farming is the only source of income for most small farms with agricultural activities (Davidova et al., 2013). According to Möllers et al. (2011), semi-subsistence farming in Romania and Bulgaria plays a vital role for living in poor households.

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19 People at risk of poverty or social exclusion (people at risk of poverty or severely deprived or living in a household with low work intensity over the total population) (EC, 2013a).

20 By type of area (thinly-populated, intermediate urbanised and densely-populated).
Box 2: The social role of agricultural cooperatives in the rural areas of Bulgaria

According to a Bulgarian case study, agricultural production cooperatives provide diverse rural functions. In very poor regions, many people rely on employment in the cooperative, cultivating their small plots or even receiving support from the cooperative for securing their livelihoods. For the locals, employment depends on the viability of the agricultural production cooperatives, and many of them would have to migrate if the cooperative would no longer exist, leaving behind the elder generation. Furthermore, municipalities are very weak and not able to maintain basic infrastructure and public services. In this situation, roads, street lightening, kindergartens, community centres, parks, green zones and sports facilities are maintained by cooperatives, although this is not in the immediate profit maximising interest of the firm. The bakery and canteen of the agricultural production cooperatives provide for cheap food. Especially for the poor and aging population, cooperatives serve as a kind of safety net (Bijman et al., 2012).

While the role of agriculture as an employer has become less significant in the EU-10, the other sectors of the local economy have been unable to cope with the consequences of the high levels of permanently unemployed, often young people, because the number of those who need social security services has been increasing in rural areas. That part of the rural population that has experience in agricultural activities and possesses production resources (land) maintains small-scale farming in order to reduce the expenses of consumption (Möllers et al., 2011). Agricultural production provides a significant part of small farms’ household incomes, therefore it contributes to reducing poverty and outmigration from rural areas to cities (Davidova et al., 2013). In some EU-10 Member States (e.g. Slovakia, Romania and Hungary), government programmes based on social considerations try to stimulate agricultural activity in order to fight against the decline of rural areas and prevent disadvantaged social groups from falling behind (e.g. public employment programmes, local economic development programmes) (Kureková et al., 2013). This is slowing down the process of agricultural restructuring and reproduces agricultural population with capital shortage.

Box 3: The role of remittances in rural areas

One consequence of international labour migration is the remittance of money to the emanating countries. In 2014 about one third of transferred incomes (USD 36.5 billion) from Europe flowed into the Balkans, the Baltics and Eastern-European countries, including the EU-10 Member States (IFAD, 2015). Of the latter group, Romania and Poland were the main recipients. IFAD (2015) also showed that approximately 40% of the transferred incomes have flowed into rural areas dominated by agriculture, providing considerable resources for agricultural development. Studies examining the consequences of labour migration also draw attention to the fact that the transferred incomes have significant rural development impacts: reducing income disparities between rural and urban households, decreasing rural poverty and thus slowing down further labour migration (Pop, 2006; EC, 2008; Hărău, 2011).

The lack of jobs has resulted in an oversupply of labour on the rural labour markets in the EU-10, placing pressure on wages (Biró et al., 2012; Biró et al., 2014). On the other hand, under-qualified labour force with outdated knowledge concentrated in rural labour markets is unable to satisfy adequately the workforce demands of scarce rural enterprises, including agricultural ones, which require specific skills (IT, knowledge-intensive techniques). Consequently, the higher level of mechanisation as a result of enterprise development leads to a lower demand for labour and changes the production
structure (Swinnen et al., 2013). **A long-term consequence of such processes is that in spite of the national and EU policy interventions the weakening of social cohesion, growing polarisation of rural society, deepening income inequalities and the spatial dissemination of poverty** that primarily affects women, Roma and elderly people can be observed (Kowalski et al., 2013).

The dominant socio-demographic and social trend in the EU-10 is **the spatial mobility of an economically active aged population** (including migration within and outside agriculture), which has also contributed to the concentration of the elderly, under-qualified population without financial capital in rural areas (EC, 2013a). All this is a burden to the development of agriculture and social-economic advancement of rural areas; **it might make all efforts impossible**.

Although in the EU-10, as a result of demographic ageing, migration to towns and other countries (especially in Bulgaria, Romania, Poland, Latvia and Lithuania), the rural population is continuously decreasing, **there are trends that have a favourable impact on population change**. In certain rural areas (typically in the surroundings of towns) **new, diverse self-employing enterprises** making use of the labour force of the household have emerged (e.g. agrarian or eco-tourism, products made from local raw materials), which not only offer jobs for local people, but create basic public and business services as well. The initiators of these activities are often highly qualified representatives of the younger generation moving back from city to the village (Kay et al., 2012).

### 3.7. Demographics

#### 3.7.1. Age structure

One of the most important demographic trends that influences the restructuring of agriculture is **the reduction in the agricultural workforce of active age group as a result of lifestyle changes, migration and ageing** (Chavas, 2001). Major consequences of the reduction of the potential labour force supply are mechanisation substituting manual work, a shift to an extensive production structure and the simplification of the product structure (Möllers et al., 2011).

A major driver of the growth of farm size is the long-term opportunity to hand over and operate accumulated resources. When the problems of the replenishment of labour force and farm succession are tackled, the likelihood of the implementation of long-term, large-scale investments increases (Zagata and Lostak, 2013). **Young farmers are more open to innovation and they pay more attention to the sustainable use of natural resources.** For example, Kucińska et al. (2010) draws attention to the fact that young, skilled Polish farmers are more likely to join environment protection programmes and to shift to organic farming than elderly farmers. **The process of concentration in land use as well as the retirement of elderly farmers may improve the opportunities for young farmers to develop and to remain in agriculture.** Zimmermann (2011) confirms that the chance of the disposal of smaller farms with farm managers aged over 62 are the highest, which provides prospects of growth for the remaining farms.

The key factors slowing down changes in the age profile of the agricultural population are **limited access to production resources** (land, credit, investments, etc.) and the **high transactional costs of farm handover** (Swinnen et al., 2013). Demographic renewal in the EU-10 is also hindered by low wages, the low prestige of agricultural jobs in accordance with changing lifestyles, the low standard of living in many rural areas and the problematic
access to basic business services (Székely, 2009). The pace of generation shift can be influenced by variables such as the health of farm managers and the expected amount of the retirement pension, professional qualifications of the potential successors, marital status and traditions of farming within the family (Tietje, 2003; Rossier, 2008). In addition the demographic renewal of agricultural society in the EU-10 is delayed owing to restricted opportunities for income generation in rural areas, a lack of jobs and wages below the EU average (Davidova et al., 2009).

According to 2013 FSS data, the age structure of farm managers in the EU-10 followed the trends characteristic of the EU-27: in the case of the two extreme categories the managers of 32.0% of the farms were over 65 years of age, while the share of young managers under the age of 35 was 6.7% (Eurostat, 2013)\textsuperscript{21}.

In the EU-27, Polish farmers had the most favourable age structure (as 12.1% of farm managers were under the age of 35 in 2013). The proportion of young farm managers also exceeded the EU-10 average in Slovakia and Estonia (8.1% and 7.5% respectively). In Poland the share of other active age groups (younger than 65) is higher than the EU-10 average, while the proportion of the age group 65+ makes up only 9.6% of all farmers in this country.

<table>
<thead>
<tr>
<th>SIZE (HA)</th>
<th>LESS THAN 35 YEARS</th>
<th>FROM 35 TO 64 YEARS</th>
<th>65 YEARS OR OVER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EU-10</td>
<td>EU-15</td>
<td>EU-27</td>
</tr>
<tr>
<td>THOUSAND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-4,9</td>
<td>272.0</td>
<td>71.1</td>
<td>343.9</td>
</tr>
<tr>
<td>5-49,9</td>
<td>123.1</td>
<td>110.1</td>
<td>233.3</td>
</tr>
<tr>
<td>50-99,9</td>
<td>8.1</td>
<td>25.1</td>
<td>33.2</td>
</tr>
<tr>
<td>100 -</td>
<td>10.6</td>
<td>23.3</td>
<td>33.9</td>
</tr>
<tr>
<td>Total</td>
<td>413.8</td>
<td>229.6</td>
<td>644.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SIZE (HA)</th>
<th>RATE (%)</th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>EU-10</td>
<td>EU-15</td>
<td>EU-27</td>
<td>EU-10</td>
<td>EU-15</td>
<td>EU-27</td>
<td>EU-10</td>
<td>EU-15</td>
<td>EU-27</td>
</tr>
<tr>
<td>0-4,9</td>
<td>65.7</td>
<td>31.0</td>
<td>53.4</td>
<td>76.5</td>
<td>41.1</td>
<td>61.3</td>
<td>89.4</td>
<td>62.4</td>
<td>78.7</td>
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<td>5-49,9</td>
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<td>21.4</td>
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<td>30.1</td>
<td>10.1</td>
<td>32.2</td>
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<td>50-99,9</td>
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<td>10.9</td>
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<td>5.2</td>
<td>9.3</td>
<td>4.6</td>
<td>0.2</td>
<td>3.1</td>
<td>1.4</td>
</tr>
<tr>
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<td>10.2</td>
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<td>4.0</td>
<td>0.2</td>
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</tr>
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<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
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</tbody>
</table>

Source: EUROSTAT FSS

The most elderly (above the age of 65) farm managers are in Romania (41.0%), Bulgaria (36.7%) and Lithuania (34.0%), where small farm units are dominant and relatively low or no survey thresholds are applied. The rate of young (under 35 years) farmers in all of these Member States is lower than the EU-10 average (Romania: 4.7%; Bulgaria: 6.4%; Latvia: 5.6%) (Annex 23). Regarding the EU-10 as a whole, farmers managing less than 5 hectares UAA predominate among farm managers both of the oldest

\textsuperscript{21} Abandonment of farming by those over 65 can have a significant impact on the farm structures change in the short-term, therefore emphasis was placed on the characterisation of this age group.
and the youngest age groups. In the EU-10 65.7% of those younger than 35 and 89.4% of the age group 65+ were cultivating less than 5 hectares, in contrast to the EU-15 where the shares are only 31.0% and 62.4% respectively (Table 3).

While in the distribution of the age structure of farm managers no significant changes can be observed in the period 2005–2013, the land use characteristics in the different age groups have changed. The number of farmers under 35 declined by two-thirds to 76.1% for example in Romania in the examined period, while among them the number of land users over 100 hectares has multiplied. In addition to the Rural Development measures which prefer the young people, national programs (’Fermierul’/ The farmer program, Life annuity program) probably facilitated this process too (Luca, 2009).

**Box 4: Rejuvenation in Polish agriculture**

In the 2007–2013 programming period Poland used several integrated measures for attracting the young generation to rural areas. These included favourable credit assistance criteria, the disbursement of national and EU financial support, and the liberalisation of the pension system. While in the EU-27 on average 6% of all Rural Development resources were allocated to generation change (M112 Setting up of young farmers, M113 Early retirement of farmers) in the 2007–2013 period, in Poland the figures were 2.4% for M112 and 12.4% for M113. Furthermore, M121 Modernisation of agricultural holdings includes specific selection criteria for young farmers in Poland. At the same time Poland placed emphasis on supporting the organisations of rural youth and young farmers (for example Polish Rural Youth Union).

Subsidies play a complex role in generation change (Zagata and Lostak, 2013). One of the impacts of introducing EU direct payments was that elderly farmers did not quit the sector (as they made a positive impact on agricultural incomes and the improvement of chances of access to agricultural loans). Meanwhile, a high number of new entrants entered the sector with the help of the young farmer payment provided within Pillar II of the CAP (yet it has to be noted that some of them were not actual new entrants, but such young family members who formerly had been engaged in agricultural activity). Early retirement schemes were not efficient enough in several EU-10 Member States and it primarily actuated the handover of farms by such farmers who intended to quit farming anyway irrespective of subsidies.

**3.7.2. Gender**

Women are important drivers of structural change in agriculture as they are more open to innovation, introduction of new methods of production, technologies and products, besides which they take more initiative in creating partnerships promoting rural development and access to markets (Franić et al., 2015). The role of rural women is
determinative in the diversification of activities facilitating a balanced use of the labour force, and the extension of income generating opportunities (e.g. agri-touristic activities, production of handmade foods) as well as services available in rural space (EC, 2002).

Although in the EU-10, similarly to the whole EU-27, the majority of farm managers are men, the proportion of female farm managers is remarkably higher than in the EU-15 (31.6% cf. 18.3%), especially among people aged 65 or over (43.6% cf. 33.1%), reflecting the lack of rural jobs or income generating opportunities (Annex 24). Regarding the specific situations within the Member States, the share of female farm managers is the highest in Lithuania and Latvia (47.1% and 45.2% respectively), especially in older age groups (Franić et al., 2015), in part explained by the higher migration ratio of men in the active age group and the higher life expectancy of women.

Strong male dominance is observable in the Czech Republic and Slovakia, where only 11.8% and 16.0% of the farms were managed by women in 2013. Between 2005 and 2013 the rate of the reduction of the number of female farm managers was the most rapid in Slovakia, the Czech Republic and Poland (28.0%, 43.0%, and 54.5% respectively). This trend can be attributed to a changes in the FSS thresholds in 2010, migration from agriculture to other sectors and retirement from agricultural work.

Considering the gender distribution of employees of the agricultural sector, there are remarkable differences between the EU-10 Member States. Female employment in agriculture is typically strong in those countries where the share of the agricultural sector in the national economy exceeds the EU-27 average (e.g. Poland, Romania), or where supplementary activities related to agriculture and offering a more balanced use of labour force (tourism, leisure time activities) play a more important role (e.g. Slovenia) (EC, 2012). Full-time employment in agriculture is considerably less frequent among female employees compared to men, and female employees often act as dependents or invisible auxiliary family members instead of being employees satisfying the labour force demands of the farms, and they usually have unfavourable wages compared to men (EC, 2012).

Although in 2005 almost 2.5 million farms were managed by women in the EU-10, in the RDPs for the 2007–2013 period only modest attention was paid to gender aspects, while requirements for equal opportunities emerged primarily in relation to LEADER. The only exception was Lithuania, where in the case of a number of Axis 1 and Axis 3 measures, women were preferred and in the case of measures M311 Diversification into non-agricultural activities and M312 Support for the creation and development of micro-enterprises the share of female applicants who were planned to be supported was set at 50% (EC, 2010).

3.8. **Human capital**

The presence and availability of qualified human capital is a basic condition for increasing agricultural productivity (Swinnen et al., 2013). Higher levels of qualifications and practical experience increase the adaptability of farms, promote specialisation and the application of innovative solutions, technologies and methods of productions (Baptista, 2012). Agriculture has become a knowledge-intensive sector. The management of challenges caused by the changes of economic, social and natural environment requires, besides traditional, farm-specific knowledge, the acquisition of new skills and competencies (e.g. ICT competence, command of foreign languages, marketing, etc.) (Dudek et al., 2014).
A number of researchers have pointed out that there is a strong, significant relationship between the investment activity, results of production and the level of professional qualifications of farm managers (Nowak, 2014). More qualified farmers not only adapt more easily to changing circumstances, but they are also more efficient in seeking and implementing new solutions (Biró et al., 2014). A high level of professional training of farm managers greatly reduces the risk of liquidation of farms (Table 4).

Table 4: Distribution of farm managers by their vocational qualifications and economic farm size classes, 2013.

<table>
<thead>
<tr>
<th>SIZE (SO) EUR</th>
<th>PRACTICAL EXPERIENCE ONLY</th>
<th>BASIC TRAINING</th>
<th>FULL AGRICULTURAL TRAINING</th>
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<td>EU-15</td>
<td>EU-27</td>
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<td>1,010.4</td>
<td>5,138.0</td>
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<tr>
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<td>954.2</td>
<td>1,145.3</td>
<td>2,099.5</td>
</tr>
<tr>
<td>50000-</td>
<td>41.2</td>
<td>289.9</td>
<td>331.1</td>
</tr>
<tr>
<td>Total</td>
<td>5,123.0</td>
<td>2,445.7</td>
<td>7,568.6</td>
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<table>
<thead>
<tr>
<th>SIZE (SO) EUR</th>
<th>RATE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3999</td>
<td>80.6</td>
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<tr>
<td>4000-49999</td>
<td>18.6</td>
</tr>
<tr>
<td>50000-</td>
<td>0.8</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: EUROSTAT FSS

Although human capital is a driver of increasing productivity, the level of professional qualifications of farmers in the EU-10 is very low (EC, 2013a). The majority of farmers (82.6%) carries out agricultural activity relying solely on practical knowledge. Only 9.0% of farm managers have taken part in secondary-level vocational training while the proportion of farm managers with a higher level of vocational training is 8.3% (Annex 25). The proportion of qualified farm managers is the highest in the Czech Republic, Slovakia and Poland, where half of the farm managers have taken part in basic or full agricultural training. The level of professional qualifications of farm managers is the lowest in Bulgaria and in Romania, which can be primarily explained by the high number of small farms that are managed on the basis of practical experience only.

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22 Considering that in the EU-10 Member States self-employing individual farms predominate, an overview of the human capital endowment of farm managers in presented.
Box 5: Spatial distribution of human capital in Poland

The spatial distribution of human capital in the EU-10 differs remarkably as well. In Poland the market-oriented farms of the West-Central region are characterised with a high concentration of human capital, 27% of the farm managers have received full agricultural training. In contrast, on the farms in the Gwictokrzyśkie, Małopolskie, Podkarpackie and Głąskie voivodeships of the South-Eastern region, which are self-sufficient or produce only for local markets, only 12% of the farm managers are highly qualified (Dudek et al., 2014).

The vocational training of the rural population aged between 25 and 64 is of basic importance to the operation of farms since it provides the labour force. Although in the EU-10 the share of citizens having basic or secondary education is higher than the average of the EU-15, taking into consideration general trends (i.e. the gradual increase in the level of skills through education, the spreading of the ‘lifelong learning’ model, the growing importance of non-formal (i.e. outside of the education system) training and the growing number of students studying abroad), only a minor improvement can be observed in this respect compared to the average of the EU, especially in rural areas (Bencheva et al., 2014; Majerová et al., 2014; Wrzochalska, 2014).

Of the EU-10 Member States, the level of educational attainment of the rural population is much lower than the average of the EU-15 (68.0%) in Bulgaria (62.6%) and in Romania (58.3%). The accumulation of human capital is restricted by that the model of ‘lifelong learning’ takes roots with a slow pace in the EU-10, with significant regional differences. While in the EU-15 10.3% of the population aged between 25 and 64 takes part in any kind of training annually on average, in the EU-12 the figure is only 4.4%\(^{23}\). In sparsely populated rural areas this figure is lower, 8.1% for the EU-15 and 3.0% for the EU-12.

The low level of human capital in the EU-10 can be explained by a number of factors. In the post-socialist countries at the beginning of the 1990s, in compliance with economic restructuring, actors with no agricultural training entered the sector en masse (Majóczki-Katona, 2012; Dudek et al., 2014). Agriculture and Rural Development policy measures were focused mainly on the modernisation and establishment of production resources and infrastructure, while less attention was paid to investment in human capital. The increase in the educational level of workers in the agricultural sector is further hindered by low wages compared to other sectors of the economy which makes people with higher educational qualifications opt for non-agricultural jobs with more prestige and fewer physical demands (Rizov and Swinnen, 2004; Swinnen et al., 2013).

In the EU-10 there are no adequate, financially accessible and efficient knowledge transmission systems and farm advisory services which hinders human capital development. The existing institutions, mostly maintained by the state are of low operational efficiency, the mediated knowledge and information are outdated and their practical adaptability is limited (Velikov, 2013; Fieldsend et al., 2015). Although farmers’ participation in training has increased remarkably in the last years due to the compulsory training courses attached to Rural Development measures (e.g. M121 Modernization of agricultural holdings, M123 Adding value to agricultural and forestry products and M125 Infrastructure related to the development and adaptation of agriculture and forestry), at the level of farms, investment in human capital has not been a priority. Most farmers and agricultural policy makers may have not yet recognised that the higher the level of knowledge of farmers, the more capable they could be, not only to improve efficiency of production but also to adapt to environmental challenges and to market changes.

\(^{23}\) Aggregated data for rural areas are only available at EU-12 level (EC, 2013a).
3.9. Collective action

The agricultural sector – in particular, the fruit and vegetable (F&V) sector – is in a relatively weak negotiating position due to the low level of concentration from which farmers approach the market (Alboiu, 2012). This weakness can only be overcome by resorting to collective actions, for instance, producer organisations (POs), producers groups (PGs) or other forms of association or cooperation. Collective actions can strengthen coordination and collaboration between actors of the supply chain while countering and reducing opportunistic behaviour (Dell’Aquila et al., 2011).

In 2010 in the F&V sector, there were 1,599 recognised POs in 23 EU Member States; only Estonia, Luxembourg, Lithuania and Slovenia had no recognised POs. Around 43% of the total value of EU F&V production was marketed by POs (43.9% if PGs are also included). The degree of organisation varied widely between the Member States: it exceeded 80% in the Netherlands and Belgium. In France, Italy and Spain, leading F&V producer countries, POs accounted for around 50% of the marketed production, while the degree of organisation in the post-socialist Member States was well below the EU average (Figure 16) (EC, 2014b).

Figure 16: Share of total value of EU F&V production marketed by POs and PGs, 2010.

Source: EC (2014)
Note: These are the latest official data about the EU Member States.

Despite the economic benefits of PGs and POs, many farmers are not interested to enter or form PGs and POs. Factors that restrict the development of POs include the lack of trust, systematic suspicion and the temptation to take advantage of the efforts of others without paying the price (‘free rider’ behaviour). Illegal activities may be a further key reason for not joining POs. Non-organised farmers can obtain higher profits than those belonging to POs, which are obliged to respect the legal framework. In addition, many producers sell exclusively in local or regional markets or through direct sales, often illegally, and are therefore less concerned with the benefits that the POs could bring them. Another possible
obstacle to the development of POs is represented by the complex requirements for obtaining recognition as a PO, for having an operational programme approved, and subsequently, for having access to public financial assistance. This complexity can discourage small producers who do not have the necessary competences or who consider that the advantages of adhering to the regime are weaker than the administrative costs associated. A further factor that reduces the attractiveness of POs may be the perception by producers that there are very high risks of losing the public financial support, which can put the survival of a PO in jeopardy. Respect of the recognition criteria, especially minimum number of members, democratic control, placing of products on the market is critical for a PO to maintain its recognition (EC, 2014).

Bijman et al. (2012) in the frame of an international research examined the performance of marketing cooperatives in eight sectors (dairy, pig meat, sheep meat, wine, F&V, olive oil and table olives, sugar and cereals) for all the 27 EU Member States. They estimated the market share of marketing cooperatives in value terms (Figure 17) and summarised the most important characteristics of cooperation of farmers in each Member State.

**Figure 17: Market share of cooperatives in value terms in the EU-27, 2010.**

![Graph showing market share of cooperatives in value terms in the EU-27, 2010.](source)

In Estonia the cooperatives only in the dairy sector have had a substantial market share. Since 1989 hundreds of new small cooperatives have been established, but most of them have since gone bankrupt or into liquidation. In Latvia about one third of the milk and cereals is marketed by cooperatives. Farmers have increasingly realised that cooperatives can be an efficient and profitable way of marketing their products. In Lithuania about 400 cooperatives, most of them with a very small number of farms, play a significant role in dairy and cereal production. People living in rural areas have tended to cooperate in informal ways by offering their help to their neighbours when needed; including help in field work, providing machinery services and during the harvest. However, that has not necessarily led to membership in a cooperative. Polish agriculture was less influenced by the socialist planned economy than the other Central and East European countries. Family farming survived (with the exception of the former German areas) and the cooperative sector was able to operate more or less according to the cooperative principles, although strongly influenced by the state. With the political and economic transition, most of the largest cooperatives in primary agriculture were liquidated, while others lost their members.
and collapsed in Poland. Currently, cooperatives have a bad image as being an obsolete structure. Nowadays cooperatives command a large market share (72.0%) only in the dairy industry. In the last decade, producer organisations and producer groups have been formed in the F&V sector. Land reform in the Czech Republic led to a large number of cooperatives being formed. Marketing organisations started re-emerging in 1994 and since 1999 they have been supported by various policy measures. Marketing cooperatives were, by far, the most common form but cooperatives have also been important in hops, dairy, F&V and – to a lesser extent – in sheep and pig meat production. In Slovakia, as a result of the transition process, agricultural production cooperatives have played an important role. Fewer than 600 such cooperatives farmed 52.0% of the land. There were also cooperatives and producer organisations for collective bargaining on product sales in the market. Their market share was highest in the dairy industry (24.5%), followed by potatoes (17.9%) and cereals (15.9%). They often represented only a few agricultural cooperatives. In Hungary although the number of cooperatives has been decreasing, there were still 960 traditional agricultural production cooperatives, and about 330 new marketing cooperatives and POs (including PGs), mainly in F&V, cereals and oilseeds, pigs and poultry in 2010. Their concentration was limited with low levels of second-tier organisation. In Romania the number of cooperatives was low and declined from 108 in 2005 to 68 in 2010. All of them were active in farming only, not in processing or marketing. In Bulgaria the land ownership after restitution became highly fragmented. This has led to a strongly dual agricultural structure: there are numerous semi-subsistence farms (mainly managed by pensioners) and very large agricultural production cooperatives. In Slovenia the cooperative movement has shown a positive development in recent decades. Market shares were high in the dairy sector (Bijman et al., 2012).
4. IMPACT OF AGRICULTURAL POLICIES

<table>
<thead>
<tr>
<th>KEY FINDINGS</th>
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<tbody>
<tr>
<td>EU direct payments have had a positive impact on farm incomes and the access to capital, and a negative impact on the intensity of labour use in the EU-10. These impacts have not been uniform across the regions due to the differences in unit amount of the payments, or across the businesses due to the differences in their physical size and specialisation.</td>
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<tr>
<td>EU direct payments and market measures, along with market developments, have induced changes in agricultural production structures in the EU-10 Member States.</td>
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<tr>
<td>The decoupling of EU direct payments has further accelerated reduction in the intensity of labour use in EU-10 agriculture.</td>
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<td>Although ‘cross compliance’ increases farmers’ costs and is perceived to reduce competitiveness, it is not driver of structural changes.</td>
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<tr>
<td>Investment support is raising productivity and speeding up structural change. Investment support flows to the more prosperous large farms.</td>
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<tr>
<td>Environmental measures applied in Rural Development Programmes have created additional labour demand to agricultural production in the EU-10, thereby slowing down the structural change in agriculture. The preference for extensive production systems also contributes to a decrease in the rate of reduction of agricultural labour.</td>
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<tr>
<td>Quality of life measures have helped to create liveable rural environments and thus contributed to retaining rural population in farming on the one hand and from exiting farming with the diversification activities on the other hand.</td>
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<tr>
<td>Preventing farm exit in the rural areas is considered desirable by many national Rural Development Policies.</td>
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<tr>
<td>During the period 2007-2013, gender-specific issues have received only modest attention in the Rural Development Programmes of the EU-10 Member States.</td>
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<tr>
<td>While the measures of Pillar II of the CAP supported the rejuvenation of the farming society in the EU-10, direct payments have slowed down the rate of exit from subsistence and semi-subsistence farming of the older generation.</td>
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4.1. Direct payments

4.1.1. Support schemes in the EU-10

With the exception of Slovenia, the post-communist Member States introduced the Single Area Payment Scheme (SAPS) upon their accession to the EU in 2004 and 2007. The SAPS is a simplified income support scheme in effect until 2020, replacing most of the EU direct
payments with a decoupled area based flat rate payment. Slovenia adopted the standard direct payment scheme applied by the EU-15 in 2004, and opted for the regionalised Single Payment Scheme (SPS) with a decoupled flat rate payment for the whole country in 2007. Both the SAPS and the SPS are subject to the 'cross-compliance' mechanism which includes statutory management requirements in respect of the environment, food safety, animal and plant health and animal welfare, and the obligation of keeping land in good agricultural and environmental condition (GAEC). The GAEC refers to standards related to soil protection, maintenance of soil organic matter and structure, avoiding the deterioration of habitats, and water management.

For the EU-10, EU direct payment ceilings were defined based on historical yields and livestock numbers. Therefore the area based flat rate payments have varied widely across the countries, distorting competition between agricultural producers in the different regions. In addition, direct payments were gradually phased in between 2004 and 2013 (between 2007 and 2016 in the case of Bulgaria and Romania) distorting the competition between the EU-10 and the EU-15 in favour of the latter for a transitional period. To compensate for this bias, these new Member States were allowed to top up their EU direct payments from their national budgets within certain limits, on the basis of specific products eligible for support under existing EU regulations. By 2007, most of these complementary national payments had to be decoupled from production in accordance with the reforms of the CAP in 2003 since when direct payments have been regarded not only as source of income support but also as compensation for the provision of public goods farmers are not rewarded from the market. Because of increasing budget constraints, in particular in the years of the economic crisis, complementary national payments were steadily reduced in some of the EU-10 Member States.

Article 69 of Regulation (EC) No 1782/2003 enabled the Member States to grant additional (coupled) payments to support agricultural activities that encourage the protection of the environment or for improving the quality and marketing of agricultural products up to 10% of their direct payments ceilings. The CAP Health Check revised this article and expanded the range of purposes in Article 68 of Regulation (EC) No 73/2009, allowing to payments coupled to production in clearly defined cases.

From 2015 on, Regulation (EU) No 1307/2013 introduced a new system of direct payments with aim to ensure the long-term viability of farms, to enhance the sustainable management of natural resources and to contribute to territorial development. For those countries applying the SAPS, the main new elements of this direct payment system are the ‘greening’ component, the young farmers’ scheme, the small farmers’ scheme (SFS) and voluntary coupled support (VCS) schemes which are allowed within strict limits. To reduce the gap between the EU direct payment ceilings of the EU Member States, a redistribution of direct payments has begun, leading to a gradual increase in the ceilings for those countries where the level of direct payments was below 90% of the EU average (Bulgaria, Estonia, Lithuania, Latvia, Poland, Romania and Slovakia in the EU-10). Since very large farms can better exploit economies of scale and thus are able to operate with less support, Member States have to reduce by at least 5% the part of the single area payment to be granted to farmers which exceeds EUR 150,000 and/or may redistribute, within certain limits, support to smaller farmers up to 30% of their EU direct payment ceilings for the first hectares (redistributive payment). This new system of direct payments offered great

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24 Member States that adopted the SAPS were allowed to grant a separate payment for sugar beet production for the years 2006 to 2010, as well as a separate transitional payment for fruit and vegetables.

25 And for Cyprus and Malta which became Member States of the EU also in 2004.
flexibility for the Member States to better adjust their support schemes to the specific needs and endowments of their regions; however, as a consequence a wide diversity of support schemes now exists across the EU which are expected to impact on farming structures quite differently.

4.1.2. Impacts of EU direct payments in the EU-10

The impacts of subsidies and direct payments on income distribution depend on their type, the structure of the markets and the existence of market imperfections (Ciaian and Swinnen, 2009). After accession to the EU, the phase in of EU direct payments has led to the gradual improvement of agricultural incomes in the EU-10 (Figure 18). In those EU-10 Member States which are outside the Eurozone, the depreciation of the national currency against the EUR also contributed to this positive effect through the years.

Figure 18: Income from agricultural activities in the EU-10, 2003-2014.

EU direct payments, by giving an opportunity to a large number of subsistence and semi-subsistence farms to prolong their existence, thereby allowing them to retain jobs and the incomes related thereto, had an indirect impact on labour markets. In Poland, for instance, the growth of agricultural incomes outpaced the growth of the value of agricultural production seven-fold in real terms (Poczta, 2012) which can largely be attributed to the adoption of the CAP. A rapid improvement in the livelihoods of a significant number of farmers and their families, members of cooperatives, land and capital owners, as well as of hired agricultural workers occurred.

Agricultural subsidies may increase or decrease bank loans by farmers, or have no impact depending on whether farms are credit constrained, whether the subsidies are allocated at the beginning or at the end of the growing season, and on the relative cost of internal and external financing (Ciaian et al., 2011). In the EU-10, the increase in the level of support to farmers after EU accession improved their access to capital in general; however, the impact was not uniform across the regions due to the differences in unit amount of the
payments, or across the businesses due to the differences in their physical size and specialisation. Farms large in physical terms became financially much stronger and could invest more into modernising their production technologies (resulting in the release of labour force), changing their production profile and expanding.

The overwhelming weight of area based decoupled payments under the SAPS, the generosity of the EU cereals intervention system (until a drastic cut in the quantities to be taken into intervention) and EU biofuel policies gave impetus to arable production mainly at the expense of livestock farming, especially in those EU-10 Member States where granivores were heavily supported and their market was kept isolated by protectionist measures until EU accession. Later on the price shocks on the international commodity markets and the concentration and intensification in livestock production further strengthened this process which has become a driver for concentration.

In response to the introduction direct support, and also due to the relatively low level of land prices and rental prices, demand for agricultural land intensified in the EU-10, driven in part by foreign investors. Part of the EU direct support is capitalised in land rental prices (and in prices of various inputs such as seeds, fertilisers, crop protection chemicals, etc. (Ciaian and Kancs, 2012).

Coupled payments are negatively associated with exit rates, as they increase the marginal value of farm labour and encourage farmers to remain in the sector (Tocco et al., 2013; Hennessy and Rehman, 2008). Nevertheless, the intensity of labour use (working hours/hectare) has been declining faster in the EU-10 since the introduction of direct payments, although it has been observed in all regions of the EU, which is consistent with the general long-term decline in workforce employment in the sector. The decoupling of EU direct payments has contributed to the accelerated reduction in the intensity of labour use in EU-10 agriculture (Petrick and Zier, 2011) and the reduction has been more significant in countries and regions where coupled payments supported labour intensive activities.

Cross-compliance represents the ‘baseline’ environmental measure promoting sustainable agriculture, which is compulsory for all farmers claiming direct payments. Its introduction resulted in agricultural production becoming more environmentally friendly through the reductions in the use of fertilisers and pesticides (Jaraitė and Kažukauskas, 2012). The rules of cross-compliance are not drivers of major structural changes as these provisions reduce the value of direct payments received. These regulations represent a barrier to access direct payments for small farms when they assess the economic and social costs of compliance with these rules to be higher than the direct payment received (OECD, 2015).

Very little can yet be said about the impacts of the new system of direct payments which came into full effect in 2015. The reduction of the part of the single area payment which exceeds EUR 150,000 gives an incentive for very large holdings to divide into smaller farms (exceptions are Lithuania and Romania which opted for the redistributive payment only). As for the SFS, introduced in only six of the EU-10 Member States (Bulgaria, Estonia, Hungary, Latvia, Poland and Romania), the overall impacts are yet to be assessed. VCS has been widely applied in most of the EU-10 Member States since 2015, in particular for beef, sheep and goats, milk and F&V. These coupled payments are expected to contribute to maintaining production in certain regions thereby conserving farm structures and enhancing the provision of environmental and social public goods.
The 'greening' component was introduced as a new policy tool to support the adoption of farming practices that help meet environment and climate goals by diversifying crops, maintaining permanent grassland and delimitation of 'ecological focus areas'. Despite the intense debate that surrounded the designing and implementation of this policy measure, the EC (2015) assesses the impacts of 'greening' on structural change in agriculture to be limited at the EU level; its most perceptible consequence may be the slowing down in the disappearance of pasture area. Also the area under N binding crops, in particular legumes, is expected to increase slightly. As an example for an EU-10 country, Was et al. (2014) finds that in Poland the majority of farms have already been complying with the 'greening’ requirements before their introduction, and adjustment of the remaining farms to these may cause only small changes in the cropping structure and would have negligible impact on the income generated.

4.2. Rural Development Support

Based on Council Regulation (EC) No. 1698/2005 RDPs from 2007 to 2013 in the EU Member States aimed at improving the competitiveness of the agricultural and forestry sector (Axis 1), improving the environment (Axis 2) and the countryside, and promoting quality of rural life and diversification of the rural economy (Axes 3 and 4).

Figure 19: Composition of the RDP budget of the EU-10 Member States by Axes, 2007-2013.

Note: Excluding the measure of Technical Assistance
Source: Based on EC, 2013a
Measures aiming at improving competitiveness (under Axis 1) had on average higher shares of the budgets of the RDPs (without spending on technical assistance) in the EU-10 Member States than in the EU-15 (Figure 19). This reflects the clear difference between the basic needs of EU-10 and EU-15 farms in relation to competitiveness. Hungary, Lithuania and Poland supported this area with the highest, and the Czech Republic with the lowest, percentage among their EU-10 counterparts. In the EU-15 and some EU-10 Member States such as Slovenia, Slovakia and the Czech Republic, more support was given to Axis 2 measures. In Bulgaria, Axis 3 measures had the highest share in the RDP budget (EC, 2013a).

4.2.1. Improving competitiveness

Under Axis 1, measure 121. Farm modernisation had the highest share (35%) at EU-10 level. In this respect, Latvia (62%), Estonia (54%) and Slovakia (52%) were the leaders in this type of support (Figure 20). In Hungary, for example, measure 121 supported the purchase of new machinery and equipment, especially for the post-harvest phase (since the average age of existing equipment was 12-15 years) and promoted energy saving and environment friendly technologies (e.g. adequate manure storage) (MARD, 2009). Promoting generational change\(^\text{26}\) had also a significant share in Axis 1 expenditure (22%) at EU-10 level. Especially Poland focused on this topic (37% of the Axis 1 budget).

Figure 20: Composition of Axis 1 public expenditures by the EU-10 Member States, 2007-2013.

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\(^{26}\) Measure 112. Setting up of young farmers, 113. Early retirement
Box 5: Investment strategies of Czech farmers

„In terms of farm strategies and objectives of investment, 75% of projects were qualified by respondents as development (growth through) investments i.e. investments for the purpose of increasing farm ability to produce and to sell products or services; 25% of projects indicated rather replacement investment even if with higher operational efficiency; 15% of all projects were bounded with needs to comply with the legislative (environmental) requirements on production and 30% were realised in animal production in order improve animal welfare above current standards.“ (Ratinger et al., 2012, p. 14)

In the Czech Republic a significant impact of investment support could be observed on farm modernisation (Ratinger et al., 2012). In Hungary a parallel trend can be seen between net investment and support on investments (FADN).

Axis 1 measures, especially farm modernisation, may have had a negative impact on the number of jobs in agriculture since labour is substituted by capital. In practice, however, only three Member States (Germany27, France28 and Hungary) reported that significant job losses originated from this measure in their mid-term evaluation reports (ÖIR, 2012). Others claim that investment support has no significant effect on levels of farm labour (Tocco et al., 2013). At the same time, changing obsolete machinery to new equipment in the EU-10 means less pollution to the environment and improvement in the quality of life by making the production process more convenient.

There is a tendency in the EU-10 for support to flow to the more prosperous beneficiaries (e.g. in Poland) (ÖIR, 2012) and this can be confirmed by FADN data in the case of investment support. This is more evident in the EU-10 Member States than in the EU-15 (Figure 21).

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27 One region.
28 An overseas region.
4.2.2. Improving the environment

Within Axis 2 the highest share of support both in the EU-10 and EU-27 average was targeted under measure 214. Agri-environmental payments (47% and 53% respectively). In Hungary for instance (with a share of 67% of the Axis 2 budget), these payments promote the adoption of methods protecting the environment, maintaining the landscape and the natural resources, and preserving the genetic base (soil protection, protection of surface- and ground waters, nature conservation, genetic conservation, reducing air pollution) (MARD, 2013).

Poland, Latvia and Lithuania, on the other hand, spent a significant shares of their Axis 2 budgets on measure 212. Payments to farmers in areas with handicaps, other than mountain areas. At the EU-10 level this measure accounts for 27% of the Axis 2 budget. Slovenia, Slovakia and Bulgaria focused more on measure 211. Natural handicap payments to farmers in mountain areas. Under measure 215. Animal welfare payments Romania spent the highest share of the Axis 2 budget among EU-10 Member States (13%) (Figure 22).
Axis 2 measures, especially those supporting handicapped areas and the agri-environment, have a positive effect on farm income and facilitate extensive production systems. The role of agri-environmental measures is to promote the conservation of natural resources and sustainable farming practices, and this can lead to slower increases in efficiency and productivity in agricultural production (Coelli et al., 2007). Environmental and technical efficiency are strongly interrelated factors that influence the improvement of production performance (Guesmi and Serra, 2015). Agri-environmental measures, by facilitating extensive production systems, and environmental regulations increase farming costs and are perceived to reduce competitiveness.

According to EUROSTAT (2012) data, the share of agricultural area under agri-environmental measures in the EU-12 is only 9.7%, compared to an average of 20.9% for the EU-27. The proportion of the area under agri-environmental measure differs widely between the EU-10 Member States, but it is particularly high in Estonia (45.0%), Slovenia (44.0%) and Slovakia (34.0%). Agri-environmental measures maintain less productive producers in the agricultural sector, and thus hinder economic growth and structural change on many farms (ÖIR, 2012).

Within the EU-10, the most important types of agri-environmental commitments in terms of area enrolled were those aimed at the management of landscape, pastures and high nature value farming. These types of commitments were popular in the EU-12: 64% of the UAA was covered under these types of commitments. Agri-environmental measures under these commitments were implemented on 99% of the total affected area in Romania and 81% in Bulgaria. Discouraging farmers from leaving rural areas and the agricultural sector by increasing the marginal value of farm labour are considered effective rural development tools (Tocco et al., 2013).
4.2.3. Diversification and quality of life

Axis 3 of the Rural Development Programmes can relate to structural change in two ways. Through the diversification measures (311. Diversification into non-agricultural activities, 312. Business creation and development, 313. Encouragement of tourism activities) it enables farms to choose non-farming activities as an alternative to leaving the sector. And at the same time quality of life measures (e.g. 321. Basic services for the economy and rural population, 322. Village renewal and development, 323. Conservation and upgrading of the rural heritage) help to create a liveable rural environment, thereby keeping the population at the countryside.

Estonia spent the majority of its Axis 3 budget on business creation (58%) and rural services (38%) while Romania supported more the village renewal (68%). As a result of Axis 3 measures micro-enterprises were established; self-employment has increased and new jobs were generated in the service sector in each Member State.

The impacts of agricultural policies are not independent of the macroeconomic effects and of the market and production structures of the given Member State. Mixed results are reported for Rural Development (Pillar II) supports due to the various effects of different measures (Tocco et al., 2013). There is a conflict between the measures aiming at job creation and those targeting the improvement of labour productivity (ÖIR, 2012). However, according to the mid-term evaluators the decline in labour productivity might have been independent from the RDPs (ÖIR, 2012). In the new programming period, based on Regulation (EU) No 1305/2013 of the European Parliament and of the Council, as an option for maintaining competitiveness and retaining farm labour at the same time, majority of the EU-10 Member States prioritised Ecosystem measures promoting environmentally sustainable practices.

4.3. Land issues

A general purpose of agricultural subsidies is to increase farmers’ income. Besides, subsidies impact factor markets, and these also exert structural change. CAP Pillar I. SAPS support is capitalised in land rents in the EU-10. The estimated capitalisation (13%-25%) is considerably higher than in the EU-15 in the case of SPS, where Michalek et al. (2013) estimated the average level of capitalisation to be 6%. With the lower land prices in the EU-10, the impact of direct payments on land price growth is higher. The capitalisation effect has an impact on land rents, indicating rent extraction by landowners. The impact is economically significant and causes outflow of income from the sector. Capitalisation of direct payments is lower in countries where more land is used by corporate farms, which is explained by strong bargaining power and income generating capacity of large farms on the land market. The land price and rental fee increase have a direct negative effect on land mobility and an indirect negative effect on farm restructuring. New farmers face a higher initial investment cost and existing farmers face a higher cost of expansion (Herck and Vranken, 2013).

SAPS payment conserve farm structures. Direct support concentrated by the large farms increases income useable for development. On the other hand, direct support helps maintain the diversity of farm structure and sustainability of farming. Relatively easy access to financial aid may support the continued existence of a significant number of small farms, hindering the process of land concentration. Family farms and investors from outside agriculture consider direct payment as a source of income (Sikorska et al., 2009). For example, owing to the small average size of Polish farms a significant amount of direct payment became in effect social aid, providing incentives for continuing small and low productivity farming. Public financial aid for Polish farmers very often helped to increase household consumption rather than to boost investment (Kundera, 2013).
The effect on the land market of the ‘green’ component of CAP direct payments will probably decline in land rents in the EU-10. Johansson and Nilsson (2012) found that in Germany agro-environmental payments were negatively correlated with land prices, which suggests that direct support in itself is not sufficient to cover the additional costs with greening. Any increase in environmental requirements will increase the costs for farms, thus reduce profits from land use and hence reduce the demand for land. This, in turn, will lead to a reduction in land use and a decline in land rents. The size of this effect may be small, depending on the precise conditions for greening and how these requirements are implemented and controlled (Swinnen et al., 2014).

In Rural Development Programmes a large share of support is not linked to agricultural land, and thus it does not directly affect the land market. They partly replace private on-farm activities (e.g. farm investments) without causing additional effects on farm behaviour (Ciaian et al., 2015). In other cases support may be capitalised directly into input prices (e.g. land rents in the case of agro-environmental support, capital cost in the case of farm investment) and hence benefit input suppliers (e.g. landowners and capital suppliers) rather than farmers (Ciaian et al., 2008).

Investment aids are designed to increase the efficiency of farms, or they may be intended to enable a farm to diversify into non-farming activities (e.g. processing and marketing activities, farm shops or tourist accommodation). Investment support impacts on land demand indirectly through the development of effective farms, leading to land concentration in the long term. In all the EU-10 Member States national agricultural policies commonly have the aim to increase competitiveness of farms through investment measures in National Rural Development Programmes. Efficient agricultural production also decreases the demand for land, thereby indirectly contributing to environmental sustainability.

Beyond modernisation of farms, organisation of environment-friendly agriculture is a focus of the national agricultural policies and Rural Development Programmes of EU-10 Member States in line with CAP Pillar II support. Environmental policies in Rural Development support the sustainable use of agricultural land. Less Favoured Areas and agro-environmental payments affect only agricultural land prices if the support is coupled to the land29. Agro-environmental payments also often decrease land rents through decreased yields or increased input costs and these have significantly lower capitalisation rates than direct payments (Feichtinger, 2011). Moderate environmental payment capitalisation in land prices in the EU-10 are also expected in the nitrate vulnerable zones and Natura 2000 sites30.

In the case of the national agricultural policies and the Rural Development Policies of the EU-10, according to the CAP Pillar II Rural Development support for enhancing quality of life has strong impact on social sustainability through the creation of the conditionalities and synergies of broader economic and social development in rural areas with a multiplier effect on structural change. For example the Polish National Rural Development Programme aims to create alternative sources of income for the rural population, improve the quality of life in rural areas by raising the competitiveness of the agri-food sector,

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29 Requirements for manure spreading area and investment subsidies significantly drove up land prices. The impact of increasing land demand is not limited to the price of land in the granivores breeding regions, it exerts upward pressure on agricultural land prices across Flanders. Owing to the manure spreading policy, intensive animal breeding profits were capitalised in the farmland prices (Goffe and Salanié, 2005).

30 As Treaty On The Functioning Of The European Union provisions states of Right Of Establishment (Chapter 2), Citizenship Of The Union (Part Two) and Free Movement Of Persons, Services And Capital (Title IV.) as well as Article 39 1. (e) sets out the specific objective of ensuring a fair standard of living for farmers of the CAP.
maintain the landscape, natural resources and the rural cultural heritage and increase the
diversity of economic activities.

Beyond the CAP payments, national land policies of the EU-10 can have considerable
direct effects on the land market, influencing structural change for providing economic
social and environmental sustainability of the balanced use of land resources. There is
no EU level land policy, Member States have independent land policies though which they
endeavour to establish farm structures that realise efficient production. The land markets in
the EU-10 (excluding Hungary) operate with only minor restrictions compared to the
characteristics of a free market. Restrictive provisions based on public interest reasons
(such as maintaining the rural population, developing small and medium farms, etc.) were
recognised by the European Court of Justice in accordance to the law of the European Union
in practice (Korom, 2013).

National land policies in the EU-10 have widely differing aims, mainly due to the
diversity in farm structures. Their common feature is to assist in meeting the land demand
of efficient farms, moderate land fragmentation and to regulate or intervene directly to
stimulate or obstruct land concentration. For the implementation of land policy a
National/State Land Fund operates in many EU-10 Member States. For example the Polish
policy to improve its agrarian structure facilitates access to land for family farms with the
assistance of Agricultural Property Agency, the National Land Fund Institute, to strengthen
competition against private persons and legal entities from outside agriculture disposing of
significantly more capital (Sikorska et al., 2009). In Bulgaria, where land ownership is
fragmented, small agricultural plots are purchased by Private Investment Funds established
to consolidate for reselling or renting purposes. The larger amount of accumulated capital
in the fund allows for the acquisition and control of greater amounts of land, which is a
factor for achieving higher returns, including through participating in land banking
(Yanakieva, 2007).

Land consolidation is a long-term measure for increasing agricultural production
efficiency. In Poland, Slovenia and Lithuania, land consolidation was mainly introduced as
an instrument to address the structural problems in agriculture arising from fragmentation
of both land ownership and land use as a tool to improve productivity and
competitiveness of small and medium farms. In the Czech Republic and Slovakia, land
consolidation focused more on addressing the fragmentation of land ownership issues
(Hartvigsen, 2015). In the case of rapid structural change the basis of effective land
concentration is the creation of sustainable land use structures. In the case of fragmented
ownership consolidation, regulative elements (like pre-emption right of the local
neighbouring farmer in Hungary) are more cost and time effective.

Considerable amount of agricultural land still remained in the ownership of the State,
treated by national land funds. In Hungary, privatisation of the State Land Fund started in
2015 with 380 thousand hectares of agricultural land out of the 2 million hectares of
productive area that are the property of the Hungarian State. A considerable part of the
area sold was under lease agreements. In Slovakia 7% of the UAA is state-owned, while
the owners of 438 thousand hectares (23% of the UAA) were not known. Unknown
ownership is managed by the land fund and might be subject to restitution or privatisation.
The Agricultural Property Agency in Poland manages 2.5 million hectares, of which three
quarters is rented out. In Estonia, the land reform basically finished, but around 40% of
UAA is still owned by the state or municipalities (Swinnen and Vranken, 2009). Although
the land reform in Bulgaria finished before 2007, fragmentation of land estates still exists
and the process of identification of land ownership is still ongoing (Yanakieva, 2007).
Private investment funds are also participating in structural change through the
accumulation of capital for land consolidation and land banking activities.
5. DEVELOPMENT PATH FOR EU-10 AGRICULTURE

**KEY FINDINGS**

- The role of agriculture in the EU-10 national economies will further decline, although the **rapid rate of improvement in agricultural GVA is likely to persist.** Improvement in labour productivity is expected.

- **Young and skilled labour may be further discouraged to enter agriculture in the EU-10.** A limited increase in the share of farmers supplementing their farming income from other gainful activities can be expected.

- Owing to demographics, **large numbers of uneducated, elderly people can be expected to leave farming.** This process will lead in the longer term to the proportional increase of specialised holdings with greater resources of human capital.

- **Developments in the specialisation of farms may continue according to current trends as a consequence of EU direct payments up to 2020.**

- **Demand for agricultural land will intensify and land concentration will accelerate,** also due to foreign investments.

- The **concentration process** in agriculture will remain pronounced in the EU-10.

Based on the overview and analysis of the main drivers of structural change in agriculture, supplemented with the impact of agricultural policies on structural change, the development paths of agriculture in the EU-10 Member States are assessed on the basis of the relative importance of factors affecting structural change to be as follows.

It is a long term trend that labour use in agriculture is decreasing in the EU-10. In Poland, Slovenia, Lithuania and Hungary this process has been relatively slow, but in the coming period it is likely to be more rapid in these countries also. Parallel to this, further increases in labour productivity are expected. The **concentration process** in agriculture will be pronounced in the EU-10. Productivity increase will remain a core influencing factor of structural changes, facilitating the continuation of the concentration process. The **increase in competition** will also represent a constant pressure on farmers to improve productivity. Restructuring of the family labour force as a growing factor in enhancement of productivity will be important. With the increase in productivity, demand for land will also rise and the land use of efficient farms will further concentrate.

**In the macroeconomic context the significance of agriculture** in national economies is **decreasing** in the long term. The development path of structural change in agriculture is well characterised by the **GVA of agriculture,** which **increased** in all the EU-10 Member States in the period 2005-2013. It can be assumed that a **rapid rate of improvement in agricultural GVA will persist,** strengthening the process of structural change. The trends in **factor income** were and are likely to be **similar.**

**Economic growth in other sectors** and **farm incomes remaining relatively low** in parallel may further **discourage the young and skilled labour** to enter agriculture in the EU-10. **Limited increase in the share of farmers supplementing their farming income from other gainful activities can be expected.** Redistribution of labour
between sectors is taking place at different rates in each Member State. In those EU-10 Member States with high shares of small farms and family labour (e.g. Bulgaria, Hungary and Romania) the process is relatively slow, while in those countries where the service sector is more developed and agricultural labour productivity is higher (e.g. Czech Republic, Estonia, Slovakia), the process is faster.

Although the processes of concentration are different between the EU-10 Member States, the developments in the specialisation of farms may continue according to current trends as a consequence of EU direct payments up to 2020. The growth of field crops farms (especially fodder plant cropping) in the past years may be followed by a further slight increase, and the numbers of mixed livestock and mixed crops and livestock farms may decrease. The change in the share of UAA of field crops farms is unlikely to be followed by any further significant increase.

It is very likely that the share of the mixed livestock farms will decline due to farm concentration. This is particularly applicable to mixed livestock/mainly grazing farms in Lithuania, Bulgaria, Latvia and Poland. The share of mixed livestock/mainly granivores farms may decrease in Poland and Bulgaria. The share of UAA for mixed livestock farms may further decrease, but less significantly, especially in those countries where the share of mixed livestock/mainly grazing farms has already declined between 2005 and 2013.

Although the share of grazing livestock farms has only slightly changed in the EU-10 Member States since their accession to the EU, the rate of specialisation shows big differences. VCS may stop the decreases in the shares of specialised dairy farms in Lithuania, Slovenia and Estonia, however it is unlikely that it will prompt any future increase in the share of the specialised sheep, goats and other grazing livestock farms. In the case of milk, investments in processing capacity and on dairy farms could help reverse production trends from negative to positive.

The share of granivores livestock farms is not directly influenced by the CAP, but the concentration processes, support for other activities and the increasing competition may result in a further decrease in the share in many countries (Poland, Bulgaria, Hungary and Slovakia). This is especially likely for specialised pig farms and various granivores combined farms. Without investment, the decline in the number of specialised poultry farms may continue in many countries (Bulgaria, Hungary, Poland and Slovakia) as a consequence of a strong concentration process, while increases may occur in Romania, Latvia and Estonia.

The decreases in the shares of UAA of mixed crops and livestock farms may continue. Regarding various crops and livestock combined farms, such decreases can be expected in every EU-10 Member State, while the share of field crops-grazing livestock combined farms is likely to decline only in a few countries (i.e. Bulgaria and Romania). The shares of horticultural (1.2%), permanent (5.3%) and mixed cropping (4.5%) farms are low and increases cannot be expected. These farms will not be turned over to field crops and will not be attractive to other specialisations either.

Owing to direct financial support, the demand for agricultural land will intensify. Despite the limits on direct payments imposed on large farms in most of the EU-10 Member States, large farms will remain financially stronger and will further invest in modernising production technologies and to expand. Coupled payments will encourage farmers to remain in the sector.
The development path for structural change in human capital is the concentration process parallel with the outflow of uneducated, elderly people from the agricultural sector. This progress will lead in the longer term to the proportional increase of specialised holdings with greater resources of human capital. This should increase production efficiency, promote the dissemination of new productive technological methods and stimulate the establishment of more competitive agricultural structures in the EU-10 (e.g. the Czech Republic and Slovakia). The low-skilled family labour force concentrated in the small and medium-sized farms (e.g. in Latvia and Lithuania) is an emphasised developmental barrier.

In those EU-10 Member States where the human capital of farm operators is more favourable (e.g. the Czech Republic, Poland, Latvia), the combined increase in innovation performance and the added value means development opportunities, while in Member States characterised by the predominance of low-skilled small farms (e.g. Bulgaria, Romania), strengthening of farm advisory services and cooperation ensuring organised production is necessary.

The development path in structural change is the acceleration of land concentration with the involvement of farmers, legal entities and citizen investors from the EU-15. This would result in farm structural change with more rapid land and rental price growth. Only minor restrictions remain on the land markets limiting land acquisition by investors from the EU-15 (even from the EU-27) Member States in terms of capital investments in the farming sector of the EU-10. Foreign investment in agriculture will occur primarily where land prices are low and farm structures are concentrated (e.g. Bulgaria, Slovakia, the Czech Republic, Estonia, Romania, Latvia and Lithuania). Where the farm structure is less concentrated (e.g. Poland and Slovenia), the rate of farm structure development will only be moderate (similarly to the EU-15), with smaller increases in land prices and rental fees. Should any Member State decide as part of their national land policy to limit domestic and foreign investments in agriculture slower structural change and land price and rental fee development can be expected.

In the EU-10 Member States Pillar II interventions of the CAP (2014-2020) can play an important role in handling challenges originating from structural change (ageing, low educational level, lagging productivity compared to the EU-15, moderate innovation performance), especially strengthening agricultural competitiveness, sustainable management of natural resources and fighting climate change. The thematic sub-programmes (e.g. supporting young farmers, small farms, short supply chains), as well as innovation and cooperation as horizontal objectives, can help in targeting Member State-specific problems deriving from farm structure. Investment support will increase the efficiency of farms. The development of efficient farms is leading to structural change in the long term. Environmental payments in Rural Development will have (maybe only) a very moderate effect on structural change. Support for enhancing quality of life can accelerate structural changes through off-farm diversification and also contribute to social sustainability.

In the programming period 2014-2020, in some EU-10 Member States (especially with high proportions of semi-subsistence small farms) such as Romania and Bulgaria, farm modernisation and other measures improving competitiveness (e.g. supporting generation change, adding value, and short supply chains) remain important issues to be considered. At the same time these farms can have more opportunities through diversification and local development (area of social inclusion). In those countries where farms are more concentrated, an option for maintaining competitiveness is adding
value and innovation, while cooperation is the key of supporting structural change.

Productivity gains from innovation can be considered as the entrepreneurial response to market opportunities, thus it will be rather an outcome of networks enabling learning and exchange of information. Innovation partnerships can be beneficial for concentrated, more competitive farms while for smaller, less modernised farms advisory services and knowledge sharing are needed. Since environmental aspects are especially prioritised, this provides a driving force for R&D and innovation in this area.

In collective action the development path of structural change in the EU-10 Member States is diverse due to differences in historical backgrounds, cooperative traditions and social and cultural contexts. In several countries numerous marketing cooperatives were established by farmers, but their market share is low, while in other countries there are only few marketing cooperatives and the supply chain is coordinated by large integrator companies and processors. It is primarily generation change, and EU and national policies that could further strengthen collective action.

Taking into account the demographic trends in future agriculture in the EU-10, in those Member States (e.g. Romania, Bulgaria, Hungary, Latvia and Lithuania) where there is a higher proportion than average of farm operators over 65, structural changes are expected in connection with the older generation. Considering the higher average age of women, this process is likely to happen more slowly in the Baltic States where a high proportion of female farm leaders is characteristic. In those Member States (e.g. Czech Republic, Poland, Slovakia, Slovenia and Estonia) where the age structure is younger, the openness of young farmers towards new, sustainable production processes, more demanding technologies and innovations can increase the production efficiency, which gives an opportunity for the further concentration of production factors and for the development of a more competitive farm structure in the short term.

Favourable changes can be expected for example in Poland where the rejuvenation of the farmer community is the most pronounced in the EU-10. In the Czech Republic and Slovakia, characterised by the smaller share of family labour, a further decline can be expected in the elderly female labour force.

The effect of social factors on agricultural restructuring will strongly depend on the different regional conditions within the EU-10 (e.g. the structure of settlements, conditions of infrastructure, state of industrialisation and traditions of livelihood). In general, as a result of the concentration process in agriculture, a group of agricultural entrepreneurs in permanent need of workforce has developed, which means that they primarily demand skilled labour. The problems of meeting the demand for labour caused by out-migration, demographic ageing and the flow of more skilled employees into other sectors can lead to further simplification of the production structure and for emphasis to be put on technological development, thereby further reducing the need for human labour. Because of the high concentration of poorly educated, ageing people among the population in remote rural areas, the self-sufficiency role of agriculture will possibly remain in existence for a long period. Depending on the conditions, there are several scenarios regarding the future of semi-subsistence farms. As a result of focused subsidies fewer farms may develop to produce for the market. A significant share of small farms may remain at the current production level and supplement their income by diversification of activities or off-farm employment. Farms run by older owners will stop operating and, if there are no successors, this would strengthen the process of concentration in agriculture.
6. OUTLINE FOR FUTURE POLICY OPTIONS

Structural change is a complex phenomenon that varies widely across the EU-10 Member States, making it difficult to apply a uniformly-designed agricultural policy that is evenly applicable across the EU. The difficulties and key barriers are not unique to the EU-10 Member States, there are significant barriers to implementing the best practice and the correct development. The disparities between EU-15 and EU-10 agriculture, the differences in the subsidies under the current CAP and the obligation on Member States to adopt more transparent and less trade-distorting farm support measures constitute key barriers to implementing the correct structural change.

Many EU-10 Member States have struggled to set up appropriate EU structures and administrative and financial institutions capable of managing EU funds. It is estimated that between 2014 and 2020 Romania absorbed just a small part of the available EU CAP funds (EUR 167.1 billion) averages EUR 164 per capita, and this value in Slovakia is EUR 369 per capita. Thus, capacity to absorb the available funds at national, regional and local levels must be improved, otherwise it is likely that less developed Member States will actually be long-term net EU contributors (Simonescu et al., 2009).

In the EU-10 Member States, the SAPS for providing direct payment provision is in effect until 2020 (except Slovenia where SPS applied). As a consequence of the new system of EU direct payments in effect until 2020, many substantially different support schemes exist across the EU which were, within limits, designed to comply with the specific needs and endowments of regions. It is difficult to assess yet whether the numerous combinations of direct payments better contribute to a more balanced territorial development within the EU. However, the expectation is that owing to the flexibility that was offered they will. Thus they would not only mitigate the differences between the regions but also the differences between agricultural sectors and the diversity of EU farms. A policy decision should also be taken in time as to whether these countries will continue applying SAPS after 2020 or whether they will adopt the standard direct payment procedures as in majority of EU Member States, or indeed will there be a comprehensive reform of the CAP payments?

Based on the exploration and evaluation of structural changes of agriculture in the EU-10 Member States between 2005 and 2013, a development path was formulated, with the key driving factors and barriers of structural change identified, allowing the formulation of proposals to assist in the design of changes to the EU level agricultural policy. A major focal point for future agricultural policies is to improve the ability of farms to better adapt with more balanced territorial development to economic, environmental and social challenges, and to manage appropriately the risks associated with these changes.

Direct payments are subject to the provision of public and private goods (cross compliance, ‘greening’, young farmers, small farmers’ scheme) for society. Decoupling changed the relationship between direct payments and productivity increases from negative to positive. In the case of large farms the policy is well targeted in the direction of structural change; they can use concentrated sources of direct support for extending their operation, modernisation and for investment purposes. In the case of small farms, direct payments rather had only income supplement effect. This line of policy development for enhancing the structural change effect of direct payments could be intensified by providing for actual services and not historical compensation, and by mitigating the
imbalances in financial support between the regions and the businesses. For enhancing structural change the strengthening of the environmental and/or social aspects of farming of the ‘greening’ component may be considered, and VCS could be focused indifferently on sectors creating employment opportunities, and even produce processed and consumed locally.

The core of stimulating specialisation is the increase of productivity which can be expanded through the utilisation of economies of scale. In order to reduce technological backlog, the qualification of human resources must be targeted adequately so that comparative advantages from the cheap labour can prevail. The process of specialisation could be stimulated by the production of labour intensive high value added products, and by the motivation of acquiring a high market share.

Land concentration could accelerate with the involvement of farmers, legal entities and citizen investors from the EU-15. This would result in farm structural change with more rapid land and rental price growth. The development path for structural change on the land market is that there is a substantial share of agricultural land still owned by the state that may be subject to future privatisation to strengthen efficient production. Private investment funds could also participate in structural change through the accumulation of capital for consolidation of fragmented land parcels and land banking activities.

Support measures could potentially help the development of collective actions in enhancing their market share. Cooperatives particularly benefit from a flexible cooperative law, single taxation and clearly defined competition rules. It is recommended to support capacity building and technical (organisational) assistance, especially for small and start-up cooperatives in order to increase the number of cooperating members. In the case of larger cooperatives the further strengthening of collaboration activities (e.g. food processing and innovation) is the main aim.

In order to manage more efficiently the risks farmers face, it is necessary to expand the knowledge and competencies (e.g. ICT, foreign languages, marketing skills) of farmers regardless of the farm size as well as to raise the awareness of lifelong learning and disseminate its culture. Competitiveness requires R&D results that are adaptable in practice, to develop innovative, advanced knowledge transfer systems, and to widen the circle of the training and farm advisory services, to improve their capacity and quality.

Rural Development is targeting a more competitive farm structure and encouraging more efficient production with farm and infrastructure modernisation, and farm advisory services. It seems that large farms benefited from the development resources because the enhancing of competitiveness by the small farms required resources in excess of their financing capacity, since labour productivity development would require a change to more intensive production and increasing the size of operation supplemented by considerable technical advancement.

The future Rural Development policy should further increase value added, innovation and cooperation to support structural change. R&D and innovation needs to take into consideration the tension between further farm modernisation toward structural change and the employment demand of agriculture on the skilled labour force. Taking gender distribution of the labour force engaged in this sector into consideration it is recommended that in the period after 2020 social and gender-specific aspects be more emphasised with regard to access to resources available under Pillar II of the CAP.
Since the measures which were available under Pillar II encouraged the **generational renewal and therefore improved demographics of farming** between 2007 and 2013, they **efficiently promoted the rejuvenation of the farmers’ society** in the EU-10, therefore it is recommended to continue using these types of interventions. The experiences of the Member States show that **demographic renewal is successfully stimulated** by integrated measures, infrastructure modernisation and knowledge capital expansion.

**By inducing structural changes in the EU-10, agriculture policy also has to consider the social effects which would hinder the achievements of the European model of agriculture.** In the EU-10 Member States, despite the decline of agriculture’s economic importance, the number of **households involved in agriculture** is still significant. Owing to the low incomes and the lack of off-farm employment opportunities, the role of agriculture is strong considering **self-consumption reduces the costs of living**. In this context, major agricultural restructuring in the EU-10 Member States may result in a significant number of people making demands on the social welfare system, the concentration of immobile population, the strengthening of outmigration of younger and skilled generation to cities and abroad, leaving behind prolonged structural unemployment in the rural areas, with increasing political concerns.

It is essential in the **social context** regarding the future of **semi-subsistence small farms** that support **policies** should not treat these farms as homogeneous groups; it has to provide appropriate, **customised solutions** for them. For the small farms that are able to become **market-oriented** entities, it is necessary to offer simplified, investment supported constructions which require little own contribution. It should help their integration into the formal markets (joining PG’s and PO’s, accessing to short food supply chains) and to obtain the necessary vocational and entrepreneurial skills.

The semi-subsistence farms which are not able to become market-oriented entities play an important role in **maintaining the population locally in the rural areas** with their active age family labour force. Therefore the Rural Development funds which encourage the **off-farm employment diversification and setting up micro-enterprises** – together the necessary knowledge transfer – **must play a major role in the future.**
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### ANNEX

**Annex 1: Number of farms in the EU-10 Member States**

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>YEAR</th>
<th>2005</th>
<th>2013</th>
<th>2005 TO 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG</td>
<td>2005</td>
<td>534,610</td>
<td>254,410</td>
<td>-52.4</td>
</tr>
<tr>
<td>CZ</td>
<td>2013</td>
<td>42,250</td>
<td>26,250</td>
<td>-37.9</td>
</tr>
<tr>
<td>EE</td>
<td>2005</td>
<td>27,750</td>
<td>19,190</td>
<td>-30.8</td>
</tr>
<tr>
<td>HU</td>
<td>2013</td>
<td>714,790</td>
<td>491,330</td>
<td>-31.3</td>
</tr>
<tr>
<td>LT</td>
<td>2005</td>
<td>252,950</td>
<td>171,800</td>
<td>-32.1</td>
</tr>
<tr>
<td>LV</td>
<td>2013</td>
<td>128,670</td>
<td>81,800</td>
<td>-36.4</td>
</tr>
<tr>
<td>PL</td>
<td>2005</td>
<td>2,476,470</td>
<td>1,429,010</td>
<td>-42.3</td>
</tr>
<tr>
<td>RO</td>
<td>2013</td>
<td>4,256,150</td>
<td>3,629,660</td>
<td>-14.7</td>
</tr>
<tr>
<td>SI</td>
<td>2013</td>
<td>77,170</td>
<td>72,380</td>
<td>-6.2</td>
</tr>
<tr>
<td>SK</td>
<td>2013</td>
<td>68,490</td>
<td>23,570</td>
<td>-65.6</td>
</tr>
<tr>
<td>EU-10</td>
<td>2013</td>
<td>8,579,300</td>
<td>6,199,400</td>
<td>-27.7</td>
</tr>
<tr>
<td>EU-15</td>
<td>2013</td>
<td>5,846,470</td>
<td>4,439,410</td>
<td>-24.1</td>
</tr>
<tr>
<td>EU-27</td>
<td>2013</td>
<td>14,482,010</td>
<td>10,683,550</td>
<td>-26.2</td>
</tr>
</tbody>
</table>

**Source:** EUROSTAT (2015)  
Key farm variables: area, livestock (LSU), labour force and standard output (SO) by agricultural size of farm (UAA) and age of manager [ef_kvage]
### Annex 2: UAA in the EU-10 Member States (hectares)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>2005</th>
<th>2013</th>
<th>GROWTH RATE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YEAR</td>
<td></td>
<td>2005 TO 2013</td>
</tr>
<tr>
<td>BG</td>
<td>2,729,390</td>
<td>4,650,940</td>
<td>70.4</td>
</tr>
<tr>
<td>CZ</td>
<td>3,557,790</td>
<td>3,491,470</td>
<td>-1.9</td>
</tr>
<tr>
<td>EE</td>
<td>828,930</td>
<td>957,510</td>
<td>15.5</td>
</tr>
<tr>
<td>HU</td>
<td>4,266,550</td>
<td>4,656,520</td>
<td>9.1</td>
</tr>
<tr>
<td>LT</td>
<td>2,792,040</td>
<td>2,861,250</td>
<td>2.5</td>
</tr>
<tr>
<td>LV</td>
<td>1,701,680</td>
<td>1,877,720</td>
<td>10.3</td>
</tr>
<tr>
<td>PL</td>
<td>14,754,880</td>
<td>14,409,870</td>
<td>-2.3</td>
</tr>
<tr>
<td>RO</td>
<td>13,906,700</td>
<td>13,055,850</td>
<td>-6.1</td>
</tr>
<tr>
<td>SI</td>
<td>485,430</td>
<td>485,760</td>
<td>0.1</td>
</tr>
<tr>
<td>SK</td>
<td>1,879,490</td>
<td>1,901,610</td>
<td>1.2</td>
</tr>
<tr>
<td>EU-10</td>
<td>46,902,880</td>
<td>48,348,500</td>
<td>3.1</td>
</tr>
<tr>
<td>EU-15</td>
<td>124,931,570</td>
<td>124,573,990</td>
<td>-0.3</td>
</tr>
<tr>
<td>EU-27</td>
<td>171,996,200</td>
<td>173,042,700</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**Source:** EUROSTAT (2015)

Key farm variables: area, livestock (LSU), labour force and standard output (SO) by agricultural size of farm (UAA) and age of manager [ef_kvage]
Annex 3: Average physical farm size in the EU-10 Member States (hectares/farm)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>2005</th>
<th>2013</th>
<th>YEAR 2005</th>
<th>2013</th>
<th>GROWTH RATE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td>16.7</td>
<td>2.8</td>
<td>12.0</td>
<td>174.1</td>
</tr>
<tr>
<td>LV</td>
<td>13.2</td>
<td>23.0</td>
<td>2.2</td>
<td>13.3</td>
<td>165.1</td>
</tr>
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<td>PL</td>
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<td>1.5</td>
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<td>1.3</td>
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<td>135.8</td>
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<td>16.2</td>
<td>1.4</td>
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</table>

**Source:** EUROSTAT (2015).  
Author’s own calculation
### Annex 4: Number of labour force in the agricultural sector in the EU-10 Member States (AWU)

<table>
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<th>COUNTRY</th>
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<th>GROWTH RATE (%)</th>
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<td></td>
<td>2005</td>
<td>2013</td>
</tr>
<tr>
<td>BG</td>
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<td>320,230</td>
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<tr>
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<td>105,080</td>
</tr>
<tr>
<td>EE</td>
<td>36,900</td>
<td>22,060</td>
</tr>
<tr>
<td>HU</td>
<td>462,740</td>
<td>433,700</td>
</tr>
<tr>
<td>LT</td>
<td>221,550</td>
<td>144,770</td>
</tr>
<tr>
<td>LV</td>
<td>137,250</td>
<td>82,090</td>
</tr>
<tr>
<td>PL</td>
<td>2,273,590</td>
<td>1,918,550</td>
</tr>
<tr>
<td>RO</td>
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<td>1,552,630</td>
</tr>
<tr>
<td>SI</td>
<td>94,980</td>
<td>82,450</td>
</tr>
<tr>
<td>SK</td>
<td>98,790</td>
<td>50,600</td>
</tr>
<tr>
<td>EU-10</td>
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<td>4,712,160</td>
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<tr>
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<tr>
<td>EU-27</td>
<td>12,715,590</td>
<td>9,333,510</td>
</tr>
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</table>

**Source:** EUROSTAT (2015)

Key farm variables: area, livestock (LSU), labour force and standard output (SO) by agricultural size of farm (UAA) and age of manager [ef_kvage]
### Annex 5: Number of salaried labour force in the agricultural sector in the EU-10 Member States (1000 AWU)

<table>
<thead>
<tr>
<th>COUNTRY</th>
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<th>GROWTH RATE (%)</th>
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</thead>
<tbody>
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<td>12.0</td>
</tr>
<tr>
<td>HU</td>
<td>114.6</td>
<td>120.8</td>
</tr>
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<td>LT</td>
<td>40.0</td>
<td>35.4</td>
</tr>
<tr>
<td>LV</td>
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<td>19.3</td>
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<tr>
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**Source:** EUROSTAT (2015)

Agricultural Labour Input Statistics: absolute figures (1 000 annual work units) [aact_ali01]
Annex 6: Number of non-salaried labour force in the agricultural sector in the EU-10 Member States (1000 AWU)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>2005</th>
<th>2013</th>
<th>2005 TO 2013</th>
</tr>
</thead>
<tbody>
<tr>
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<td>-54.8</td>
</tr>
<tr>
<td>CZ</td>
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<td>27.9</td>
<td>11.2</td>
</tr>
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<td>EE</td>
<td>23.5</td>
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</tr>
<tr>
<td>HU</td>
<td>407.7</td>
<td>323.6</td>
<td>-20.6</td>
</tr>
<tr>
<td>LT</td>
<td>133.6</td>
<td>109.4</td>
<td>-18.1</td>
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<tr>
<td>LV</td>
<td>118.9</td>
<td>63.5</td>
<td>-46.5</td>
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<tr>
<td>PL</td>
<td>2,161.9</td>
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<tr>
<td>RO</td>
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<td>1,386.0</td>
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<tr>
<td>SI</td>
<td>81.5</td>
<td>77.3</td>
<td>-5.2</td>
</tr>
<tr>
<td>SK</td>
<td>42.0</td>
<td>15.1</td>
<td>-64.0</td>
</tr>
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<td>-30.9</td>
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<td>9,958.1</td>
<td>7,444.1</td>
<td>-25.2</td>
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Source: EUROSTAT (2015)
Agricultural Labour Input Statistics: absolute figures (1 000 annual work units) [aact_ali01]
### Annex 7: Number of regular labour force in the agricultural sector in the EU-10 Member States (AWU)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>YEAR</th>
<th>GROWTH RATE (%)</th>
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<td></td>
<td>2005</td>
<td>2013</td>
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<tr>
<td>BG</td>
<td>596,620</td>
<td>298,380</td>
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<td>CZ</td>
<td>142,110</td>
<td>101,070</td>
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<tr>
<td>EE</td>
<td>35,850</td>
<td>21,550</td>
</tr>
<tr>
<td>HU</td>
<td>451,990</td>
<td>400,020</td>
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<tr>
<td>LT</td>
<td>215,230</td>
<td>142,450</td>
</tr>
<tr>
<td>LV</td>
<td>133,870</td>
<td>81,770</td>
</tr>
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<td>PL</td>
<td>2,207,110</td>
<td>1,866,450</td>
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<tr>
<td>RO</td>
<td>2,407,660</td>
<td>1,451,870</td>
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<tr>
<td>SI</td>
<td>90,100</td>
<td>79,470</td>
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<td>SK</td>
<td>95,790</td>
<td>49,030</td>
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<td>EU-10</td>
<td>6,376,330</td>
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<td>EU-15</td>
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<td>EU-27</td>
<td>11,746,150</td>
<td>8,560,380</td>
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</table>

**Source:** EUROSTAT (2015)
Labour force: number of persons and farm work (AWU) by agricultural size of farm (UAA) [ef_olfaa]
## Annex 8: Number of regular family labour force in the agricultural sector in the EU-10 Member States (AWU)

<table>
<thead>
<tr>
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<th>YEAR</th>
<th>GROWTH RATE (%)</th>
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</thead>
<tbody>
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<td></td>
<td>2005</td>
<td>2013</td>
</tr>
<tr>
<td>BG</td>
<td>542,870</td>
<td>245,090</td>
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<td>CZ</td>
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<td>EE</td>
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<td>192,980</td>
<td>114,850</td>
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<td>LV</td>
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<td>13,960</td>
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<tr>
<td>EU-27</td>
<td>10,259,770</td>
<td>7,109,350</td>
</tr>
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**Source:** EUROSTAT (2015)

Labour force: number of persons and farm work (AWU) by agricultural size of farm (UAA) [ef_olfaa]
### Annex 9: Farm managers younger than 35 in the EU-10 Member States

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>TOTAL NUMBER OF FARM MANAGERS</th>
<th>SHARE OF FARM MANAGERS YOUNGER THAN 35</th>
<th>GROWTH RATE OF THE SHARE OF FARM MANAGERS YOUNGER THAN 35 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG</td>
<td>534,610</td>
<td>254,410</td>
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</tr>
<tr>
<td>CZ</td>
<td>42,250</td>
<td>26,250</td>
<td>9.9</td>
</tr>
<tr>
<td>EE</td>
<td>27,750</td>
<td>19,190</td>
<td>7.0</td>
</tr>
<tr>
<td>HU</td>
<td>714,790</td>
<td>491,330</td>
<td>7.8</td>
</tr>
<tr>
<td>LT</td>
<td>252,950</td>
<td>171,800</td>
<td>5.3</td>
</tr>
<tr>
<td>LV</td>
<td>128,670</td>
<td>81,800</td>
<td>7.8</td>
</tr>
<tr>
<td>PL</td>
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<td>1,429,010</td>
<td>12.5</td>
</tr>
<tr>
<td>RO</td>
<td>4,256,150</td>
<td>3,629,660</td>
<td>5.3</td>
</tr>
<tr>
<td>SI</td>
<td>77,170</td>
<td>72,380</td>
<td>4.4</td>
</tr>
<tr>
<td>SK</td>
<td>68,490</td>
<td>23,570</td>
<td>4.4</td>
</tr>
<tr>
<td>EU-10</td>
<td>8,579,300</td>
<td>6,199,400</td>
<td>7.6</td>
</tr>
<tr>
<td>EU-15</td>
<td>5,846,470</td>
<td>4,439,410</td>
<td>5.9</td>
</tr>
<tr>
<td>EU-27</td>
<td>14,482,010</td>
<td>10,683,550</td>
<td>6.9</td>
</tr>
</tbody>
</table>

**Source:** EUROSTAT (2015)

Key farm variables: area, livestock (LSU), labour force and standard output (SO) by agricultural size of farm (UAA) and age of manager [ef_kvage]
Annex 10: Farm managers aged over 55 in the EU-10 Member States

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>TOTAL NUMBER OF FARM MANAGERS</th>
<th>SHARE OF FARM MANAGERS YOUNGER THAN 35</th>
<th>GROWTH RATE OF THE SHARE OF FARM MANAGERS YOUNGER THAN 35 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG</td>
<td>534,610</td>
<td>254,410</td>
<td>67.5</td>
</tr>
<tr>
<td>CZ</td>
<td>42,250</td>
<td>26,250</td>
<td>44.2</td>
</tr>
<tr>
<td>EE</td>
<td>27,750</td>
<td>19,190</td>
<td>53.3</td>
</tr>
<tr>
<td>HU</td>
<td>714,790</td>
<td>491,330</td>
<td>51.4</td>
</tr>
<tr>
<td>LT</td>
<td>252,950</td>
<td>171,800</td>
<td>53.8</td>
</tr>
<tr>
<td>LV</td>
<td>128,670</td>
<td>81,800</td>
<td>50.0</td>
</tr>
<tr>
<td>PL</td>
<td>2,476,470</td>
<td>1,429,010</td>
<td>34.2</td>
</tr>
<tr>
<td>RO</td>
<td>4,256,150</td>
<td>3,629,660</td>
<td>64.8</td>
</tr>
<tr>
<td>SI</td>
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<td>72,380</td>
<td>56.9</td>
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<tr>
<td>SK</td>
<td>68,490</td>
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</tr>
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<td>6,199,400</td>
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<td>EU-15</td>
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<td>4,439,410</td>
<td>53.9</td>
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<tr>
<td>EU-27</td>
<td>14,482,010</td>
<td>10,683,550</td>
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Source: EUROSTAT (2015)
Key farm variables: area, livestock (LSU), labour force and standard output (SO) by agricultural size of farm (UAA) and age of manager [ef_kvage]
Annex 11: Ratio of farm managers younger than 35 to farm managers aged over 55 in the EU-10 Member States

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>YEAR</th>
<th>GROWTH RATE (%)</th>
</tr>
</thead>
<tbody>
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<td>0.14</td>
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<td>HU</td>
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<td>0.10</td>
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<td>0.10</td>
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</tr>
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<td>RO</td>
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<td>0.12</td>
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<tr>
<td>EU-15</td>
<td>0.11</td>
<td>0.09</td>
</tr>
<tr>
<td>EU-27</td>
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<td>0.11</td>
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</table>

Source: EUROSTAT (2015). Author’s own calculation
Annex 12: Number of male workers as regular farm labour force in the EU-10 Member States (AWU)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>YEAR</th>
<th>GROWTH RATE (%)</th>
<th>2005 TO 2013</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>CZ</td>
<td>96,670</td>
<td>70,660</td>
<td>-26.9</td>
</tr>
<tr>
<td>EE</td>
<td>18,980</td>
<td>12,370</td>
<td>-34.8</td>
</tr>
<tr>
<td>HU</td>
<td>282,380</td>
<td>251,090</td>
<td>-11.1</td>
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<tr>
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<td>-29.0</td>
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<td>43,940</td>
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<td>1,024,010</td>
<td>-19.4</td>
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<tr>
<td>SK</td>
<td>64,460</td>
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</tr>
<tr>
<td>EU-15</td>
<td>3,716,450</td>
<td>2,960,340</td>
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</tr>
<tr>
<td>EU-27</td>
<td>7,368,130</td>
<td>5,558,660</td>
<td>-24.6</td>
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</table>

Source: EUROSTAT (2015)
Labour force categories: number of persons and farm work (AWU) by sex of worker, legal status of holding and agricultural size of farm (UAA) [ef_lflegaa]
Annex 13: Number of female workers as regular farm labour force in the EU-10 Member States (AWU)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>YEAR</th>
<th>GROWTH RATE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
<td>2013</td>
</tr>
<tr>
<td>BG</td>
<td>246,440</td>
<td>115,220</td>
</tr>
<tr>
<td>CZ</td>
<td>45,440</td>
<td>30,410</td>
</tr>
<tr>
<td>EE</td>
<td>16,870</td>
<td>9,180</td>
</tr>
<tr>
<td>HU</td>
<td>176,070</td>
<td>156,520</td>
</tr>
<tr>
<td>LT</td>
<td>105,600</td>
<td>64,590</td>
</tr>
<tr>
<td>LV</td>
<td>68,090</td>
<td>37,840</td>
</tr>
<tr>
<td>PL</td>
<td>956,380</td>
<td>842,440</td>
</tr>
<tr>
<td>RO</td>
<td>1,112,550</td>
<td>664,460</td>
</tr>
<tr>
<td>SI</td>
<td>38,460</td>
<td>34,760</td>
</tr>
<tr>
<td>SK</td>
<td>32,540</td>
<td>13,430</td>
</tr>
<tr>
<td>EU-10</td>
<td>2,798,440</td>
<td>1,968,850</td>
</tr>
<tr>
<td>EU-15</td>
<td>1,652,470</td>
<td>1,197,120</td>
</tr>
<tr>
<td>EU-27</td>
<td>4,460,290</td>
<td>3,171,840</td>
</tr>
</tbody>
</table>

Source: EUROSTAT (2015)
Labour force categories: number of persons and farm work (AWU) by sex of worker, legal status of holding and agricultural size of farm (UAA) [ef_lflegaa]
## Annex 14: Males per female ratio as regular farm labour force in the EU-10 Member States (AWU)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>YEAR</th>
<th>GROWTH RATE (%)</th>
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</thead>
<tbody>
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<td></td>
<td>2005</td>
<td>2013</td>
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</tr>
<tr>
<td>CZ</td>
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<td>2.3</td>
</tr>
<tr>
<td>EE</td>
<td>1.1</td>
<td>1.3</td>
</tr>
<tr>
<td>HU</td>
<td>1.6</td>
<td>1.6</td>
</tr>
<tr>
<td>LT</td>
<td>1.0</td>
<td>1.2</td>
</tr>
<tr>
<td>LV</td>
<td>1.0</td>
<td>1.2</td>
</tr>
<tr>
<td>PL</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>RO</td>
<td>1.2</td>
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<tr>
<td>SI</td>
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<td>2.7</td>
</tr>
<tr>
<td>EU-10</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>EU-15</td>
<td>2.2</td>
<td>2.5</td>
</tr>
<tr>
<td>EU-27</td>
<td>1.7</td>
<td>1.8</td>
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</table>

**Source:** EUROSTAT (2015). Author’s own calculation
### Annex 15: Share of agricultural holdings in the total number of farms by specialization in the EU-10 Member States. 2013

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>FIELD CROPS</th>
<th>HORTICULTURE</th>
<th>PERMANENT CROPS (INCLUDED WINE)</th>
<th>GRAZING LIVESTOCK</th>
<th>GRANIVORES LIVESTOCK</th>
<th>MIXED CROPS</th>
<th>MIXED LIVESTOCK</th>
<th>MIXED CROPS AND LIVESTOCK</th>
<th>NON CLASSIFIED HOLDINGS</th>
</tr>
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<td>26.6</td>
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<td>4.9</td>
<td>9.9</td>
<td>20.1</td>
<td>0.3</td>
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<tr>
<td>CZ</td>
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<td>1.3</td>
<td>11.4</td>
<td>33.7</td>
<td>1.6</td>
<td>1.1</td>
<td>3.4</td>
<td>16.6</td>
<td>0.2</td>
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<td>1.7</td>
<td>23.3</td>
<td>2.6</td>
<td>2.3</td>
<td>1.6</td>
<td>9.9</td>
<td>23.5</td>
</tr>
<tr>
<td>HU</td>
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<td>1.9</td>
<td>14.6</td>
<td>4.8</td>
<td>28.6</td>
<td>2.9</td>
<td>2.8</td>
<td>15.1</td>
<td>4.1</td>
</tr>
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<td>0.7</td>
<td>21.6</td>
<td>1.2</td>
<td>9.2</td>
<td>8.0</td>
<td>20.0</td>
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</tr>
<tr>
<td>LV</td>
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<td>3.4</td>
<td>5.6</td>
<td>19.4</td>
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<td>12.1</td>
<td>19.9</td>
<td>4.9</td>
<td>7.5</td>
<td>20.6</td>
<td>1.6</td>
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<tr>
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<td>10.0</td>
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<td>8.3</td>
<td>5.8</td>
<td>14.4</td>
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<tr>
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<td>2.0</td>
<td>28.7</td>
<td>3.4</td>
<td>0.8</td>
<td>5.3</td>
<td>19.9</td>
<td>1.4</td>
</tr>
<tr>
<td>EU-10</td>
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<td>1.2</td>
<td>5.3</td>
<td>12.9</td>
<td>14.8</td>
<td>4.5</td>
<td>6.7</td>
<td>19.7</td>
<td>1.9</td>
</tr>
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<td>EU-15</td>
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<td>23.3</td>
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<td>5.0</td>
<td>1.2</td>
<td>5.5</td>
<td>0.9</td>
</tr>
<tr>
<td>EU-27</td>
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<td>17.4</td>
<td>17.2</td>
<td>9.5</td>
<td>4.7</td>
<td>4.4</td>
<td>13.7</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Source:** EUROSTAT (2015)

Key variables: area, livestock (LSU), labour force and standard output (SO) by type of farming (2-digit) and economic size of farm (SO in Euro) [ef_kvftecs]
## Annex 16: Change in the share of agricultural holdings in the total number of farms by specialization in the EU-10 Member States. 2005 to 2013

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>FIELD CROPS</th>
<th>HORTICULTURE</th>
<th>PERMANENT CROPS (INCLUDED WINE)</th>
<th>GRAZING LIVESTOCK</th>
<th>GRANIVORES LIVESTOCK</th>
<th>MIXED CROPS</th>
<th>MIXED LIVESTOCK</th>
<th>MIXED CROPS AND LIVESTOCK</th>
<th>NON CLASSIFIED HOLDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG</td>
<td>11.4</td>
<td>1.9</td>
<td>5.1</td>
<td>2.5</td>
<td>-8.0</td>
<td>2.2</td>
<td>-12.7</td>
<td>-2.6</td>
<td>0.1</td>
</tr>
<tr>
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<td>-1.5</td>
<td>-0.6</td>
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<td>-3.7</td>
<td>-1.8</td>
<td>-4.2</td>
<td>-3.9</td>
<td>-0.1</td>
</tr>
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<td>0.9</td>
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<td>0.5</td>
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<td>-5.2</td>
<td>23.1</td>
</tr>
<tr>
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<td>1.3</td>
<td>-12.6</td>
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<td>-0.3</td>
<td>-0.0</td>
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<td>-9.0</td>
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</tr>
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<td>-4.0</td>
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<td>0.5</td>
</tr>
<tr>
<td>SI</td>
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<td>-4.9</td>
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<td>-0.5</td>
<td>-2.5</td>
<td>-2.3</td>
<td>-0.0</td>
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<tr>
<td>SK</td>
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<td>-0.1</td>
<td>-8.2</td>
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<td>-19.2</td>
<td>-1.9</td>
<td>-1.5</td>
<td>-8.4</td>
<td>1.3</td>
</tr>
<tr>
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<td>1.0</td>
<td>1.3</td>
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<td>-6.5</td>
<td>-3.0</td>
<td>-0.6</td>
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<td>-0.8</td>
<td>-0.9</td>
<td>-1.1</td>
<td>-0.3</td>
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<td>0.4</td>
<td>1.8</td>
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<td>0.1</td>
<td>-4.3</td>
<td>-2.4</td>
<td>-0.5</td>
</tr>
</tbody>
</table>

**Source:** EUROSTAT (2015)

Key variables: area, livestock (LSU), labour force and standard output (SO) by type of farming (2-digit) and economic size of farm (SO in Euro) [ef_kvftecs]
### Annex 17: Share of agricultural holdings in the total UAA by specialization in the EU-10 Member States. 2013

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>FIELD CROPS</th>
<th>HORTICULTURE</th>
<th>PERMANENT CROPS (INCLUDED WINE)</th>
<th>GRAZING LIVESTOCK</th>
<th>GRANIVORES LIVESTOCK</th>
<th>MIXED CROPS</th>
<th>MIXED LIVESTOCK</th>
<th>MIXED CROPS AND LIVESTOCK</th>
<th>NON CLASSIFIED HOLDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG</td>
<td>85.6%</td>
<td>0.3%</td>
<td>1.5%</td>
<td>6.1%</td>
<td>0.5%</td>
<td>1.2%</td>
<td>0.5%</td>
<td>3.7%</td>
<td>0.6%</td>
</tr>
<tr>
<td>CZ</td>
<td>33.4%</td>
<td>0.1%</td>
<td>1.0%</td>
<td>23.4%</td>
<td>0.6%</td>
<td>1.8%</td>
<td>5.2%</td>
<td>34.4%</td>
<td>0.0%</td>
</tr>
<tr>
<td>EE</td>
<td>41.6%</td>
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<td>0.5%</td>
<td>40.0%</td>
<td>0.9%</td>
<td>0.5%</td>
<td>1.7%</td>
<td>9.0%</td>
<td>5.3%</td>
</tr>
<tr>
<td>HU</td>
<td>63.7%</td>
<td>0.5%</td>
<td>2.8%</td>
<td>9.7%</td>
<td>1.7%</td>
<td>2.8%</td>
<td>2.3%</td>
<td>16.2%</td>
<td>0.2%</td>
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<tr>
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<td>0.6%</td>
<td>2.7%</td>
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<td>50.4%</td>
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<td>0.5%</td>
<td>28.3%</td>
<td>0.7%</td>
<td>1.2%</td>
<td>2.0%</td>
<td>15.3%</td>
<td>1.0%</td>
</tr>
<tr>
<td>PL</td>
<td>45.4%</td>
<td>1.3%</td>
<td>2.7%</td>
<td>17.8%</td>
<td>3.2%</td>
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</tr>
<tr>
<td>RO</td>
<td>61.4%</td>
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<td>1.7%</td>
<td>13.2%</td>
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<td>4.8%</td>
<td>11.4%</td>
<td>2.6%</td>
</tr>
<tr>
<td>SI</td>
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<td>0.3%</td>
<td>4.7%</td>
<td>54.4%</td>
<td>1.1%</td>
<td>4.3%</td>
<td>4.7%</td>
<td>14.2%</td>
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</tr>
<tr>
<td>SK</td>
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<td>0.2%</td>
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<td>16.9%</td>
<td>1.7%</td>
<td>2.5%</td>
<td>4.0%</td>
<td>16.8%</td>
<td>1.2%</td>
</tr>
<tr>
<td>EU-15</td>
<td>37.7%</td>
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<td>7.8%</td>
<td>37.1%</td>
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<td>2.8%</td>
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<td>2.3%</td>
<td>11.4%</td>
<td>0.5%</td>
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</tbody>
</table>

**Source:** EUROSTAT (2015)

Key variables: area, livestock (LSU), labour force and standard output (SO) by type of farming (2-digit) and economic size of farm (SO in Euro) [ef_kvftecs]
Annex 18: Change in the share of agricultural enterprises in the total UAA by specialization in the EU-10 Member States. 2005 to 2013

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>FIELD CROPS</th>
<th>HORTICULTURE</th>
<th>PERMANENT CROPS (INCLUDED WINE)</th>
<th>GRAZING LIVESTOCK</th>
<th>GRANIVORES LIVESTOCK</th>
<th>MIXED CROPS</th>
<th>MIXED LIVESTOCK</th>
<th>MIXED CROPS AND LIVESTOCK</th>
<th>NON CLASSIFIED HOLDINGS</th>
</tr>
</thead>
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<tr>
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<td>-3.2</td>
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<td>5.3</td>
</tr>
<tr>
<td>HU</td>
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<td>-0.6</td>
<td>-0.3</td>
<td>-0.5</td>
<td>-2.4</td>
<td>-1.1</td>
<td>-2.7</td>
<td>-4.6</td>
<td>-0.1</td>
</tr>
<tr>
<td>LT</td>
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<td>0.0</td>
<td>0.1</td>
<td>-3.1</td>
<td>-0.1</td>
<td>-1.1</td>
<td>-12.4</td>
<td>-8.7</td>
<td>0.4</td>
</tr>
<tr>
<td>LV</td>
<td>12.4</td>
<td>0.0</td>
<td>-0.5</td>
<td>7.1</td>
<td>0.0</td>
<td>-2.8</td>
<td>-9.8</td>
<td>-7.5</td>
<td>1.0</td>
</tr>
<tr>
<td>PL</td>
<td>16.6</td>
<td>0.1</td>
<td>0.8</td>
<td>1.2</td>
<td>-4.2</td>
<td>0.7</td>
<td>-13.9</td>
<td>-1.6</td>
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</tr>
<tr>
<td>RO</td>
<td>9.7</td>
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<td>0.2</td>
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<td>1.0</td>
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</tr>
<tr>
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<td>-0.2</td>
<td>3.4</td>
<td>-0.3</td>
<td>-0.5</td>
<td>-5.6</td>
<td>-8.0</td>
<td>0.2</td>
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<td>-0.8</td>
<td>-0.5</td>
<td>-3.0</td>
<td>-2.2</td>
<td>0.3</td>
</tr>
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</table>

Source: EUROSTAT (2015)
Key variables: area. livestock (LSU). labour force and standard output (SO) by type of farming (2-digit) and economic size of farm (SO in Euro) [ef_kvftecs]
### Annex 19: Agricultural income compared to average wages in 2013 in the EU-10 Member States

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>Agricultural entrepreneurial income (in current prices) / Hours worked</th>
<th>Gross wages and salaries in the total economy (in current prices) / Hours worked by employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EUR/hour</td>
<td>EUR/hour</td>
</tr>
<tr>
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<td>3.5</td>
<td>3.3</td>
</tr>
<tr>
<td>CZ</td>
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<td>6.6</td>
</tr>
<tr>
<td>EE</td>
<td>13.4</td>
<td>6.3</td>
</tr>
<tr>
<td>HU</td>
<td>3.8</td>
<td>5.3</td>
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<td>LT</td>
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<td>5.2</td>
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<td>LV</td>
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<td>5.5</td>
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<tr>
<td>PL</td>
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<td>4.6</td>
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<tr>
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<td>3.2</td>
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<tr>
<td>SI</td>
<td>2.2</td>
<td>13.9</td>
</tr>
<tr>
<td>SK</td>
<td>1.5</td>
<td>6.7</td>
</tr>
<tr>
<td>EU-10</td>
<td>4.8</td>
<td>6.1</td>
</tr>
<tr>
<td>EU-15</td>
<td>11.8</td>
<td>22</td>
</tr>
<tr>
<td>EU-27</td>
<td>8.9</td>
<td>14.9</td>
</tr>
</tbody>
</table>

## Annex 20: The percentage of agricultural holders with other gainful activity in 2005 and 2013 in the EU-10 Member States

| COUNTRY | YEAR | 2005 | 2013 | GROWTH RATE (%)
|---------|------|------|------|----------------
| BG      | 2005 | 33.7 | 73.2 | 39.5
| CZ      | 2005 | 43.8 | 38.1 | -5.6
| EE      | 2005 | 39.4 | 40.1 | 0.7
| HU      | 2005 | 38.5 | 42.3 | 3.7
| LT      | 2005 | 36.5 | 39.3 | 2.8
| LV      | 2005 | 27.2 | 35.5 | 8.2
| PL      | 2005 | 38.2 | 39.1 | 0.8
| RO      | 2005 | 40.4 | 26.2 | -14.2
| SI      | 2005 | 74.4 | 38.0 | -36.4
| SK      | 2005 | 42.1 | 50.0 | 7.9
| EU-10   | 2005 | 39.1 | 33.1 | -6.0
| EU-15   | 2005 | 29.8 | 31.2 | 1.4
| EU-27   | 2005 | 35.5 | 32.4 | -3.2

**Source:** EUROSTAT (2015)

Other gainful activities (OGA) of the farm of sole holder: number of farms, agricultural area, standard output (SO) and livestock (LSU) by economic size of farm (SO in Euro) [ef_ogaecs]
Annex 21: The status of small farms (under EUR 4000 SO) in the EU post-socialist Member States in 2005 and 2013

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>NUMBER OF HOLDINGS</th>
<th>SHARE (%) OF THE SMALL HOLDINGS (UNDER 4000 EURO SO) IN UTILISED AGRICULTURAL AREA (HA)</th>
<th>LIVESTOCK UNIT OF THE HOLDINGS WITH LIVESTOCK</th>
<th>LABOUR FORCE (AWU)</th>
<th>STANDARD OUTPUT (EURO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG</td>
<td>86.7</td>
<td>75.0</td>
<td>11.1</td>
<td>3.4</td>
<td>41.5</td>
</tr>
<tr>
<td>CZ</td>
<td>48.0</td>
<td>15.4</td>
<td>1.3</td>
<td>0.6</td>
<td>0.9</td>
</tr>
<tr>
<td>EE</td>
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<td>36.9</td>
<td>10.6</td>
<td>5.8</td>
<td>3.5</td>
</tr>
<tr>
<td>HU</td>
<td>81.1</td>
<td>75.0</td>
<td>8.0</td>
<td>5.3</td>
<td>16.5</td>
</tr>
<tr>
<td>LT</td>
<td>62.0</td>
<td>62.9</td>
<td>22.3</td>
<td>15.8</td>
<td>19.4</td>
</tr>
<tr>
<td>LV</td>
<td>82.7</td>
<td>62.8</td>
<td>38.4</td>
<td>18.8</td>
<td>20.9</td>
</tr>
<tr>
<td>PL</td>
<td>64.2</td>
<td>45.9</td>
<td>20.8</td>
<td>12.0</td>
<td>8.5</td>
</tr>
<tr>
<td>RO</td>
<td>86.0</td>
<td>83.1</td>
<td>37.3</td>
<td>25.4</td>
<td>46.6</td>
</tr>
<tr>
<td>SI</td>
<td>42.9</td>
<td>38.1</td>
<td>16.3</td>
<td>11.2</td>
<td>6.7</td>
</tr>
<tr>
<td>SK</td>
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<td>2.0</td>
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<td>22.3</td>
<td>13.3</td>
<td>20.4</td>
</tr>
<tr>
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<td>29.9</td>
<td>5.0</td>
<td>3.7</td>
<td>0.8</td>
</tr>
<tr>
<td>EU27</td>
<td>61.1</td>
<td>54.3</td>
<td>9.7</td>
<td>6.4</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Source: EUROSTAT (2015)
Key variables: area, livestock (LSU), labour force and standard output (SO) by type of farming (2-digit) and economic size of farm (SO in Euro) [ef_kvftec]
### Annex 22: Shares of all farms and those under EUR 4000 SO in the EU post-socialist Member States where the farm holder-manager had a main other gainful activity in 2013 (%)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>2005</th>
<th>2013</th>
</tr>
</thead>
<tbody>
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<td>79.0</td>
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<tr>
<td>CZ</td>
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</tr>
<tr>
<td>EE</td>
<td>34.1</td>
<td>34.3</td>
</tr>
<tr>
<td>HU</td>
<td>37.9</td>
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<td>LT</td>
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<td>34.3</td>
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<tr>
<td>LV</td>
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<td>39.8</td>
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<tr>
<td>PL</td>
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<tr>
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<tr>
<td>SI</td>
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<td>30.2</td>
</tr>
<tr>
<td>SK</td>
<td>37.3</td>
<td>36.3</td>
</tr>
<tr>
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<td>28.7</td>
</tr>
<tr>
<td>EU-15</td>
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<td>23.9</td>
</tr>
<tr>
<td>EU-27</td>
<td>26.9</td>
<td>28.7</td>
</tr>
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</table>

**Source:** EUROSTAT (2015)

Other gainful activities (OGA) of the farm of sole holder: number of farms, agricultural area, standard output (SO) and livestock (LSU) by economic size of farm (SO in Euro) [ef_ogaecs]
## Annex 23: Share of farm managers according to age groups, 2005, 2013 (in%)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>LESS THAN 35 YEARS</th>
<th>FROM 35 TO 44 YEARS</th>
<th>FROM 45 TO 54 YEARS</th>
<th>FROM 55 TO 64 YEARS</th>
<th>65 YEARS OR OVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>BG</td>
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<td>6.4</td>
<td>10.4</td>
<td>13.2</td>
<td>18.0</td>
</tr>
<tr>
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<td>4.6</td>
<td>17.3</td>
<td>14.8</td>
<td>28.6</td>
</tr>
<tr>
<td>EE</td>
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<td>7.5</td>
<td>17.4</td>
<td>16.8</td>
<td>22.2</td>
</tr>
<tr>
<td>HU</td>
<td>7.8</td>
<td>6.1</td>
<td>14.8</td>
<td>14.9</td>
<td>26.0</td>
</tr>
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<td>5.3</td>
<td>5.6</td>
<td>19.1</td>
<td>13.9</td>
<td>21.8</td>
</tr>
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<td>5.0</td>
<td>19.2</td>
<td>14.5</td>
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<td>31.1</td>
</tr>
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<td>4.7</td>
<td>12.1</td>
<td>13.9</td>
<td>17.8</td>
</tr>
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<td>4.8</td>
<td>14.3</td>
<td>14.4</td>
<td>24.3</td>
</tr>
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<td>8.1</td>
<td>14.0</td>
<td>15.4</td>
<td>27.1</td>
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<td>6.7</td>
<td>15.5</td>
<td>16.3</td>
<td>22.7</td>
</tr>
<tr>
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<td>5.8</td>
<td>17.0</td>
<td>16.5</td>
<td>23.2</td>
</tr>
<tr>
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<td>6.9</td>
<td>6.0</td>
<td>16.1</td>
<td>15.3</td>
<td>22.9</td>
</tr>
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</table>

**Source:** EUROSTAT FSS (2013)

Agricultural training of farm managers: number of farms, agricultural area, labour force and standard output (SO) by age and sex of the manager [ef_mptrainman]
## Annex 24: Share of farm managers according to age groups and sex (2013) (%)

<table>
<thead>
<tr>
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<th>MALES</th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than 35 y.</td>
<td>From 35 to 44 y.</td>
<td>From 45 to 54 y.</td>
<td>From 55 to 64 y.</td>
<td>65 y. or over</td>
<td>Less than 35 y.</td>
<td>From 35 to 44 y.</td>
<td>From 45 to 54 y.</td>
<td>From 55 to 64 y.</td>
<td>65 y. or over</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BG</td>
<td>5.9</td>
<td>12.8</td>
<td>18.5</td>
<td>25.4</td>
<td>37.4</td>
<td>8.3</td>
<td>14.8</td>
<td>18.3</td>
<td>24.6</td>
<td>34.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CZ</td>
<td>4.3</td>
<td>14.7</td>
<td>24.3</td>
<td>34.1</td>
<td>22.5</td>
<td>6.8</td>
<td>15.2</td>
<td>19.7</td>
<td>32.3</td>
<td>26.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE</td>
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<td>18.2</td>
<td>25.0</td>
<td>21.8</td>
<td>26.4</td>
<td>5.4</td>
<td>14.2</td>
<td>20.4</td>
<td>22.0</td>
<td>37.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HU</td>
<td>6.3</td>
<td>16.2</td>
<td>21.0</td>
<td>30.1</td>
<td>26.4</td>
<td>5.7</td>
<td>11.4</td>
<td>15.2</td>
<td>26.9</td>
<td>40.8</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>29.0</td>
<td>21.5</td>
<td>26.7</td>
<td>3.9</td>
<td>11.7</td>
<td>21.9</td>
<td>20.3</td>
<td>42.2</td>
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<td>28.4</td>
<td>24.4</td>
<td>25.2</td>
<td>4.7</td>
<td>11.8</td>
<td>23.6</td>
<td>23.8</td>
<td>36.0</td>
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<td></td>
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<tr>
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<td>30.5</td>
<td>25.0</td>
<td>7.6</td>
<td>11.3</td>
<td>22.2</td>
<td>29.6</td>
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<td>14.2</td>
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<td>19.7</td>
<td>23.9</td>
<td>33.8</td>
<td>3.2</td>
<td>7.6</td>
<td>11.2</td>
<td>22.4</td>
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<td>27.3</td>
<td>28.9</td>
<td>23.5</td>
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<td>12.9</td>
<td>23.5</td>
<td>30.0</td>
<td>31.3</td>
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<td></td>
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<tr>
<td>SK</td>
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<td>25.1</td>
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<td>21.2</td>
<td>7.4</td>
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<td>23.4</td>
<td>31.4</td>
<td>23.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>18.4</td>
<td>22.8</td>
<td>24.9</td>
<td>26.7</td>
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<td>23.4</td>
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<td>12.6</td>
<td>24.4</td>
<td>25.8</td>
<td>33.1</td>
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<tr>
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</table>

**Source:** EUROSTAT FSS (2013)

Agricultural training of farm managers: number of farms, agricultural area, labour force and standard output (SO) by age and sex of the manager [ef_mptrainman]
### Annex 25: Distribution of farm managers by type of vocational qualification, 2005, 2013 (in%)

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>PRACTICAL EXPERIENCE ONLY</th>
<th>BASIC TRAINING</th>
<th>FULL AGRICULTURAL TRAINING</th>
</tr>
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<tbody>
<tr>
<td>BG</td>
<td>94.7</td>
<td>92.9</td>
<td>4.3</td>
</tr>
<tr>
<td>CZ</td>
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<td>60.4</td>
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</tr>
<tr>
<td>HU</td>
<td>86.6</td>
<td>82.1</td>
<td>4.9</td>
</tr>
<tr>
<td>LT</td>
<td>69.1</td>
<td>65.4</td>
<td>19.1</td>
</tr>
<tr>
<td>LV</td>
<td>65.9</td>
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</tr>
<tr>
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<td>96.4</td>
<td>6.3</td>
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<td>50.0</td>
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<td>11.4</td>
</tr>
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<td>80.0</td>
<td>70.8</td>
<td>11.4</td>
</tr>
</tbody>
</table>

*Source: EUROSTAT FSS (2013)*

Agricultural training of farm managers: number of farms, agricultural area, labour force and standard output (SO) by age and sex of the manager [ef_mptrainman]
Annex 26: The classification of HS codes according to the processing rate

Agricultural commodities
- HS-01
- HS-0301
- HS-0407
- HS-05
- HS-06
- HS-07, except: HS-0710 – HS-0714
- HS-08, except: HS-0811 – HS-0814
- HS-10
- HS-12, except: HS-1208
- HS-13
- HS-14
- HS-2401

Primary processed products
- HS-02
- HS-03, except: HS-0301
- HS-04, except: HS-0403, HS-0405 – HS-0407
- HS-0710 – HS-0714
- HS-0811 – HS-0814
- HS-09
- HS-11
- HS-1208
- HS-15
- HS-17, except: HS-1704
- HS-18, except: HS-1806

Secondary processed products
- HS-0403, HS-0405, HS-0406
- HS-16
- HS-1704
- HS-1806
- HS-19
- HS-20
- HS-21
- HS-22
- HS-23
- HS-24, except: HS-2401
DIRECTORATE-GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT B: STRUCTURAL AND COHESION POLICIES

AGRICULTURE AND RURAL DEVELOPMENT

RESEARCH FOR AGRI COMMITTEE - FOOD VALUE CHAIN IN THE EU – HOW TO IMPROVE IT AND STRENGTHEN THE BARGAINING POWER OF FARMERS?

STUDY
The recent CAP reforms assign an increasing role in the agricultural market organisation to private entities such as POs, APOs and IBOs. It has required an articulated and consistent set of exemptions to the general competition rules for the food supply chains. This analysis aims to highlight the conditions under which the new CAP framework can be effective in achieving the objective to strengthen the bargaining power of farmers.
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<table>
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<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AGRI</td>
<td>Agriculture and Rural Development Committee</td>
</tr>
<tr>
<td>APO</td>
<td>Associations of Producer Organisation</td>
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<td>APT</td>
<td>Asymmetric Price Transmission</td>
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<td>CAP</td>
<td>Common Agricultural Policy</td>
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<td>CMO</td>
<td>Common market organisation</td>
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<td>CR</td>
<td>Concentration Ratio</td>
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<tr>
<td>DEFRA</td>
<td>Department for Environment, Food and Rural Affairs</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>ECJ</td>
<td>European Court of Justice</td>
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<tr>
<td>EP</td>
<td>European Parliament</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>F&amp;V</td>
<td>Fruit and Vegetable</td>
</tr>
<tr>
<td>GI</td>
<td>Geographical Indication</td>
</tr>
<tr>
<td>HHc</td>
<td>Helmberger and Hoos conditions</td>
</tr>
<tr>
<td>IBO</td>
<td>Inter-Branch Organisation</td>
</tr>
<tr>
<td>ICA</td>
<td>Italian Competition Authority</td>
</tr>
<tr>
<td>IOF</td>
<td>Investor Owned Firms</td>
</tr>
<tr>
<td>MS</td>
<td>Member State</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>PO</td>
<td>Producer Organisation</td>
</tr>
<tr>
<td>PDO</td>
<td>Protected Denomination of Origin</td>
</tr>
<tr>
<td>PGI</td>
<td>Protected Geographical Indication</td>
</tr>
<tr>
<td>SCI</td>
<td>Supply Chain Initiative</td>
</tr>
<tr>
<td>TFEU</td>
<td>Treaty on the Functioning of the European Union</td>
</tr>
<tr>
<td>TGT</td>
<td>Total Gain from Trade</td>
</tr>
<tr>
<td>UTP</td>
<td>Unfair Trading Practices</td>
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EXECUTIVE SUMMARY

Background

The food supply chain plays a substantial role in the European economy, connecting sectors such as agricultural, food processing industry and distribution that together make more than 5% of European value-added and 7% of employment. Furthermore, all European consumers are directly affected by EU food supply chain performance since food and beverage account for a significant part (14%) of the average European households’ expenditures (EC, 2015).

The EU food system is evolving rapidly. Changes in the organization of international trade, technology, and in society’s needs are triggering a deep restructuring of the agro-food supply chains. E-food and convenience retail, food customization, food quality, safety and identity are just few examples of the challenges that agro-food firms are facing. The increasing competitiveness and social pressure foster innovation in the organization of the agribusiness. As a consequence, the food supply chain is a complex series of inter-related markets (with increasing forms of coordination, integration and contracts).

As widely shown in many studies about structural changes (see Van der Ploeg et al., 2016; AKI, 2016), the speed and the modalities of the adjustment trajectories in farming sector tend to diverge from those of upstream/downstream sectors. For example, the consolidation of farming systems is much slower than in processing and retailing. Furthermore, size is not the only difference: social, economic and organizational variables move along with different dynamic models in agriculture with respect to downstream and upstream sectors. The new CMO measures provide the opportunity to introduce a ‘drive belt’, reducing the potential misalignment in adjustment patterns of farming and the other sectors.

This trend poses new challenges to the public governance of agricultural markets. The centralized top-down approach characterizing the CAP first pillar in the XX century has become obsolete and incapable of effectively governing a complex and rapidly evolving agro-food system. The recent 2013 reform opted for a more decentralized approach, and now private entities such as Producer Organizations (POs), Associations of Producer Organisations (APOs) or Inter Branch Organizations (IBOs) are assuming an increasing role in the governance of the agricultural markets. This report moves from these recent developments to propose an economic assessment of the ability of the new regulations to pursue CAP objectives in this new scenario.

Objectives and structure of the analysis

The aim of this analysis is to assess to what extent the new measures for the single CMO introduced by the last CAP reform may improve functioning of the EU food value chain and strengthen the bargaining power of farmers. The final objective is to provide a cognitive and analytical framework identifying policy options to consolidate the degree of farmers’ cooperation and to improve specific CAP rules.

Such a goal is pursued through:

- a brief overview of the EU food value chain focusing mainly on the market structure at different stages of the supply chain, on the price transmission and on the recent developments in selling features and contractual arrangements;
• an analysis of the changes introduced by the 2013 CAP reform and the Milk Package in the measures addressing POs, IBOs and agricultural contractual relations; the analysis is mainly focused on the effectiveness of the exemptions to EU competition policy aimed at strengthening farmers’ bargaining power.

• a simple bargaining model aimed to identify the determinants of the bargaining power in the food supply chain; the model is used to assess the capability of Producer Organizations to strengthen farmers’ bargaining power.

Main choices and perimeter of the analysis

In our study we focus on competition, which is one of the major issues in agro-food supply chains. Agricultural markets are highly interdependent and competition at different stages of the supply chain matters for the overall functioning of the entire food sector. Welfare implications of competition at any stage of the food supply chain concern several ‘weak subjects’ such as small farmers and consumers, and for that reason are of specific interests for policy-makers.

Relevance of competition issues arises from the fragmentation of the farm system and the consolidation of downstream stages. The difference in industry concentration between farm sectors and other sectors is often referred as one of the causes of the changes in the distribution of value added in the last decade. The sharp decline in farmers’ share of value added is one of the most critical issues for agricultural policy. In order to achieve a more sustainable distribution of value-added, the recent reform set the explicit goal of balancing power across the agro-food supply chain. Fostering horizontal coordination via POs is considered a key measure to this purpose.

The main instruments featuring the new paradigm of market organisation proposed by the CAP reform are: POs, APOs and IBOs. Actually, to make vertical integration though IBOs effective, the downstream firms in the food supply chain need a clearly recognizable upstream counterpart, which is also reliable and able to comply with their qualitative and quantitative standards. If so, the development of the IBOs is in some way consequent and subsequent to an adequate concentration of the agricultural supply. That explains why in this report we have chosen to focus our attention to the POs’ capacity in exploiting their functions and rebalancing the bargaining power along the supply chain.

Final considerations

Our analysis pointed out three critical issues in the current CMO regulation with respect to the organisation of the agricultural markets and the exemption to competition rules in agriculture:

• there is no specific setting for a specific legal form for the recognition of a PO (e.g. cooperatives);

• derogations to competition rules differ widely across sectors without a clear justification why provisions do not apply in certain sectors;

• derogations on a case by case approach leads to legal uncertainty; producers and their organisations need positive and clear examples specifying which practises are allowed and under which conditions.

These critical issues call for a revision of the current procedures aimed to provide harmonisation of rules and legal certainty in their interpretation. For this purpose the approaches based on marginal adjustment of the current regulation might not be advisable.
A more comprehensive approach based on rewriting the rules on POs and derogation to competition law in agriculture may be more effective. Despite of the high burden of producing a new regulation, a comprehensive approach can offer the opportunity of developing a simple and consistent regulation, reducing legal uncertainty.

The suggested policy options and recommendation follow factual, theoretical and normative analysis based on economic categories and assumptions. So they are supposed to provide some general principles consistent with economic reasoning and empirical data. Our theoretical analysis identified three key goals to be considered in the possible revision of the CMO regulation:

- **Simplification of rules concerning agricultural exemptions to the general competition rules (art. 101 TFEU).** This goal calls for convergence toward a single framework of PO objectives and agricultural exemptions to general competition rules with sector specificities only where and when strictly necessary. Possibly, the multiple layers of derogations to competition rules should be summarized in a single principle.

- **Effective strengthening of farmers bargaining power.** Joint selling and production planning (art 152 1.c.i CMO regulation) can be effective tools for rebalancing power in the agro-food system. We also concluded that requiring a minimum size for POs may improve their effectiveness. Such requirement should be calibrated on the structure of the downstream (upstream) relevant market: more consolidated buyer (seller) industries call for larger POs. Promoting the diversification of the POs' market channels is a key success factor. This objective can be pursued even allowing multi-sector POs. Consistency in Rural Development policy is advisable: measures to support POs' flexible investment, as well as legal and trade services aimed at strengthening the farmers’ negotiation power, should be a distinctive criteria in evaluating the measures in priority 3.

- **Safeguard of competition in the agri-food single markets.** Concerns about the anti-competitive behaviour of POs should be explicitly considered. We found that designing pro-competition PO governance (no entry or exit barriers for members, POs bounded to accept all their members’ production, POs operating at cost), imposing cap on PO market share size calibrated on the structure and size of the downstream/upstream relevant market and limiting no erga omnes provisions might help preserving consistency with current competition law.
1. INTRODUCTION

KEY FINDINGS

- The CAP is moving toward a new paradigm of agricultural market organization. The changes concern:
  - The CAP nature: from an \textit{expenditure} to a regulatory policy;
  - Its process: from a \textit{top-down} to a \textit{bottom-up} approach;
  - Its actors: from \textit{public} bodies to \textit{private} agents.
- The new CAP:
  - Calls for a strategic role for \textit{organisations} (POs, APOs and IBOs);
  - Provides tools to govern \textit{the structural adjustment} of an increasingly complex food supply chains;
  - Faces \textit{competition concerns};
  - Calls for cooperation between \textit{agricultural and competition policy}.

Answering to the question introduced by the title of this report not an easy task to solve. For almost a century the agricultural policies in the industrialized countries have tried to identify and implement effective instruments to balance the bargaining power along the food supply chain. The same Common Agricultural Policy (CAP) since its origin has faced this problem and found a solution in the management of the Common Market Organizations (CMOs) through direct intervention and price guarantees. The long and difficult transition to an agricultural policy, oriented to support the competitiveness of European agriculture in the current global economic scenario, raises again the issue of bargaining power in the supply chain in terms that are no longer the same.

The recent CAP reform, enhancing a model that has already been partially implemented in certain sectors (fruit and vegetables, olive oil, oil seeds and hops), looms a real paradigm shift in the organization of agricultural markets. The traditional instruments of the single CMOs are indeed mainly limited to address market crisis situations. Unlike, the new CAP assigns the market organization three instruments: Producers’ Organisations (POs), Interbranch Organisations (IBOs) and Contractual negotiations.

As widely shown in many studies about structural changes (see sections 1 and 2 of this report), the speed and the modalities of the adjustment trajectories in farming sector tend to diverge from those of upstream/downstream sectors. For example, the consolidation of farming systems is much slower than in processing and retailing. Furthermore, size is not the only difference: social, economic and organizational variables move along with different dynamic models in agriculture with respect to downstream and upstream sectors. The new CMO measures provide the opportunity to introduce a ‘drive belt’, reducing the potential misalignment in adjustment patterns of farming and the other sectors.

The new measures, aimed at promoting a better coordination of the food supply chain and strengthening the farmers’ bargaining position, shape a genuine paradigmatic policy shifts: a radical change concerning the nature of the policy, the process driving the market organization and the actors involved. The new provisions concerning market organization consolidate and reinforce the shift of the CAP from the traditional expenditure policy to a
mainly regulatory policy. The traditional CMO, centrally coordinated and managed by the EU authorities’ decisions, gives way to a bottom-up governance model where producers and traders are supposed to jointly deal with the market organization. The main actor is not anymore the public institution but private operators such as POs and IBOs among the others. In this new EU agricultural market policy, POs and IBOs become the strategic instruments aimed at concentrating agricultural supply, regulating the market coordination and increasing the bargaining power of farmers.

Moving the nature of the market organisation from public to private entities raises concern for the competition issues involved. Of course, in the case of a market organization regulated by a public body, the derogation to the competition rules (art.101(1) TFEU) may be definitely justified by the attainment of the CAP objectives, as referred to in Art.209(1) of EU Reg. 1308/2013. But the same cannot be said when the market is regulated and organized by private organizations. In such a case CAP and Competition policies have to work together keeping in account the structural exceptions of the food supply chain.

The new paradigm underlying the current agricultural market organization calls for a structural adjustment of the food supply chain. Concentration of supply, joint selling and vertical integration require a structural reorganization of the supply chain leading to scale and scope economies, cost reduction and value creation. Such a structural adjustment has to be consistent with the dynamic changes characterizing the EU manufacturing and retailing sectors. It cannot follow the gradual time path of the farming structural adjustment, whose constraints are more binding and require long term to be removed. Unlike, it has to be strictly contextual to the market reorganization induced by the new regulatory environment.

Currently, POs, IBOs and contractual negotiations in the agricultural markets have not uniformly evolved among the EU member states and regions. Their spread, size, functions and working modes are considerably different, depending on the local features of the agri-food supply and demand. Generally, in the sectors where they are formally recognized since many years, POs are spread all over the EU area. Unlike, the IBOs’ diffusion is much more restricted to some areas (France and Spain) and their experience concerns the markets where agricultural supply concentration is well consolidated thanks to the action of POs and cooperatives. It suggests that, in order to engage in an IBO, the downstream firms in the food supply chain need a clearly recognizable upstream counterpart, which is also reliable and able to comply with their qualitative and quantitative standards. If so, the development of the IBOs is in some way consequent and subsequent to an adequate concentration of the agricultural supply. That explains why in this paper we have chosen to focus our attention to the POs’ capacity in exploiting their functions and rebalancing the bargaining power along the supply chain.

The purpose of this paper is to look at how the new measures for the single CMO introduced by the last CAP reform may improve functioning of the EU food value chain and strengthen the bargaining power of farmers. The final objective is to provide cognitive and analytical tools aimed at identifying EU options in order to consolidate the degree of farmers’ cooperation and to improve specific competition rules in agriculture. The policy options and recommendation presented in the conclusions follow factual, theoretical and normative analysis based on economic categories and assumptions. Therefore, we are not providing a technical advice for the legal text but only some general principles consistent with economic reasoning and empirical data.
The paper is organized as follows. Section 2 contains a brief overview of the EU food value chain focusing mainly on the market structure at different stages of the supply chain, on the price transmission and on the recent developments in selling methods and contractual arrangements. Section 3 describes the change introduced by the CAP reform and the Milk Package in the measures addressing POS, IBOs and agricultural contractual relations; such change will be evaluated according both the enlargement of the agricultural sectors involved and the deepening of derogations to the competition rules. In Section 4 we present a simple bargaining model aimed to identify the determinants of the bargaining power in the food supply chain. Such a model is then used to address an economic analysis of Producer Organizations concerning their capacity to move bargaining position in favor of their members. Finally, Section 5 outlines the future EU policy options in order to improve fairness, transparency and stability in the food supply chains as well as to create additional value and strengthen the farmers negotiating position. This section also contains a set of conclusions and policy recommendations for the EU Parliament to improve and make more effective the competition provisions addressed to the contractual relations in the agricultural sector.
2. OVERVIEW OF THE EU FOOD SUPPLY CHAIN

KEY FINDINGS

- The food supply chain plays a relevant role in the European economy connecting sectors such as agriculture, food processing industry and the distribution.

- EU food supply chain is characterized by increased concentration of downstream stages and imbalanced distribution of value added.

- Increasingly complex forms of coordination, integration and contracts, within and between different stages, lead to different kinds of food supply chain.

- Asymmetric Price Transmission in EU food supply chains has been proven significant in 6 cases out of 10.

- Asymmetric Price Transmission is often explained by buyers’ market/bargaining power but the results depend on model assumptions and case specificity.

- Bargaining power imbalance may lead to Unfair Trade Practices in case where larger and more powerful actors seek to impose contractual arrangement to their advantage.

The food supply chain plays a substantial role in the European economy, connecting sectors such as agricultural, food processing industry and distribution that together make more than 5% of European value-added and 7% of employment (EC, 2014). Furthermore, all European consumers are directly affected by EU food supply chain performance since food and beverage account for a significant part (14%) of the average European households’ expenditures (EP, 2015; EC, 2014).

The food supply chain is a complex series of inter-related markets where competition at different stages of the supply chain matters for the overall functioning of the food sector. Welfare implications of competition at any stage of the food supply chain increase the public concern for greater transparency over food pricing issues. Competition issues become very relevant given the increased concentration of downstream stages and the distribution of value added in the last decades (Figure 1): the value added for agriculture dropped from 31% in 1995 to 21% in 2011, versus a value added of about 28% (-3%) for the food industry and of 51% (+13%) for food retail and food services taken together (EP, 2015). As a consequence, a better functioning food supply chain is crucial both for consumers and for ensuring a sustainable distribution of value added along the chain.

In the remainder of this section, firstly, we focus on the main features of the actors in the different stages of the EU food supply chain; then, a classification of the main kinds of supply chain is reported. Various issues related to competition in the EU food sector such as price transmission, market/buyer power and unfair trading practices are briefly analysed in the last part.
2.1. The EU food supply chain

Figure 1 shows the different stages of the food supply chain of processed products\(^1\): upstream stages consist of industries related to farm inputs (seed, feed, fertilizers, plant protection agents and energy) and primary production produced by farmers; food processors and food retailers, who sell to consumers, represent, respectively, midstream and downstream phases.

2.1.1. Input suppliers

Since several stakeholder groups, such as farmer unions and policy makers, expressed concerns regarding concentration of farm inputs markets, some works (Wageningen University, 2015; Ragonnaud, 2013) have focused on the relative importance of the various farm inputs on total farm cost and on EU inputs sectors (Figure 2). The share of seed in total farm cost shows a declining trend over time ranging between 2% and 15% among EU Member States. Similar tendencies are shown by the costs for feed, fertilizers and plant protection agents, which on average represent, respectively, around the 30%, 10% and 6% of European farmers’ costs. Farms in UE spend between the 8% and the 24% of their total expenditures on energy with an uptrend in the last decades indicating that EU agricultural sector has become more energy-intensive.

![Figure 1: EU supply chain](source)

In comparison with the world market, the European seed market is less concentrated though higher concentration may raise concerns for some crops and vegetables, such as sugar beet and tomato. In the feed market, the five largest producers in Europe hold, on average, only one sixth of the market share, with decisively more evident market concentration in consumer countries (Belgium and Netherlands). While the European fertilizer industry is moderately concentrated, although firms appear actively engaged in operations of mergers and acquisition, plant protection agents industry appears decisively more concentrated. Among energy industries the highest concentration level is found in the

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\(^1\) In the food supply chains of unprocessed products, processors are not involved.
oil sector, followed by the natural gas sector while the electricity sector shows the lowest concentration ratios. A relevant element is that, regardless of the sector, the concentration levels rise over time.

**Figure 2: Main characteristics of farm inputs industries**

![Figure 2: Main characteristics of farm inputs industries](image)


### 2.1.2. Agricultural production

The next stage of EU food supply chain consists of 12.2 million agricultural holdings which harvest nearly 176 million ha of utilized agricultural area and employ on a regular basis approximately 25 million of people (EC, 2013a). In the EU-28, a relevant factor characterizing the majority of farms is their small size in terms both of physical and economic size (see Exhibit 1). Moreover, the structural characteristics of agriculture in EU-15 are decisively different than those observed in EU-13. The average physical farm size and the average standard output per year in the former are, respectively, three and seven times higher than in the latter. Moreover, although the total number of cooperatives has recently decreased reaching less than 22 thousands units, a significant growth trend showed by the leading cooperatives indicates that the presence and the total turnover (€347 billion) of EU cooperatives are relevant in European food supply chain (Cogeca, 2015). However, it is worth to note that the level of cooperation is very different depending on the countries and sectors and the majority of these cooperatives are small companies.

**Exhibit 1: Key facts of EU agricultural sector**

<table>
<thead>
<tr>
<th>HOLDINGS</th>
<th>EMPLOYMENT</th>
<th>PHYSICAL SIZE</th>
<th>ECONOMIC SIZE</th>
<th>AGRI-COOPERATIVES</th>
</tr>
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<tbody>
<tr>
<td>EU-28: 12.2 million holdings</td>
<td>9.8 million people (Farm Structure Survey indicates 25 million - EC, 2013a)</td>
<td>69.3% ≤ 5 Ha 24.8% between 5-50 Ha 5.9% ≥ 50 Ha</td>
<td>9% ≥ €50,000 (SO per farm) 58.5% ≤ €4,000 (SO per farm)</td>
<td>21,769 cooperatives 6,172,746 members ≈700,000 employees Turnover €347 billion Turnover of Top 10 EU Agri-cooperatives €84.8 billions</td>
</tr>
</tbody>
</table>

Since the concentration ratio at the farm level is very low if compared to the other stages of the food supply chain, in order to strength the bargaining power of farmers the 2013 Reform includes new rules related to the recognition of Producer Organisations (POs) and Inter-Branch Organisations (IBOs). Such rules allow farmers to jointly sell under certain conditions through POs and Associations of Producer Organisations (APOs) as derogation to competition rules - albeit with certain conditions.

Since 1996, POs has become the cornerstone of EU regime for fruit and vegetables (F&V) sector and, more recently, similar rules have been extended to the milk sector. Although the F&V scheme has been very effective in increasing the production marketed by POs/APOs, POs’ distribution and size across EU-28 are definitely heterogeneous (see Figure 3). In 2010, the 1599 POs (with more than 320 thousands producer members) sold the 43% of total value of EU F&V production; the organisation rate in some countries (Netherlands and Belgium) was about 90% while EU-13 (except Czech Republic) showed the lowest rate (Bijman, 2015).

Likewise, IBOs framework has initially been introduced in F&V sector (1996) and then extended to other sectors such as tobacco, wine and, more recently, milk. IBOs are formed on the initiative of all or some of the representatives of different stages of the supply chain and carry out activities in one or more regions of the EU. The main goals of IBOs are to facilitate relations (also drawing up a standard form of contracts) between stakeholders and to promote a positive image of products. On June 2012, only 5 countries had recognised IBOs in F&V sector (EC, 2012). Among Member States, Spain and France showed the highest adoption with, respectively, 3 and 5 IBOs. In some Member States (France and Spain) and sectors (F&V, milk and wine), probably due to the specific characteristics of the food supply chain, such tool has been successfully employed. Differently, in other Countries formal recognition and monitoring of IBOs is seen as additional administrative burdens and costs and, therefore, policy makers and stakeholders prefer working through existing organisations and other voluntary initiative such as in UK dairy sector (Defra, 2013).

**Figure 3: Organisation rate by MS in the F&V Sector (2010)**

![Bar chart showing organisation rate by MS in the F&V Sector (2010)](source: European Commission, 2014)
Several studies have investigated on the efficiencies generated by POs in terms of increasing productivity, rising of farmers’ welfare and ensuring reasonable consumer prices (e.g. Heyder et al., 2011). Some evidences, as found by Arcas et al. (2008) in Spanish F&V sector, concern a positive correlation between the size of the PO and its performance because of cost reduction through economies of scale and differentiation through innovation. However, other studies find no significant relation between size of PO and efficiency and/or profitability (Sueyoshi et al. 1998). Therefore, although most of the evidence suggests that significant economies of scale exist, larger POs sometimes could also be associated with structural complexity and reduced flexibility, which may lead to decrease efficiency (Van Herck, 2014). Moreover, the internationalization of the activities of the PO might improve their performance, especially in smaller countries where POs face smaller domestic market. Empirical evidences show that the presence of POs positively affects market performance (Haller, 1993).

The mainstream approach is based on the measure of the PO impact on the negotiation outcome. The task is non-trivial because a key characteristic of today’s food system is the multi-dimensionality of negotiation outcomes. For instance, in a standard supply contract with supermarkets, parties agree on prices, quality, production standards, logistics, timing of delivery and payments, promotions, trade spending, risk allocation and many other issues.

The complexity of the outcomes makes evaluation of the PO performance difficult. A recent study by Van Herck (2014) provided a comprehensive analysis of the existing literature about PO efficiency. The author summarizes her thorough review of studies about PO welfare effect in a table (Van Herck 2014, p. 46). Exhibit 2 reports such results. Empirical studies found two types of PO’s effects on outcome: (i) a private effect, which is the ability of the PO to pay members higher prices than the market and (ii) an industry-level effect (also known as competitive yardstick effect), which is the ability of POs to determine higher prices for all farmers when their market share is large. Exhibit 2 reports several cases of positive impact of POs on farm prices, but the empirical evidence can hardly be generalized and the effectiveness of POs is still an open question.

Exhibit 2: Overview of different studies on the impact of POs on farmers’

<table>
<thead>
<tr>
<th>STUDY</th>
<th>DATA</th>
<th>SECTOR</th>
<th>COUNTRY</th>
<th>N. OF OBSER.</th>
<th>MAIN RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mishra et al. (2004)</td>
<td>1998</td>
<td>Arable crops, F&amp;V, dairy, livestock (bee, hog, poultry)</td>
<td>US</td>
<td>2886 farms of which 1789 supply to a PO and 1096 to an IOF</td>
<td>Evidence of private effects</td>
</tr>
<tr>
<td>Zhang et al. (2007)</td>
<td>1980-2004</td>
<td>Arable crops</td>
<td>Canada</td>
<td>Case study on one PO and one IOF</td>
<td>Supports industry-level effects</td>
</tr>
</tbody>
</table>

Such approach, however, is not able to disentangle the effects on bargaining power from the effects on bargaining position.
<table>
<thead>
<tr>
<th>STUDY</th>
<th>DATA</th>
<th>SECTOR</th>
<th>COUNTRY</th>
<th>N. OF OBSER.</th>
<th>MAIN RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lind (2011)</td>
<td>-</td>
<td>Meat</td>
<td>Sweden</td>
<td>Case study on one PO</td>
<td>Supports private effects</td>
</tr>
<tr>
<td>Bijman et al. (2012)</td>
<td>-</td>
<td>Dairy</td>
<td>Various EU countries</td>
<td>Country-level price level data and PO market share data</td>
<td>Evidence of industry-level effects. No evidence of private effects.</td>
</tr>
<tr>
<td>Sauer et al. (2012)</td>
<td>2006</td>
<td>Dairy</td>
<td>Armenia, Moldova and Ukraine</td>
<td>916 farms, which deliver 44% of their production to a PO</td>
<td>Evidence of private effects, inconclusive evidence of industry level effects.</td>
</tr>
<tr>
<td>Cazzuffi (2012)</td>
<td>End of the 2000s</td>
<td>Dairy</td>
<td>Italy</td>
<td>313 farms of which 254 farms supplying to a PO and 59 farms supplying to Non-PO firms</td>
<td>Evidence of private effects.</td>
</tr>
<tr>
<td>Hernández Espallardo et al. (2013)</td>
<td>2009</td>
<td>F&amp;V</td>
<td>Spain</td>
<td>320 farms which supply to a PO</td>
<td>Supports private effects, stressing the importance of non monetary benefits</td>
</tr>
</tbody>
</table>

Source: our summary from Van Herck 2014, pp. 46-47

The other dimensions of the negotiation outcome are hardly explored by the literature. The lack of data, due to the proprietary nature of contract information, is a remarkable barrier to academic studies.

2.1.3. Food and drink industry

An intermediate stage of the food supply chain is represented by EU food and drink industry which consists of 286,000 companies, employs 4.2 million people and records a turnover of more than 1 trillion euros (Food Drink Europe, 2014). It is the largest EU manufacturing sector in terms of turnover, value added and employment. It has remained stable even in time of economic downturn. The EU food and drink industry involves a variety of sectors ranging from meat processing to dairy production. The top 5 subsectors (meat sector, various food products category, drinks, dairy products and bakery products) represent four fifth of the total turnover. On the one hand, food and drink industry appears fragmented, since 99.1% of total companies are SMEs (with less than 250 employees), including 78.8% of micro-companies (with less than 10 employees). On the other hand, some major EU-companies, which represent only 1% of the total processors, account for around 49.5% of total turnover, 52.2% of value and 35.5% of employment.

2.1.4. Wholesale and retail

Distribution sector represents the next stage along the food supply chain. The last decades have been characterized by a strong development of EU modern retails, whose share of total grocery sales increased in 24 Member States (EC 2014a; OECD, 2013). New shop openings and increased floor space characterize the development of the retailing stage in which the share of large outlets (hypermarkets, supermarkets and, above all, discount store) has grown to the detriment to smaller stores. Retailing stage is a very dynamic sector. Online food delivery services are rapidly growing and some online retail giants, such as Amazon and Google, are trying to capture a piece of food demand. The rise of
convenience and online shopping is putting under pressure supermarkets. According to the Industry body IGD, in UK by April 2019 sales from convenience stores, discounters and the internet will overtake superstores and hypermarkets for the first time (The Telegraph, 2015).

**Figure 4: Retail Concentration (CR5) in EU Countries**

These trends associated with mergers and acquisitions lead to a high level of market concentration (Figure 4): only 10 large retailers control the 40% of the European food market while in most Member States, 3-5 retailers hold over 65% of the market share (Consumers International, 2012). Furthermore, buyer groups are an important feature of the food supply chain in several EU countries. As reported in Dobson et al. (2001) and in OECD (2013), in some countries (France, Italy and Spain) the role of buyer groups increases the level of concentration at the retail stage. Buyer groups, representing either many small retailers or two or more larger retailers, buy collectively on behalf of members that remain independent retailers. Their goal is to obtain benefits and discounts from suppliers. On the one hand, buyer groups can increase efficiency of the undertakings, with consequent benefits to consumers. On the other hand, they may guarantee to the members stronger negotiating positions and thus increasing competition concerns. Recently, the Italian Competition Antitrust (ICA) intervened adopting a restrictive approach (closure) against an Italian buyer group given the numerous restrictive effects produced (ICA, 2014).

The penetration of private labels by retail chains is an increasingly significant feature of the food sector: on average, private labels account for 23% of total retail food sales in Europe and 15% in North America (EC, 2014a). Although initially private labels were exclusively introduced as a lower-price alternative to a national brand, recently retailers have put on their shelf higher quality products (the so-called “premium private labels”). On the one hand, private labels might positively affect the market, increasing consumer choice and competition for suppliers of branded products. On the other hand, competition concerns increase when private labels are used to strengthen the retailer’s bargaining power through stricter terms and conditions for suppliers (OECD, 2013).

---

3 In literature they are also referred to as: own brands, private label brands, store brands or own labels. Daskalova (2012, p. 2) defines them as “goods produced by a manufacturer at the request of a retailer, sold under the brand name of the retailer and distributed exclusively by retailer that ordered them.”
2.1.5. Classification of supply chains

So far, we have explored the main characteristics of the actors involved in the different stages of the food supply chain. However, it is important to keep in mind that the increasingly use of complex forms of coordination, integration and contracts lead to different kind of food supply chains. They depend on the role of the various stakeholders, the kind of relationship established by the actors, the scope for coordination and the model of governance assuring the overall working of the chain (Carbone, 2016).

Exhibit 3 includes an attempt to make a classification of the different kind of food supply chains, which identifies two main groups: “conventional” and “alternative” supply chains. These typologies are not to be considered as completely separated and/or independent one from the other because same operators may belong to different kind of chains (Gereffi et al., 2005; Carbone, 2016).

The first group includes the food supply chains usually considered as “conventional”, characterized by a basically standardised quality, which is guaranteed through reputation and certification schemes. The conventional chains can be driven by a large retailer, a global processing company or a large trade company. In the first case, supermarket set contracts based on which sellers have to respect quite strict rules of production and sale. Retailers widely use private label brands and quality/safety certification such as Global g.a.p. and ISO standards. In the second case, a large processor, with a very well established reputation, buys raw materials and other inputs from a very large set of farms and sells the final product in different marketing channels such as large retailers and traditional small shops. The last case occurs for some commodities such as cereals, cocoa and banana where a large trade company is leader of the food supply chain. The major traders do not just trade physical commodities but provide all inputs and services to the other stages transforming food production into a complex, globalized and financialized business (Murphy et al., 2012). In the conventional chains, which are the most widespread, POs and IBOs might represent a useful way to strengthen the bargaining power of farmers making potentially more beneficial their negotiations with downstream actors.

Exhibit 3: Classification of the different kind of food supply chains

<table>
<thead>
<tr>
<th>SUPPLY CHAIN</th>
<th>MAIN CHARACTERISTICS</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Food Supply Chain</td>
<td>Supermarket set strict rules of production</td>
<td>fruit and vegetable</td>
</tr>
<tr>
<td></td>
<td>Use of private label</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of quality and safety certifications</td>
<td></td>
</tr>
<tr>
<td>Driven by a large retailer</td>
<td>Processor buy raw materials from a large set of farms</td>
<td>dairy products</td>
</tr>
<tr>
<td></td>
<td>Selling in different marketing channels</td>
<td></td>
</tr>
<tr>
<td>Driven by a large processor</td>
<td>Trader provides all inputs and services to the other stages</td>
<td>cereals, banana, cacao</td>
</tr>
<tr>
<td>Driven by a large trader</td>
<td>Food chain is complex, globalized and financialized</td>
<td></td>
</tr>
</tbody>
</table>
Looking at alternative chains (where quality plays a relevant role), in the short supply chains farmers vertically integrate downwards and directly sell their own products through alternative ways such as on-farms’ shops, farmers’ markets, deliveries to final consumers. Usually, consumers appreciate such chains because of the perceived attributes of buy “more authenticity and typicality” and “less sophistication”. On the one hand, short chains represent a way through which farmers might have a direct relationship with final consumers and increase their quota of the final value added. On the other hand, they present some constraints such as the seasonality of their supply (in particular perishable goods), the poor basket of products and the difficulties related to supply and stock management.

In the last years, supply chains driven by a specialized high quality retailer have met great success. These retailers (e.g. Eataly, iGourmet, D’Artagnan), who focus on high quality food specialties often confined in small local niches, have had the ability to launch these products (through their store chains and websites) in larger markets with more visibility.

Lastly, another alternative food supply chain concerns products that have obtained the Geographical Indication (GI). The European scheme of GIs, based on the idea that the quality of some products is strictly linked to their place of origin, includes the Protected Denominations of Origin (PDO) and Protected Geographical Indication (PGI). The EU system of GIs offers a very attractive opportunity to producers who can also reach international markets. Some successful PDOs participate to conventional food supply chains. For these products a relevant role is played by Consortia that are well capable to represent the various stakeholders involved (i.e. farms, cooperatives and processing firms).

### 2.2. Competition issues

In this section we present some empirical results about competition issue. More detailed theoretical discussion will be included in section 4.

#### 2.2.1. Price transmission along food chain

As above mentioned, the increased concentration of downstream stage, the unbalanced distribution of the value added and the volatility of price has encouraged policy makers and researchers to pay attention to the efficiency and transparency of the EU food supply chain. Asymmetric price transmission is sometimes considered as a signal of possible inefficiencies and/or market power. Moreover, price transmission approach allows researchers to evaluate whether price decreases are transmitted along the food supply chains with equal
speed and/or magnitude as price increases do. A number of empirical studies have looked for asymmetries\(^4\) between input (farm) and output (consumer) price movements in vertically related markets. Asymmetry occurs when an increase (decrease) in input (output) price is quickly and fully passed on to the output (input) price, while a decrease (increase) in the former is slowly and partially passed on to the latter (Box 1).

**Box 1: Price transmission along food chain**

<table>
<thead>
<tr>
<th>PRICE TRANSMISSION ALONG FOOD CHAIN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symmetric price transmission</strong></td>
</tr>
<tr>
<td>Symmetric price transmission along the food supply chain occurs when price decreases are transmitted with equal speed and/or magnitude as price increases do.</td>
</tr>
<tr>
<td><strong>Asymmetric price transmission</strong></td>
</tr>
<tr>
<td>Asymmetric price transmission occurs when an increase (decrease) in an input (output) price is quickly and fully passed on to the output (input) price, while a decrease (increase) in the former is slowly and partially passed on to the latter</td>
</tr>
</tbody>
</table>

Figure 5 reports two illustrative cases where retailers respond in different way to an equivalent increase and decrease of the farm price. In both cases an initial retail price of €0.50 per kilo is assumed. After two months, we suppose a farm price increase of €0.10 per kilo and allow retailer to incorporate it without introducing any other changes until the fifth month. After the adjustment process to farm price increase is complete, we introduce an equivalent farm price reduction of €0.10 per kilo. In the case of symmetric price transmission, we expect that the final retail price at the seventh month returns to the initial level of €0.50 per kilo.

In “case A” retailers responds to raw material price increase with an instantaneous and wide consumer price rise. A light upward movement occurs in the two subsequent months. The net retail price increase is €0.107 and the transmission rate is about 107%. Likewise, the retail price response to farm price decrease is fully incorporated. However, the downward adjustment is slower and mainly occurs in the subsequent months. The final retail price returns almost to the initial level, therefore, although retailers incorporate more slowly decrease than increase, “case A” shows symmetric price transmission\(^5\).

On the contrary, “case B” shows interesting differences in the retail price adjustment process to farm price changes when compared to “case A”. The effect of price increases, both in the current period and the subsequent months, is slightly greater than in the previous case (the transmission rate is about 130%). The most remarkable differences can be seen in the farm price decrease effects. “Case B” is characterized as having slower and incomplete downward adjustment of retail price in reaction to farm price decreases. As a consequence, the final retail price fails to return to the initial level remaining at about €0.61 per kilo, illustrating the asymmetry of price transmission.

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\(^4\) In food supply chains the price transmission movements can also occur from output price to input price. For review on the kind of asymmetries and the econometric models, see Meyer and von Cramon-Taubadel (2004) and Frey and Manera (2007).

\(^5\) Case A, actually, shows: i) long-run symmetric price transmission; ii) short-run asymmetric price transmission. The long-run symmetry focuses on the size of price transmission. In other words, if retailers equally incorporate in retail prices both the increases and decreases in the upstream prices. The short-run symmetry refers to whether the speeds of adjustment are equivalent for rising versus falling prices.
Several studies have empirically estimated and tested models to detect asymmetric price movements in food supply chains (EC, 2009; Meyer and von Cramon-Taubadel, 2004; Cacchiarelli et al., 2016a). Evidences of asymmetry are found for various markets in different countries suggesting that vertical asymmetric price transmission appears the rule rather than the exception\(^6\).

Figure 6 reports the percentage of presence/absence of asymmetric price transmission from 22 recently published papers (66 cases) that focused on the price transmission mechanism in EU food supply chains. Looking at the direction of price transmission, in the majority of supply chains prices are transmitted from farm to retail. Most of the cases under investigation concern livestock products (above all milk sector) while F&V chains represent the one fifth of the sample. Based on these studies, in 6 EU food supply chains out of 10 we find significant asymmetric price transmission behaviour.

A number of arguments have been proposed to explain why price transmission could be asymmetric. Many authors explain APT with the exertion of market power by processors and retailers (Peltzman, 2000; Lloyd et al. 2006); others (Levy et al, 2011) suggest retailer behaviour such as menu cost, cost of acquisition and the use of psychological pricing points; while Kinnucan and Forker (1987) and Lass (2005) propose political regulation in the form of farm minimum price.

Employing a meta-analysis of the existing studies Bakucs et al. (2014) have investigated on how the various characteristics of the agro-food supply chain increase or decrease the probability of the presence of asymmetries in farm-retail price transmission. An expected result is that asymmetric price transmission is more (less) likely in the presence of fragmented (concentrated) farm structure. However, an unexpected outcome shows a

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\(^6\) The presence of asymmetry characterizes food supply chains all over the world. Peltzman (2000) finds asymmetric price transmission in almost two thirds of products analyzed while Meyer and von Cramon-Taubadel (2004) in nearly half of the selected food supply chain.
positive association between symmetric price mechanism and the concentration ratio\(^7\) of the five largest retailers. Interestingly, the price transmission seems to be symmetric in food supply chains where processors play a relevant role. The other results show that higher governmental support and more restrictive regulations on price control in retail sector are associated to asymmetric transmission while restrictive regulations on entry barriers in retail sector tend to promote symmetric farm-retail price transmission.

**Figure 6: Results of the papers investigating price asymmetry in EU supply food chains**

![Graph showing results of price asymmetry in EU supply food chains](source: Own elaborations based on sample literature)

### 2.2.2. Market power and unfair trade practices (utp)

Several theoretical and empirical models\(^8\) have been employed in order to estimate the presence of market/buyer power exertion and its extension in the different stages of the food supply chain (Russo et al., 2011; Moro et al., 2012; Sexton and Zhang 2001). Various researchers, applying the “first-pass” test by Lloyd et al. (2009), prove market and/or buyer power exertion in various EU agricultural and food markets (Falkowski, 2010; Madau et al., 2016; Özer et al., 2015, Cavicchioli, 2010). Recently, some authors (Cacchiarelli et al., 2016b) empirically estimated the presence of retailers’ buyer power along F&V chains in the EU-28. Their results have evidenced that POs might exert an important countervailing power in countries where their presence is relevant. Using alternative statistical models, other authors prove absence or weak market power exertion for some supply chains (Dobson et al., 2011; Sckokai et al., 2013). Overall, such results show that the presence of market power in the food supply chain is not unambiguously proven but it depends on the variety of model assumptions and case specificities\(^9\) (McCorriston, 2015).

\(^7\) Bakucs et al. (2014) argument this result explaining that effect of retail concentration is more complex affecting both efficiency and rent distribution, as expressed by Swinnen and Van de Pias (2010). However, a potential explanation draws on the fact that concentration would allow retailers to exert bargaining power rather than market power.

\(^8\) For more details on the kind of product analysed, the side of the market examined and the type of estimation adopted, see Perloff et al. (2007).

\(^9\) Similar results are shown by Lopez et al. (2002) for US.
The increased concentration in the downstream stages have led to structural changes in the EU food supply chain contributing to situations of bargaining\textsuperscript{10} power imbalance between participants in trade relations. Specifically, information asymmetries, ability and negotiation skills allow more powerful actors to impose a much favourable negotiation outcome to trading partners. Bargaining power imbalance may sometimes lead to UTP\textsuperscript{11} (EC, 2016; EC, 2014; EC, 2013; OECD, 2013).

Four key categories of UTPs, which may occur at every link of the food chain, have been identified by EC (2016). The first category includes practices that allow one trading partner to transfer its own costs and/or risks to another. The second category refers to practices occurring when one party asks the other one for advantages without giving a service (e.g. upfront payments as entry fees to negotiate). The third category contains unilateral and/or retroactive changes to agreed terms, for example in form of discounts on agreed price. Last unfair practices consider the threat to terminate a contractual relationship in order to obtain further concessions.

UTPs represent additional and unexpected costs for the harmed firms with negative effects on their financial viability and capability to conduct business. European Commission in close cooperation with Member States and relevant stakeholders encouraged to look for ways to improve protection against the unfair practices producing the Green Paper consultation and accompanying studies (EC, 2014; EC 2013). Their suggestion was to apply a “mixed approach” through voluntary schemes such as Supply Chain Initiative (SCI) accompanied with credible and effective national enforcement based on comparable principles.

Although SCI has gained significant participation, stimulating the discussion of best practices and inducing a cultural change in the food supply chain, it seems to work better in some countries than in others. Recently, most of EU Countries have introduced legislative and enforcement measures against UTPs. While in the majority of the Member States these laws apply to business-to-business relationships along all stages of the food supply chain, some EU Countries’ legislations are limited to cases where one party is a retailer.

### 2.3. Preliminary considerations

Overall, EU food supply chain plays a relevant role in the European economy. Modern food supply chains are characterized by increasingly complex forms of coordination, integration and contract design (Figure 7). Moreover, some factors such as increased concentration of downstream stages and imbalanced distribution of value added increase competition concerns.

Balancing power across actors is a key concern in modern agricultural policy. The 2013 Reforms includes new rules related to POs and IBOs in order to strengthen the bargaining power of farmers. The welfare implications of PO establishment could be twofold: i) the cost reduction through economies of scale and differentiation allows POs to gain efficiencies; ii) joint selling can strength the bargaining power of farmers, making potentially more beneficial their negotiations with downstream actors. Therefore, the participation in the PO can grant members to increase their income.

\textsuperscript{10} A detailed explanation on the main differences among market power, bargaining power, buyer power and countervailing power will be reported in section 4.1.

\textsuperscript{11} EC (2014) p. 2 defines UTPs as “practices that grossly deviate from good commercial conduct, are contrary to good faith and fair dealing and are unilaterally imposed by one trading partner on another”. However, across Member States exist different definitions of unfair practices which range from broad descriptions to detailed list of prohibited practices.
The benefits of PO depend on different factors such as the size and the number of POs. In section 3, firstly, a simple bargaining power model that permits to identity the key determinants of the bargaining power in the food supply chain is described. Secondly, such model is used to evaluate the capacity of POs to strength the bargaining position of farmers.

**Figure 7: The complexity of food supply system**
3. CAP MEASURES CONCERNING THE FOOD SUPPLY CHAIN AND DEROGATIONS TO THE COMPETITION RULES

KEY FINDINGS

- The **general derogation** for agriculture products to comply with competition rules (Art 101 TFEU), in place since the CAP inception, **continues to apply** to agreements that pursue the objectives of the CAP.

- The legislator has **extended the scope of derogations** for horizontal and vertical agreements between farmers, OPs and associations of OPs, excluding price fixing, to all agricultural products.

- **Specific provisions** authorising joint activities, including joint selling, are defined on a case by case approach, and they **differ widely across sectors** without a clear justification (e.g. joint selling and price fixing in the dairy sector).

- **Legal uncertainty.** Lack of clear examples of what practises are recognised in order to benefit from derogations. Producers and their organisations struggle to understand what practises are allowed and under what conditions. The situation for cooperatives remains uncertain, and so does the sugar sector. There is no setting for a specific legal form for the OPs recognition and the derogation for joint selling does not appear in the legislation.

The objective to balance farmers’ bargaining power vis à vis highly concentrated buyers and input suppliers requires a market organisation that works in the interest of farmers, allowing agreements and practises between agricultural producers whereas necessary. The particularities of the agriculture sector have been acknowledged since the early days of the CAP. Initially the CAP worked by centrally planned regulations supporting agricultural prices through public managed demand and supply control, and farmers have benefitted from implicit derogations to competition rules that prohibit agreements aimed at planning the supply and fixing prices. More recently, with the removing most of the direct public intervention in the agricultural markets the CAP has broaden provisions that allow market agreements among farmers and between farmers and other supply chain operators to a wide range of agricultural sectors. These provisions call for specific and substantiated derogations from the general competition rules along with more harmonization between agricultural and competition policies.

Agricultural producer organisations in the European Union (and the United States) have historically benefitted from derogations from competition rules. As a matter of fact, cooperatives and producer organisations have been operating legally for decades in various sectors.

In the European context, exemptions to EU competition policy in the agricultural sector aiming at strengthening farmers' bargaining power have been in place since the CAP inception. Exemptions can be broadly categorised in general and specific derogations\(^{12}\) (Carrau 2012, Del Cont et al. 2012, Carrau 2014, Velazquez and Buffaria 2015).

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\(^{12}\) Derogations are specified in two Council regulations: Reg. 1234/2007 (Single CMO) and Reg. 1184/2006. The Single CMO Regulation applies to products of Annex I of the TFEU and Regulation EC No 1184/2006 to products listed in Annex I TFEU with the exception of those covered by the single CMO Regulation.
A general derogation (Article 42 Treaty on the Functioning of the EU - TFEU) is applicable to agriculture to the extent determined by the co-legislators within the framework of the CAP and taking into account of Article 39 of the TFEU ("objectives of the CAP"). This 'general derogation' dates back to Regulation 26/62 and has been part of the agricultural acquis since then. Consequently, Article 101 TFEU (the prohibition against anti-competitive agreements) does not apply to agricultural products. The principle only refers to certain types of activities (production and trade) and makes no distinction between the types of undertakings involved, unless CAP objectives are jeopardised and provided that such agreements do not entail an obligation to charge an identical price or exclude competition.

In general the European Court of Justice has confirmed the prevalence of the objectives of the CAP over those in relation to competition the operators, but have placed on the operators the heavy burden of proving that the agreement is necessary and represent the only way to achieve all CAP objectives (Del Cont et al. 2012)\(^\text{13}\). In general, the relationship has been characterised by certain legal ambiguities and even seasoned practitioners such as national competition authorities do not always the demarcation line straight-forward.

**Specific derogations** regard:

- **Internal market organisations** exemptions, when the CAP objectives were not in danger, like in the French Potatoes national market organisation or the Milk National Boards UK, were of relevance in the past. Today, these national market organisations do not exist anymore.

- **Horizontal and vertical agreements**

  - Horizontal agreements between farmers, farmers' associations and association of farmers associations involving the production or sale of agricultural products or the use of joint facilities for the storage, treatment or processing of agricultural products\(^\text{14,15}\), excluding price fixing\(^\text{16}\). Horizontal agreements in the form of Producers Organisations (POs) have played a central role in the fruit and vegetable sector since 1972, when its Common market Organisation (CMO) has been created. This is the sector where horizontal agreements of this type are most diffused.

  - Vertical agreements (commercialization agreements between representatives of farmers and representative of other categories operating at a different stage of the supply chain). Subject to limitations on market power and not involving price fixing, quotas or geographical division of markets, unless the Commission finds that competition is thereby excluded or that the objectives of Article 33 of the Treaty are jeopardised. An example of the later exemption is found in the sugar sector, where delivery written contracts are compulsory and they must include price and quantities\(^\text{17}\).

\(^\text{13}\) As cited by Del Cont et al. (2012) see cases C-399/93 Oude Luttikhuis 23 et seq., T-70/92 and T-71/92 Florimex and VGB versus Commission 152, as well as the Commission Decision 1999/6/EC of 14 December 1998 relating to a proceeding under Article 101 of the TFEU (IV/25.280) Sicasov).

\(^\text{14}\) Regulations 1182/2007 and 330/2010

\(^\text{15}\) Such agreements are subject to a market share threshold of 20% on any relevant market as set out by Reg. 1218/2010

\(^\text{16}\) This exemption refers to cooperatives companies that usually are de facto POs but may be extended to other types of POs or farmers' associations. The conduct must not produce a restriction of competition by object (for instance, price fixing) or by effect (for example, market power).

\(^\text{17}\) Regulation (EU) 318/2006
Inter-branch Agreements: inter-branch organisations (IBOs) could declare the extension of rules of its agreements to non-associated producers. Evidence about agricultural Producer Organisations (POs) and Associations of Producer Organisations (APOs) benefits suggested that there were significant economies of scale (Van Herck, 2014). Evidence in the Italian context, highlights that the use of contracts in the dairy, olive oil and fruit and vegetable sectors have introduced greater transparency in trade relationships between agro-food firms, with positive impacts on the financial management of farmers and food processors (Ciliberti and Frascarelli 2013). Based on a series of studies that compared prices paid between OPs and investors owned firms (IOFs) Van Herck (2014) confirmed that prices paid by POs are higher than prices paid by IOFs. It seems that POs could have ensured a higher income to farmers, conversely, little evidence was found of higher consumer prices associated with the presence of POs.

3.1. Recent reforms and current legislative setting

One prominent aspect of the reformed CAP is the declared intention of the legislator to strengthen the standing of farmers in the agricultural value chain. To this end, in the new legislative setting – new Market Organisation regulation (CMO Regulation) - the general exemption to agriculture is maintained, and sectorial coverage is widened for certain specific derogations. One prominent feature is the extension of the possibility to recognise horizontal, vertical agreements and inter-branch agreements to all agriculture products covered by the CMO, as well as the extension of the possibility of contractual negotiations (joint selling) to olive oil, beef and arable crops. POs, associations of POs and IBOs could receive financial support, under certain conditions, within Rural Development Programmes. In addition, specific exemptions are defined and dealt on a case by case approach (Carrau 2012, Del Cont et al. 2012, Velazquez and Buffaria 2015).

Summing up, derogations could be grouped in three types:

**A general derogation:** this derogation to EU competition policy rules continues to apply to the commercial activities of farmers within the framework of the CAP (Article 42 TFEU) is contained in Art 209 of the new CMO regulation. However, the practical consequences of this general derogation (as specified in the cited Article) are not clear. As long as it is not addressed and clarified, this ambiguity reduces the legal certainty for operators relying on Article 209 CMO and thereby increases the importance of other, sector-specific derogations in the CMO (see below).

**Horizontal rules on producer cooperation,** which include general rules for the recognition and activities of POs, associations of POs and IBOs, are extended to all products covered by the CMO.

**Sector-specific provisions** in the CMO authorising joint activities, including joint selling by producers/POs in certain sectors, which go beyond what is permissible under general competition rules for agricultural markets. These provisions are defined on a case by case approach:

- **Standard written contracts in the milk sector:** the joint sale of raw milk by POs was introduced by the so-called 'milk package', where the price payable for the delivery may

18 The extended agreement could involve statistical data of the given market; quality of products; innovation; consumer information; environmental questions; standard clauses of contract like minimal information, arbitration of conflict, etc. (Art 126 Reg. 1234/2007 and Regulation 479/2008).
19 Regulation (EU) 1308/2013
20 Regulation (EU) 1305/2013
21 Articles 148 and 149 CMO Regulation
be set in a so-called model of “written contract”. This package is one of the remedies to tackle the persistent weakness of this market after the abolition of the Quota Regime. Unlike the provisions on olive oil, beef and arable crops, the possibility of milk POs to jointly sell (and set prices) for the raw milk of their members is limited only by certain (generous) quantitative thresholds (up to 33% of national production per PO).

- **Joint selling by POs in the fruit and vegetables sector:** As POs and APOs in the fruit and vegetables sector fulfil a particular role, they are granted Union financial assistance in the framework of operational programmes. With a view towards amplifying their effectiveness, POs in fruit and vegetables are required to sell the entire production of their members (with certain exceptions, e.g. for on-farm sale). The General Court considered in its decision T-432/2007 that this obligation requires the PO to be in control of the sale of produce including the setting of the sales price. Thus, the setting of a sales price is a requirement resulting from the Producer Organisation's legal obligation to sell its members' production. The activity, in our, and arguably the Court's view, is implicitly exempted from competition rules (Velazquez and Buffaria 2015). Having said this, a possible systemic weakness of the regime is that – unlike collective negotiation possibilities foreseen in the milk, arable crops, olive oil and beef sectors – there is no market share cap on a Producer Organisation/APO which intends to engage in joint selling.

- **Contractual relations in the olive oil, beef and veal, and arable crops sectors.** These provisions (Articles 169-171 CMO regulation) are meant to secure possibilities for enhanced cooperation for Producer organisations (POs), in addition to what is already permissible under the existing exemptions from competition rules. In other words, the purpose of these Articles is to strengthen the bargaining power of producers, while at the same time avoiding the creation and exertion of market power. Within this objective, the provisions contain safeguards and quantitative thresholds to ensure a level playing field for all operators.

In order to help farmers and national competition authorities interpret and apply these provisions, the European Commission has tabled a document containing Guidelines for implementation (EC, 2015). The Guidelines are also meant to ensure legal consistency across the EU Member States, as requested by the Parliament during the legislative process of the 2013 CAP reform. A summary of conditions POs must comply to benefit from the derogations is contained in Box 2.

- **Collective negotiations in the sugar sector:** The quota system for sugar applies until the end of the 2016/2017 marketing year (Article 124 CMO Regulation). There will no longer be a guaranteed sugar beet price as from that date. The question arises whether growers will be able to continue to collectively negotiate prices with producers after the end of the quota regime, as is the current practice. Unlike in the milk, arable crops, olive oil and beef sectors there is no explicit collective negotiation provision for sugar beet growers in the CMO. However, the rules for the sugar sector do provide for the collective negotiation of inter-professional agreements between associations of beet growers and sugar manufacturers (so-called 'agreements within the trade').

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22 Regulation (EU) 261/2012
23 These provisions are contained in the “Rural Development” Regulation 1305/2013
**Box 2: Conditions for benefiting from rules in art 169, 170 and 171 of the CMO regulation**

<table>
<thead>
<tr>
<th><strong>Box 2 - Conditions for benefiting from rules in art 169, 170 and 171 of the CMO regulation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recognition of PO and association of POs:</strong></td>
</tr>
<tr>
<td>- needed to benefit the derogation</td>
</tr>
<tr>
<td>- a PO may be member of another PO (second-tier PO) which</td>
</tr>
<tr>
<td>commercialise the output by its member PO</td>
</tr>
<tr>
<td>- members of the PO can be producers and other entities which are not producers</td>
</tr>
<tr>
<td><strong>Pursuing specific objectives:</strong> at least one of the following: concentrate supply, placing products of members into the market, optimise production costs</td>
</tr>
<tr>
<td><strong>Creating significant efficiencies:</strong> by integrating activities in the PO, by generating efficiencies and thus by contributing to the CAP objectives. Efficiencies are measured in terms of volume increase or reduction of costs when the PO carries out at least one activity, or using alternative ad-hoc methods when the POs carries out various activities</td>
</tr>
<tr>
<td><strong>Relations between the PO and its members:</strong> producers are only members of one PO (but they can sell in parallel product to the market) and compliance with existing obligations in cooperative structures</td>
</tr>
<tr>
<td><strong>Cap on quantities subject to contractual relations:</strong> the PO should not hold a dominant position:</td>
</tr>
<tr>
<td>- Beef and veal: maximum 15% of the total national production of each product</td>
</tr>
<tr>
<td>- Arable crops: maximum 15% of the total national production of each product</td>
</tr>
<tr>
<td>- Olive oil maximum 20% of the relevant market</td>
</tr>
<tr>
<td><strong>Notification obligations:</strong> volume of production to the competent authorities in the MS</td>
</tr>
</tbody>
</table>

A comparison of the derogations, their nature and the implementation across sectors is presented in Exhibit 4.
**Exhibit 4: Comparison of derogations**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agreements, decisions and practises that:</td>
<td>In addition to general derogations:</td>
<td>Agreements or practises needed to attain CAP objectives</td>
<td></td>
</tr>
<tr>
<td>- are part of a national market organisation</td>
<td>Joint selling of milk and milk products by POs</td>
<td>Horizontal, vertical or inter-branch agreements, on a case by case approach</td>
<td></td>
</tr>
<tr>
<td>- are necessary for the attainment of CAP objectives</td>
<td>POs can collectively negotiate contract terms including price of raw milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- concern the production, sale of agricultural products or the use of joint facilities for the storage, treatment or processing</td>
<td>Deliveries by farmers to their cooperatives cannot be subject to joint negotiations but collecting cooperatives can form POs and negotiate collectively with processors</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Conditions</strong></td>
<td>Thresholds: volume of milk negotiated by a PO &lt; 3.5% of EU production and &lt; 33% national production in MS</td>
<td>No price or quota fixing, no geographical division of markets (with exceptions)</td>
<td></td>
</tr>
<tr>
<td>No price or quota fixing, no geographical division of markets, unless CAP objectives are jeopardised</td>
<td>Market share thresholds</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sector coverage</strong></td>
<td>Milk and milk products</td>
<td>All agricultural products covered by Reg. 1308/2013</td>
<td></td>
</tr>
<tr>
<td>Hops, olive oil, table olives, silkworm, tobacco (Reg. 1234-2007); Sugar (Reg. 318/2006); Fruit and vegetables (Reg. 1182/2007); Wine (Reg.479/2008)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sector specificities</strong></td>
<td>Tobacco: IBOs provisions could be extended to non-members, if they pursue specific objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobacco: IBOs provisions could be extended to non-members, if they pursue specific objectives</td>
<td>Tobacco: IBOs provisions could be extended to non-members, if they pursue specific objectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar: Compulsory delivery written contracts, where price and quantities must be defined</td>
<td>Sugar: Collective negotiation provision not explicitly mentioned in Reg. 1308/2013 but rules for the sugar sector provide for the collective negotiation, price and quantity are part of the delivery contract(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruit &amp; vegetables: Financial assistance to POs and APOs; Market withdrawal by POs; POs are required to sell the entire production of their members.</td>
<td>Fruit &amp; vegetables: Financial assistance to POs and APOs. Market withdrawal by POs. Joint selling by POs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>24</strong> In particular pursuing research aiming at finding uses that do not pose threats to public health, improving leaf quality, researching environmentally friendly methods permitting the use of plant health products.</td>
<td>Dairy: specific written contracts including prices (milk package) Olive oil, beef and veal, and arable crops: joint selling by POs</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>25</strong> In particular pursuing research aiming at finding uses that do not pose threats to public health, improving leaf quality, researching environmentally friendly methods permitting the use of plant health products.</td>
<td>Sugar: Collective negotiation provision not explicitly mentioned in Reg. 1308/2013 but rules for the sugar sector provide for the collective negotiation, price and quantity are part of the delivery contract(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>26</strong> The General Court considered in its decision T-432/2007 that this obligation requires the PO to be in control of the sale of produce including the setting of the sales price.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.2. Concluding remarks

The CMO Regulation relies on Producer Organisations as the main vehicle for producer cooperation (i.e. extension of the possibilities for agreements in all agricultural sectors) but the current legislative setting could lead to the paradoxical consequence of challenging the existence and/or creation of a PO.

First, there is no specific setting for a specific legal form for the recognition of a PO. For instance, cooperatives are among the most common organisational forms of establishment in the agricultural sector, especially in Eastern Member States, but they are not legally referenced. The derogation for the joint sale of produce by cooperatives does not appear clearly in the Single CMO regulation. Consequently, operations by cooperatives could be exempted only under the general exemption, if the conditions are fulfilled. The case of cooperatives provides a hint of the paradoxical situation that could be faced in the future.

Second, derogations differ widely across sectors without a clear justification why provisions do not apply in certain sectors.

- Joint selling and price setting are allowed in raw milk in the dairy sector.
- The possibility for contractual relations, including joint selling, is extended to olive oil, beef and veal, and arable crops but they require the fulfilment of additional conditions. Notably, the integration of certain activities by the POs to generate significant efficiencies (the so-called “significant efficiency test”). Moreover, additional powers for competition authorities were added as safeguards to intervene on a case-by-case basis and to review the relevant product market.  
- POs in the fruit and vegetable sector are required to sell the entire production of their members and according to the ECJ this requires the setting of prices, but there is no market share cap on POs which intend to engage in collective action.

Third, derogations on a case-by-case approach lead to legal uncertainty. Because of self-assessment, producers and their organisations, as well the national auditing authorities, need positive and clear examples specifying which practises are allowed and under what conditions. Exemptions to contractual negotiations, e.g. in the olive oil, beef and veal, and arable crops sectors need to be better qualified, showing consistency with the general exemption to agriculture. Conditions for collective negotiations in the sugar sector need still to be clarified, as well as those related to cooperatives.

Uncertainty, divergent interpretations and difficulties for POs in complying with minimum requirements for exemption may represent a deterrent to the existence/recognition of POs.

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27 Commission Guidelines on the application of specific rules set out in Articles 169, 170 and 171 of the CMO Regulation (2015/C 431/01)
4. BARGAINING IN THE AGRI-FOOD SYSTEM

**KEY FINDINGS**

- The difference between market power and bargaining power is a key distinction in agricultural policy.
  - Market power grants higher profits by reducing trade (action)
  - Bargaining power grants higher profits by threatening to withdraw from the transaction (threat)
- Strengthening farmers’ bargaining power does not necessarily determine a loss of efficiency in the market.
- Bargaining power is the result of two determinants: negotiation power (the ability of imposing the term of trade to the counterpart) and bargaining position (the ability of withdrawing from the transaction if the terms imposed by the counterpart are unfavourable).
- Agricultural policies aimed to strengthen farmers’ bargaining power should affect both negotiation power and bargaining position.

The analysis in the previous sections highlighted the rapid changes in the agro-food supply chains and the evolving regulation of the agricultural sector. In this context, Producer Organizations (POs) are a key policy tool aiming at two joint objectives: (i) reducing the role of public incentives in agricultural production decisions and (ii) pursuing the CAP objectives ex art. 39 TFEU. As discussed in Section 3, the recent CAP reform built on the positive POs performance in the fruit and vegeta
table and dairy sectors and developed a similar regulation for other sectors. A sound ex-ante evaluation of the reform requires a clear understanding of the economic mechanisms governing the functioning of POs and their role in agricultural markets. In this section we present a simplified theoretical model describing the implications of horizontal coordination for the organization of the agro-food supply chains. We focused our analysis on the bargaining implications of POs implementation. This choice allowed us to capture the essential effects of joint selling on the supply chain and to elaborate about the explicit objective of the derogations to the general competition rules, which is strengthening farmers’ bargaining power.28

We move our analysis from the comparison between the two most important Industrial Organization frameworks about power relationships: market power theory and bargaining power theory (Section 4.1). This comparison allowed us to elaborate on the welfare implications of joint selling. In Section 4.2 we developed a simple bargaining model illustrating how joint selling can improve bargaining outcomes for farmers.

4.1. Defining power: implications and modelling choices

Balancing power across the agro-food supply chain is a key concern in modern agricultural policy. Due to subsidy decoupling and, more in general, the CAP reforms in the late twenty

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28 "The purpose of the Derogation is to strengthen the bargaining power of producers in the sectors concerned vis-à-vis downstream operators in order to ensure a fair standard of living for the producers and a viable development of production” (Guidelines on the application of Articles 169, 170 and 171 of Regulation (EU) No 1308/2013 establishing a common organisation of the markets in agricultural products, p. 16)
years farmers are more exposed to the influence of ‘powerful’ agents (e.g., Russo et al 2011). A substantial literature has been developed to detect power and to assess welfare consequences (e.g., Perloff et al. 2007) but relatively few contributions have considered tools to balance power distributions.

The definition of power is a key issue in this field. The literature defines several kinds of powers and the choice of the most fitting definition is a critical modelling choice. In this section we compare four definitions: market power, bargaining power, buyer power and countervailing power. We argue that the choice of the right ‘kind of power’ has strong policy and welfare implications.

“The ability of a firm (or group of firms) to raise and maintain price above the level that would prevail under competition is referred to as market or monopoly power. The exercise of market power leads to reduced output and loss of economic welfare.” (Khemani and Shapiro 1993, p .57, similar definition in Perloff et al. 2007). The definition can be easily extended to include monopsony/oligopsony power, i.e., the ability to lower and maintain purchasing price below the perfect competition level.

Market power theory is based on two key assumptions: (i) the firm(s)’ actions influence the market equilibrium, (ii) firm(s) are aware of this influence and take it into account in their planning (optimization problem). A general conclusion deriving from this theory is that market power results in reduced trade and loss of economic welfare (e.g., Dockner 1993; Sexton and Zhang 2001). Powerful firms create artificial scarcity (of demand or supply) to benefit from higher profit margins. The value of firms’ oligopoly (oligopsony) rent is lower than the aggregate value of losses in other agents’ surpluses. This is the fundamental justification of policies aimed at safeguarding an acceptable degree of competition in the markets.

Bargaining power is a general notion in economics. It can be defined as “the power to obtain a concession from another party by threatening to impose a cost, or withdraw a benefit, if the party does not grant the concession.” (Kirkwood 2005). Unlike market power theory, the emphasis of the definition is on a specific negotiation among certain parties, disregarding the outcome at industry level.

In principle, both bargaining power and market power may result in lower prices or surplus transfers. The main difference is that market power achieves this result through the act of purchasing/supplying less, whereas bargaining power uses the threat of purchasing/supplying less. The key difference is that the exertion of market power always determines lower trade level compared to perfect competition, while this conclusion is not necessarily true in the case of bargaining power.

Buyer power concerns with “how downstream firms can affect the terms of trade with upstream suppliers” (OECD, 2009, p. 9). This general definition is considered an application of the bargaining power notion to the specific framework of buyer-supplier vertical relationships (e.g., Chen 2008). To our purposes, we define buyer power as bargaining power exerted by a buyer (for example a processing firm with respect to farmers). Similarly, we define seller power as the bargaining power exerted by a seller (for example an input provider with respect to farmers).

Countervailing power refers to the ability of offsetting, in whole or in part, the market and/or the bargaining power of another firm (e.g., OECD 2009). There is an extensive literature about this topic, starting from Shapiro cooperative theory (1923) and Galbraith’s
seminal paper (1952) (for an extensive review: Ruffle 2005). The notion is usually well received in agricultural policy debates, because it implies that public intervention in the farm sector might build countervailing power offsetting the power of downstream (or upstream) firms, without the need of regulating other industries. We define countervailing power as the bargaining power exerted by a weak firm, which is a firm that is exposed to other firms’ market/bargaining power.

The above-mentioned definitions are summarized and compared in Exhibit 5. The differences among the various types of power originate from two key parameters: (i) the contractual strength of the firm and (ii) how power is exerted.

**Exhibit 5: Types of power**

<table>
<thead>
<tr>
<th>Type of power:</th>
<th>Bargaining power</th>
<th>Market Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power mechanism:</td>
<td>Threat (to withdraw from the transaction)</td>
<td>Action (reducing trade)</td>
</tr>
<tr>
<td>Agent power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weak</td>
<td>Countervailing power</td>
<td>Bilateral market power</td>
</tr>
<tr>
<td>Strong</td>
<td>Buyer power</td>
<td>Oligopsony</td>
</tr>
<tr>
<td></td>
<td>Seller power</td>
<td>Oligopoly</td>
</tr>
</tbody>
</table>

For simplicity, we define agents in the negotiations as strong or weak. A strong agent can influence the governance of the supply chain, for example setting rules of trade or affecting prices directly. A strong firm exerts power by definition. A weak agent, instead, considers governance as an exogenous parameter. A weak firm is subject to somebody else’s bargaining or market power.

If power is exerted through the action of producing/supply less, we have market power. If, instead, it is exerted through the threat of withdrawing from the transaction, we have bargaining power. In the literature the position of the strong firm in the supply chain is used to categorize power. Literature refers to oligopoly if market power is exerted by a seller and to oligopsony in the case of a buyer. If the strong firm exerts bargaining power, the categories are seller power or buyer power, respectively.

Literature acknowledges that weak(er) agents can exert power. The exertion of bargaining power by a weak agent is usually defined as countervailing power, which is the buildup and use of bargaining power aiming at offsetting and balancing the power of the strong party in the transaction. If the weak agent reacts to the counterpart’s power by reducing trade (i.e., building up market power), we refer to a bilateral market power condition. ²⁹

Technical appendix 1 provides a brief analysis of the differences between bargaining and market power and the welfare implications of the two types of power. To the purpose of our analysis, a key conclusion from the appendix is of paramount importance.

**C1: Unlike market power, bargaining power does not necessarily leads to loss in social welfare.**

²⁹ In the existing literature, countervailing power is sometime used in market power frameworks as a synonymous of bilateral market power. We consider that the distinction between the two terms is of paramount importance because of the welfare implications of the two approaches.
The conclusion is supported by economic literature. For instance, Inderst and Wey (2007, p. 647) noted that buyer power “[…] can induce suppliers to undertake strategies that lead to higher output and potentially higher welfare” (similar conclusions in Iyer and Villas Boas 2003). Because bargaining power relies on threats rather than actions, it does not necessarily create scarcity. Economic theory supports the possibility that in bargaining power setting firms can agree on the efficient trade organization and then bargain over the distribution of the gain from trade (technical appendix 1). In such cases, power affects distribution without hampering efficiency.

This conclusion has major implications for the evaluation of PO regulation. If PO joint selling results only in increased bargaining power, without determining oligopoly power, the regulation does not necessarily undermine the efficiency of agricultural markets. In this case, strengthening farmers’ bargaining power would result in a more favourable distribution of value along the supply chain without producing scarcity (i.e., harming consumers). We summarize this point in the following lemma L1 from conclusion C1:

**L1:** PO joint selling does not necessarily reduce the efficiency of agro-food markets.

In section 5 we discuss L1 into details.

### 4.1.1. Choosing the right framework

The discussion in the previous section stressed the importance of choosing the right framework for economic analysis, because different definitions might lead to different conclusions about agricultural and competition policies effectiveness. In the following section we use a bargaining model to represent the vertical relationships along a stylized agro-food supply chain. Our choice is motivated by two considerations. Firstly, the CMO regulation explicitly mentions the bargaining power: one of PO objectives is strengthening farmers bargaining power limiting the negative impact on competition. Using a market power framework would hamper our ability to discuss such objective. Secondly – and more importantly – bargaining models are more effective in describing the complexity of the food system (e.g., the new trends described in Section 2) while the predictive power of market power models is being questioned (e.g., Sexton 2013; Crespi et al. 2012). More specifically:

1. Market power models predict scarcity. This conclusion is not consistent with the observed behaviour of retailing firms, who act as ‘big box’ stores.
2. Common market power models assume non-cooperative behaviour. This assumption is not consistent with the high degree of coordination that is observed along the agro-food supply chain (e.g., contracts, etc.) especially in organized supply chains.
3. Market power models focus on prices and quantities. This focus is not consistent with the observed reality of the agro-food system. Price and quantity are just two components of complex contracts which include many other dimensions such as payment delay, quality, integrated logistics, risk allocation, promotions, trade spending. Bargaining models can easily accommodate important features of retailer-supplier contracts such as trade spending (Allain and Chambolle, 2005).

For these reasons, we decide to develop a simple bargaining model describing the fundamental economic principles of PO operations.

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30 In the standard market power framework, instead, the two decisions are simultaneous.
4.2. A simple bargaining model

The purpose of this section is to develop the simplest possible bargaining model able of illustrating the basic functioning of POs. We start with a bilateral bargaining model with only two firms and then we expand the model to incorporate multiple sellers. The effects of PO joint selling are modelled as a reduction in the number of sellers.

Consider a buyer and a seller negotiating about a trade opportunity. The buyer acts as middleman between the supplier and the consumers. He buys a product X from the supplier and sells it to the consumer. The negotiation is successful if buyer and seller agree on the quantity supplied, the wholesale price and all other contract terms (lump-sum transfers such as trade spending, etc.). If the negotiation is successful a contract is written, trade happens and parties share the total surplus according to the rules agreed upon in the contract. If the negotiation fails, trade does not happen and parties gain the profits from the next best available alternatives (the so-called disagreement payoffs or outside option profits).

Standard bargaining theory describes this class of problem using the generalized Nash bargaining solution (e.g., Muthoo 1999; Napel 2012). In this framework, the outcome of negotiation is driven by two main parameters: negotiation power and bargaining position. The distinction between the two notions is of paramount importance.

4.2.1. Bargaining position

The bargaining position is the firm’s stake. It is given by the difference in a firm’s profits between successful or unsuccessful negotiations (e.g., Dukes et al. 2006). The more a firm loses in case of negotiation failure, the weaker is its bargaining position. The disagreement payoffs (i.e., the profits in the case of negotiation failure) play a key role in determining the bargaining outcome because no rational firm is willing to trade if the transaction makes them worse-off. Bargaining position is related to firms’ outside options, which are the trade alternatives to the current bargain. In our example, a supplier with profitable alternatives to the considered transaction may achieve a more favourable negotiation outcome than a firm with no other option than selling to the middleman. This general principle is consistent with market power theory as well. In several market power studies the intensity of market power in an industry is negatively associated to the number of firms, implicitly assuming that the lower the number of firms, the fewer (and worse) are the outside options of counterparts (e.g., Appelbaum 1982). Nevertheless, the bargaining perspective is more general, because it considers the multiple dimensions of the outside options, not just the number of possible trade partners.

4.2.2. Negotiation power

Bargaining position is not sufficient to characterize a negotiation outcome. Other factors might affect the result such as the ability of imposing negotiation rules, negotiation skills,

31 The solution vector of contact terms (including prices) is obtained as the maximand of the product: \( n \cdot (t_s - d_s)^{\lambda} \cdot (t_r - d_r)^{\lambda} \) where \( n \) is the payoffs (profits) from a successful negotiation, \( d \) is the disagreement payoffs, \( t \) is the vector of negotiation terms (in this case, wholesale price) and subscripts \( r \) and \( s \) refer to supplier and retailer respectively. The parameter \( \lambda \) captures all factors that may affect the outcome of the process, including negotiation tactics, bargaining rules, information, risk attitudes and preferences (Muthoo 1999).

32 Economic literature often refers to the ability of choosing a point in the negotiation space as «bargaining power». In order to avoid language ambiguities we use "bargaining power" as a general term to describe the ability to impose contract terms (similarly to the legal jargon of the CMO regulation). We use negotiation power to indicate the ability of choosing among the possible outcomes (the economic concept of bargaining power).
patience, technical constraints, risk attitudes and information. Literature refers to these factors as negotiation power (e.g., Iyer and Villas-Boas 2003, Dukes et al. 2006, Draganska et al. 2010). For instance, a large buyer can hire an expert negotiator to manage the supply channel and obtain more favourable terms. Large supermarket chains may impose early negotiations to supplier, so that they can bargain without the need of an urgent delivery. A multi-sector firm might be willing to take a more aggressive (and risky) stance in the negotiation than a specialized counterpart, as the risk of failure can be hedged within their product portfolio.

4.2.3. Negotiation space and negotiation outcome

Successful negotiations determine an agreement among parties. The content of the agreement is defined as negotiation outcome. Negotiation outcomes are a function of parties’ bargaining position and power. The set of possible negotiation outcomes that all parties are willing to accept is defined as negotiation space. Summarizing, the parties’ bargaining positions determine the negotiation space and the parties’ bargaining power determines which point in the negotiation space becomes the negotiation outcome.

Exhibit 6 summarizes the key concepts of bargaining theory, providing a glossary of terms.

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**Exhibit 6: Bargaining Theory Glossary**

<table>
<thead>
<tr>
<th>KEY CONCEPT</th>
<th>DEFINITION</th>
<th>DETERMINANTS</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bargaining Position</strong></td>
<td>The ability of a firm to profitably reduce the counterpart’s negotiation space</td>
<td>Relative concentration 34</td>
<td>A dairy processor buying milk from several local dairy farmers has a strong bargaining position with respect to farmers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outside options</td>
<td>A unique local fruit and vegetable trader having access to global sourcing has a strong bargaining position with respect to local suppliers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cost of failure</td>
<td>A farmer who is forced to shut down operation if the transaction fails has a weak bargaining position</td>
</tr>
<tr>
<td><strong>Disagreement payoff</strong></td>
<td>Alternative profits achieved by a party if negotiation fails</td>
<td>Same as bargaining position</td>
<td></td>
</tr>
<tr>
<td><strong>Negotiation space</strong></td>
<td>The set of negotiation outcomes parties might be willing to accept 35</td>
<td>Parties’ disagreement payoff</td>
<td>A farmer able to sell the product to another buyer for 0.20 €/kilo, will not accept a lower price from the counterpart</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total gain from trade (TGT)</td>
<td>Marketing margins: difference between farmers’ cost of production and buyer’s net revenues 36</td>
</tr>
</tbody>
</table>

---

33 Game theory often refers to negotiation power defined in section 4.2.3 as « bargaining power ». In order to avoid language ambiguities, we prefer to use « negotiation power » to prevent misunderstanding with general definition in section 4.1.

34 Relative concentration and outside options are related concepts.

35 In a bilateral negotiation, Negotiation space = max{0, TGT - Σdisagreement payoff}

36 Buyer’s net revenues are equal to the buyer’s total revenues minus its marketing costs.
### Negotiation power

<table>
<thead>
<tr>
<th>Negotiation outcome</th>
<th>Information asymmetries</th>
<th>Negotiation power</th>
</tr>
</thead>
<tbody>
<tr>
<td>The ability to impose a negotiation outcome that is as close as possible to the most desired point in the negotiation space</td>
<td>A firm with more information consumer willingness to pay for a product can obtain a favourable outcome on a counterpart with less information</td>
<td>Sourcing procedures imposed by supermarkets</td>
</tr>
<tr>
<td>Ability to impose negotiation rules</td>
<td>Patience</td>
<td>A part with high need for liquidity might be force to accept unfavourable terms</td>
</tr>
<tr>
<td></td>
<td>Negotiation skills</td>
<td>A highly trained negotiator might obtain favourable deals from unskilled farmers</td>
</tr>
<tr>
<td></td>
<td>Risk attitudes</td>
<td>A highly risk averse firm might be willing to concede good terms to the counterpart in order to avoid the risk of negotiation failure</td>
</tr>
</tbody>
</table>

### Negotiation outcome

<table>
<thead>
<tr>
<th>The content of the agreement</th>
<th>Negotiation power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bargaining positions</td>
<td></td>
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</tbody>
</table>

#### 4.2.4. A simple representation of bilateral bargaining

Figure 8 summarizes the key elements of a simple bilateral bargaining. In our example, the middleman and the supplier bargain over the total gain from trade (TGT), using a lump-sum transfer. Assuming a zero-sum game greatly simplifies the example. In theory, the TGT can be broken down into three areas:

(i) The supplier’s disagreement payoff (yellow area in Figure 8). This area is equal to the surplus that the supplier would receive from the next best alternative if the transaction fails. Clearly, if the middleman offers a share of TGT that is smaller than the disagreement payoff, the supplier can credibly threat to withdraw from the trade.\(^{37}\)

(ii) The middleman’s disagreement payoff (red area in Figure 8) is his/her surplus from the next best outside option. The middleman can credibly threat to fail any negotiation resulting in a lower share of TGT than the disagreement payoff.

(iii) The difference between the TGT and the aggregate disagreement payoff (if positive) is the negotiation space (orange area in Figure 8). The boundaries between the disagreement payoff areas and the negotiation space are the agents’ bargaining positions.

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\(^{37}\) Even in the case of bilateral negotiation, parties may have non-zero disagreement payoffs. Farmers, for example, may use products for self-consumption or as inputs (fertilizer, feedstuff). Similarly, retailers may have a return from selling consumers other products (e.g., using shelf-space to trade other product-categories).
**Figure 8: Bilateral, zero-sum bargaining**

Any point in the negotiation space is a feasible negotiation outcome because no agent can credibly threaten the other to fail the trade. The specific outcome within the negotiation space depends on the relative magnitude of negotiation power. If the middleman has a strong negotiation power compared to the supplier, then the outcome transfer is closer to the supplier’s bargaining position than to the middleman’s one. Vice versa, if the middleman is relatively weak, the outcome is close to his/her position.

Box 3 provides an illustrative example of key concepts in bargaining theory.

**Box 3: Example of bargaining theory concepts.**

**Example of bargaining setting**
Consider a firm Y producing oranges with a constant marginal cost of production of 0.5€/kg willing to negotiate with a retailer Z. The parties negotiate only on price. Assume that if the negotiation fails, Y can sell the goods to the processing industry for 0.6€/kg. Z knows that (i) consumers are willing to pay 1€/kg for the product and (ii) if the transaction fails they can gain a margin of 0.2€/kg from the sale of a substitute product (tangerines). In this simple example:

- **Y’s bargaining position** is 0.6€/kg (the processing industry price)
- **Y’s disagreement payoff** is 0.1€/kg (processing industry price minus per-unit production cost)
- **Z’s disagreement payoff** is 0.2€/kg (the margin from selling tangerines)
- **Z’s bargaining position** is 0.8€/kg (higher prices paid to the seller implies that Z would obtain lower margins than the disagreement payoff)

The negotiation space is the range [0.6€/kg, 0.8€/kg]: both parties are willing to accept an outcome within that range.

The actual outcome depends on the relative negotiation power. If Z is strong compared to Y, the outcome will be close to the lower bound (for example: 0.61 €/kg). If Z is weak, the outcome will be close to the upper bound (for example: 0.79€/kg).
### 5. REBALANCING BARGAINING POWER IN THE AGRI-FOOD SUPPLY CHAINS THROUGH PRODUCER ORGANIZATIONS

<table>
<thead>
<tr>
<th>KEY FINDINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>About PO efficiency</strong></td>
</tr>
<tr>
<td>- PO joint selling does not necessarily determine a loss in market efficiency.</td>
</tr>
<tr>
<td>- The rules governing the PO-member interaction may have direct implication on competition and efficiency in the downstream markets.</td>
</tr>
<tr>
<td><strong>About PO effectiveness</strong></td>
</tr>
<tr>
<td>- The ability of POs to rebalance power in practice is an open question.</td>
</tr>
<tr>
<td>- The possibility of rebalancing power distribution is greatly affected by the negotiation rules, the type of food chain and the structure of the industry.</td>
</tr>
<tr>
<td>- In general PO joint selling is expected to affect positively farmers’ bargaining position and negatively the buyer’s one. The magnitude of the effect depends on the structure of the downstream (upstream) market.</td>
</tr>
<tr>
<td><strong>About PO design</strong></td>
</tr>
<tr>
<td>- A ‘too small’ PO might be ineffective in improving farmers’ bargaining power. A ‘too large’ PO might incur in significant coordination costs.</td>
</tr>
<tr>
<td>- The structure of downstream (and upstream market) is a critical determinant of the optimal size. The more the buyers (or input suppliers) are consolidated the larger is the optimal size.</td>
</tr>
<tr>
<td><strong>About efficiency gains</strong></td>
</tr>
<tr>
<td>- Efficiency gains are a necessary condition for win-win agreement in the supply chain.</td>
</tr>
<tr>
<td>- Farmers can retain the value of the efficiency gain that is captured in the disagreement payoff (non-specific investment).</td>
</tr>
<tr>
<td>- A PO can defend farmers’ efficiency gains from specific investment only if its bargaining power is not negligible.</td>
</tr>
<tr>
<td><strong>About PO strategy</strong></td>
</tr>
<tr>
<td>- PO objective should consider not only strengthening bargaining power, but also improving bargaining flexibility.</td>
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</table>

The bargaining framework allows us to discuss the implications of the new CMO regulation on the negotiation outcome in the trade between farmers and buyer or farmers and input-providers. We focus our analysis on Producer Organizations (POs), given the relevance of this policy tool in the reformed CAP. In the following sections we outline the key conclusions, leaving the analytical proofs to the technical appendix.

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38 For simplicity we avoid referring to APOs, even though the analysis can be extended immediately to associations.
Using a bargaining perspective, we describe the overall effect of the regulation with its impact on the bargaining position and power of the firms of stylized supply chain. More specifically, we assume that there are four types of agents: input suppliers, farmers, middlemen and consumers. Three transactions happen along the chain: (i) input suppliers sell inputs to farmers, (ii) farmers sell agricultural products to middlemen, and (iii) middlemen sell to consumers. For clarity and simplicity, we focus our attention on transaction (ii), but our conclusions can be easily extended to type (i) transaction. We use economic theory and reasoning to describe how regulation might impact the bargaining between input suppliers and farmers and between farmers and middlemen.

To understand the impact of POs on the supply chains, we consider three main questions: (i) can a PO change the allocation of negotiation power along the supply chain? (ii) Can a PO credibly threat to withdraw from a transaction that individual farmers (in the absence of a PO) were forced to accept? Or in other words: does forming a PO affect the parties’ outside options and their bargaining position? (iii) What is the share of the PO’s benefits that farmers can retain (without being appropriated by other firms in the supply chain)?

In the next section we apply this framework to discuss critical issues in Producer Organizations (POs). In section 5.1 we present a brief discussion of the PO impact on negotiation power, while section 5.2 develop a simple model of sequential bargaining explaining how POs’ joint selling can affect bargaining issues. From section 5.3 to 5.6 we build on these results to explain the critical issues of POs.

5.1. PO and negotiation power

In theory, horizontal integration and joint selling can result in stronger bargaining, or at least in an improved ability to resist to counterparts’ negotiation power. Organized farmers might have access to resources, services, capital or information to support the negotiation activities that would be impossible to be achieved by individual producers. Box 4 provided few examples of PO services or activities that might have an impact on the allocation of negotiation power.

Despite these opportunities, in practice, the actual ability of POs to reallocate negotiation power along the agro-food supply chain is an open question. The PO potential might be difficult to apply in practice, especially in conventional food supply chains driven by large retailers or processors. For example, the negotiation procedure imposed by large supermarket chains maximizes their negotiation power and even efficient POs might fail in countervailing such unequal allocation of power. The discussion in section 2 summarized the literature about this topic.

Box 4: PO and bargaining power

<table>
<thead>
<tr>
<th>Examples of PO services/activities rebalancing negotiation power</th>
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<tbody>
<tr>
<td><strong>Legal services in litigations about Unfair Trade Practices.</strong> In several Member States specific trade practices such as unwritten contracts, ex-post renegotiation, excessive payment delays are illegal (EC COM(2016) 32). A PO might be less vulnerable to the ‘fear factor’ discouraging weak firms from filing complaints or might have better access to legal services to sustain (or threat) litigations.</td>
</tr>
</tbody>
</table>
**Hiring trained negotiators.** Services of highly trained selling representatives are costly. Often, small farmers cannot afford them. A PO can achieve the necessary production volume to cover such fixed costs.

**Improved inventory management.** Patience is a key component of negotiation power. A PO can invest in efficient storage infrastructures attenuating farmers’ pressure to fast sales.

**Information management.** Information asymmetries can affect the result of negotiations. A PO can have better access than individual farmers to information such as demand fluctuations or final consumers’ willingness to pay for specific attributes. Such information may provide an edge in the negotiation with buyers.

**Buyer selection.** A PO might be able to screen buyers, choosing the ones with lower negotiation power among the available one.

Summarizing, POs have a potential for rebalancing negotiation power along the food supply chain. However, a review of empirical studies suggests that:

- **C2:** The actual ability of POs to rebalance power in practice is an open question.
- **C3:** The magnitude of the rebalancing is greatly affected by the negotiation rules, the type of food chain and the structure of the industry.

In the next sections we use the bargaining model to investigate the role of the PO in determining the bargaining position.

### 5.2. POs and bargaining positions

Joint selling is a key activity of POs. In this section we use the bargaining model from Section 4.2 to explain the basic link between horizontal integration and bargaining position. Here we illustrate the intuition of the model. The formal derivation is in Technical annex 2.

Consider a simple model of sequential bargaining among multiple agents. Each supplier and each buyer pick a random counterpart and start a bilateral negotiation. If the negotiation fails, they move on and negotiate with another partner. This model can be used to describe the horizontal integration process. We represent joint selling as a reduction in the number of suppliers in the market and we propose a simplified version of the Inderst-Wey model (2007).

Figure 9 illustrates the impact of a change in suppliers’ number on bargaining positions and negotiation outcome. In our example, a middleman and a supplier bargain over the gain from a trade. For simplicity, we assume that:

- the total gain from trade (TGT) is exogenous,
- the middleman and the suppliers have the same negotiation power (i.e., the outcome is obtained splitting the negotiation space into two equal shares).

Alternative allocations of negotiation power can be modelled by changing the exogenous proportion in splitting the negotiation space,
the value of the outside options (disagreement payoff) is non zero even if there are only one supplier and one middleman in the market\textsuperscript{39},
all players are perfectly informed and have truthful expectations. This assumption implies that all parties know the outcome of all possible trade in the market.\textsuperscript{40}

**Figure 9:** Bargaining positions and negotiation outcome as a function of suppliers’ number

If there are only one supplier and one middleman (first row of Figure 9), the bargaining positions are at the extremes of the segment (the dotted black marks): if negotiation fails, both firms achieve minimum payoffs. The negotiation space is defined by the difference between the TGT and the aggregate value of the disagreement payoffs. For convenience we define $NS_{1,1}$ the value of the negotiation space in the case of only one supplier and only one middleman, $DPS_{1,1}$ the corresponding supplier’s disagreement payoff, and $DPM_{1,1}$ the middleman’s payoff, such that $TGT = NS_{1,1} + DPS_{1,1} + DPM_{1,1}$.

The negotiation outcome is at midpoint of $NS_{1,1}$, due to the assumption of equal negotiation power, and - in this case only - the firms split the $NS_{1,1}$ in two equal shares, i.e., the supplier gains $\frac{1}{2}NS_{1,1} + DPS_{1,1}$ and the middleman gains $\frac{1}{2}NS_{1,1} + DPM_{1,1}$.

\textsuperscript{39} As discussed in footnote 36, even in the case of two firms the disagreement payoffs are not necessarily equal to zero. Figure 8 can easily accommodate the case of zero disagreement payoff: the yellow and red areas are zero and the negotiation space is equal to the TGT.
\textsuperscript{40} For example, consider a middleman negotiating with one firm out of three available suppliers. The assumption implies that the middleman knows exactly what the outcome from a negotiation from each of the two remaining suppliers would be in the case that the current negotiation fails.
Now assume that the middleman can engage in a sequential bargaining with two identical suppliers (second row in Figure 9). The middleman buys only from one supplier, but now has two possible negotiation partners. The middleman randomly chooses one supplier and starts negotiations. The presence of a second supplier changes the middleman’s bargaining position, because if the negotiation fails he/she can still buy from the other supplier in a bilateral bargain. Because of the assumption of truthful expectations the middleman knows that if the negotiation fails he still can obtain $\frac{1}{2}NS_{1,1} + DPM_{1,1}$ from the trade with the other supplier. This means that in this case the middleman disagreement payoff is $\frac{1}{2}NS_{1,1} + DPM_{1,1}$ (i.e., only the outcome from the bilateral negotiation with the other supplier). The middleman will not consider any outcome resulting in a smaller surplus than $\frac{1}{2}NS_{1,1} + DPM_{1,1}$. In this case, the middleman’s bargaining position is stronger and the negotiation space is smaller. In other words, the opportunity to trade with another supplier moves the negotiation space in favor of the middleman and to detriment of the suppliers. The firms bargain over a negotiation space worth $\frac{1}{2}NS_{1,1}$ (the orange area in the second row of Figure 9). The firms split the negotiation space in two equal segments worth $\frac{1}{4}NS_{1,1}$ each. As a result the negotiation outcome is $\frac{1}{4}NS_{1,1} + DPS_{1,1}$ to the supplier and $\frac{3}{4}NS_{1,1} + DPM_{1,1}$ to the middleman.

The same reasoning applies to a sequential bargaining with three suppliers. When negotiating with the first suppliers, the middleman knows that he/she can obtain $\frac{3}{4}NS_{1,1} + DPM_{1,1}$ from the sequential bargaining with the other two suppliers and will not accept any inferior outcome. Therefore his/her bargaining position is stronger and the negotiation space is smaller than in a two-supplier case. Now the final outcome is $\frac{1}{8}NS_{1,1} + DPS_{1,1}$ for the supplier and $\frac{7}{8}NS_{1,1} + DPS_{1,1}$ for the middleman.

A similar reasoning suggests that in the case of four suppliers the outcome is $\frac{1}{16}NS_{1,1} + DPS_{1,1}$ for the supplier and $\frac{15}{16}NS_{1,1} + DPM_{1,1}$ for the middleman. In general, this framework result in a supplier surplus that is equal to $\frac{1}{2^n}NS_{1,1} + DPS_{1,1}$, where $n$ is the number of suppliers.

This result supports the following conclusions:

**C4**: The larger the number of potential suppliers, the stronger is the buyer’s bargaining position and the more favorable is the negotiation outcome for the buyer.

Figure 10 reports supplier’s share of the TGT as a function of the number of suppliers in the market, for illustrative parameter values. The function follows a geometric decay process, meaning that the share falls sharply when there are few suppliers in the market, slowing down in a fragmented market. The process converges to the value $DPS_{1,1}$ (the dotted black line in Figure 10). For a concise jargon, we define a middleman’s bargaining position such that the negotiation space is zero as a ‘take-all’ position.

The numerical simulation shows that the speed of the decay depends on the distribution of the negotiation power: the stronger the middleman, the faster is the decrease in supplier’s share.

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41 Due to the sequential bargaining framework, if the current negotiation fails, the middleman will negotiate with the remaining supplier as if it was the only one in the market and the model reverts to the previous case.
The model concludes that small POs might be unable to significantly alter the negotiation outcome. In the numerical simulation in Figure 10, POs reducing the number of firms from 25 (or more) to 10 fail to achieve a significant benefit for farmers, unless the middleman is weak. This result suggests the following lemma to conclusion C4:

**L2:** ‘Too small’ POs might fail in improving farmers’ bargaining position.

Although the results of the numerical simulation in Figure 10 are illustrative, it must be noted that in the Strong middleman scenario n=4 is sufficient to leave suppliers only with a minimal share of TGT equal to DPS\(_{1,1}\). This result suggests that in the presence of strong buyers the cap to the PO’s market share might have a non-negligible effect on the distribution of the gain from trade.

Figure 10 has been derived assuming that there is only one middleman in the market, for consistency with Figure 9. Obviously, if the number of potential buyers increases the outcome changes. The model predicts that – keeping everything else constant – the supplier’s share of TGT increase with the number of middlemen in the market. This outcome is consistent with existing analyses about industry concentration. The graph highlights two further results of particular importance: (i) the PO market share/size necessary to achieve a non-negligible share of TGT increases with the degree of concentration of the downstream industry and (ii) the marginal benefit of reducing the number of suppliers (i.e., increasing the PO size) increases with the degree of concentration of the downstream market. The model concludes that when downstream

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The parameters for the numerical simulation are: TGT = 1, DPM\(_{1,1}\) = 0.05, DPS\(_{1,1}\) = 0.05, number of middlemen = 1. The Strong middleman scenario assumes that the middleman captures 75% of the negotiation space; in the Strong supplier scenario the middleman captures 25%. The Equal power scenario assumes 50% splitting, as in Figure 8.
industry is highly consolidated, small POs might be ineffective. These results support the following lemma:

**L3:** The effectiveness of a PO in improving farmers’ bargaining position depends on the concentration of the downstream market. The more the downstream sector is consolidated, the larger the size of the PO should be.

### 5.3. Efficiency gains

The model from the previous section can be used to identify and model critical issues for Producer Organizations (POs). More specifically, we focus our attention on four topics: (i) efficiency gains (ii) structure of downstream markets and net effects of POs on farmers’ bargaining position, (iii) joint selling, dominant position and trade efficiency, and (iv) power vs. flexibility: promotion and marketing. In this section we address the first issue.

#### 5.3.1. Taxonomy of efficiency gains

A PO can provide efficiency gains in several ways. To the purpose of this study the distinction between production economies (scale, scope or density) and transaction cost reduction is of particular importance (for an extensive analysis of PO efficiency see Van Herck 2014).

Production economies define those activities such that an increase in volume (economies of scale), in variety (economies of scope), or in the number of firms (economies of density) brings an increase in efficiency. POs can play a role in production economies by fostering horizontal concentration. In this way they can increase the traded volume, build up assortment and promote cooperation among neighbour firms. Examples of activities bringing economies of scale might be: joint transportation, joint processing, joint input purchasing etc. Examples of economies of scope are related to the possibility of supplying multiple varieties to buyers (e.g., in the fruit and vegetable sector). Examples of economies of density might be the information and knowledge sharing among local members.

Transaction costs are the expenses that a firm might incur in when making an economic exchange (production costs excluded). Literature categorizes transaction costs into three groups (e.g., Dahlman 1979):

- Search and information costs, referring to the costs of searching for information (for example, which counterpart offer the best condition, where to find the quality standards satisfying the downstream clients; which buyer valorises better the farmers’ products; etc.);
- Bargaining and decision costs, i.e., the costs of coming to acceptable terms with the counterpart (for example, the time spent negotiating, the cost of writing contracts, etc.);
- Policing and enforcing costs are the expenses that a firm must pay to make sure that the counterpart honours the contract and to take action in case of defection.

It is important to point out that POs’ joint selling activity is expected to reduce the former two types of transaction costs. Although the buyer might suffer for the lessening of competition among sellers, he/she can save the cost of searching and negotiating with a large number of suppliers. The net effect of the negative (less competition) and positive (lower transaction costs) implications of joint selling is an empirical question that cannot be answered in theory.
Anecdotal evidence supports the conclusion that strong buyers attach a value to the reduction of transaction and negotiation costs. In conventional supply chains strong leaders, such as retailers or processors, have encouraged farmers to form POs in order to reduce the number of negotiations and foster coordination. This strategy is consistent with the results from section 5.2: if the number of suppliers is high enough, a small degree of consolidation does not significantly alter the middleman bargaining position. Consequently the negotiation and coordination costs may considerably decline, whilst the loss in the negotiation outcome may be negligible.

5.3.2. A bargaining perspective

Efficiency is a key issue in the competition analysis of joint selling. In particular, Reg. 1308/13 states that in the sectors of olive oil, beef and veal, and arable crops:

"[a] producer organization fulfils the objectives mentioned in this paragraph provided that the pursuit of these objectives leads to the integration of activities and this integration is likely to generate significant efficiencies so that the activities of the producer organization overall contribute to the fulfilment of the objectives of Article 39 of the Treaty" (art. 169, 170, 171).

Efficiency gains are a prerequisite for authorization of joint selling activities in these three sectors (but not in fruits and vegetables or dairy). The rationale for this provision is clear. The achievement of significant efficiency by the PO changes the bargaining from a zero sum game into a positive sum game. In theory, if the efficiencies are large enough, the PO could be beneficial for the bargaining counterpart as well.\textsuperscript{43}

Figure 11 illustrates the negotiation outcome. Consider two suppliers joining a PO. In the absence of efficiency gains, the suppliers achieve higher surplus at the middleman’s expenses. The suppliers’ surplus increase (purple line in Figure 11) is financed by a decrease in middleman’s surplus, as in a typical zero sum game.

Efficiency gains increase the TGT (as in row three of Figure 11). In our example, suppliers can achieve higher surplus while the middleman keeps the same surplus as in the no-PO case.\textsuperscript{44} In this case, the PO is beneficial to suppliers without hurting the middleman. With efficiency gains the PO becomes a win-win agreement: suppliers benefit from a stronger bargaining and middlemen can benefit from the improved efficiency.

\textsuperscript{43} Efficiencies are a necessary (but not sufficient) condition for the Pareto optimality of POs.

\textsuperscript{44} The outcome is just an illustrative example based on simulation parameters of our choice, and it is no general result.
5.3.3. Appropriation of efficiency gains

The model from section 4.2 suggests that a firm holding a strong negotiation power or facing a fragmented industry can take a large share of the available value. In extreme conditions, the weak firm can be left with a value equal to its disagreement payoff while the strong one can take the remainder of the TGT.

This conclusion implies that the distribution of the efficiency gains might be a critical issue. If farmers are weak and their trade counterpart is strong, the benefits from the PO’s efficiency gains can be extracted from farmers being appropriated by the counterpart. For instance, consider a dairy PO receiving for milk a price that is exactly equal to its per-unit cost of production (say 0.35 €/l). In order to support farmers’ income, the PO invests in a production facility lowering the production cost to 0.3 €/l. The investment provides an efficiency gain of 0.05 €/l. The members’ value depends on the buyer bargaining power. Indeed, the buyer can capture a share of the gain simply by offering a lower price. In this case, members’ net benefit depends on the PO ability to counter buyer’s power. This implies that (i) the bargaining position of the buyer leaves a non-empty negotiation space (see Figure 9) and (ii) the PO has a non-negligible negotiation power.

In this example, if POs can negotiate effectively, they can keep at least a share of the efficiency gains. Noticeably, this point establishes a two-way link between bargaining and efficiency gains. Efficiency gains obtained in a fragmented farming industry are not easily defensible and can be extracted easily by the counterpart. Thus, POs appear as a tool to preserve efficiency value for farmers.

The theoretical model suggests that a key element in the appropriation of efficiency gain is the effect on the PO’s bargaining position. Often, efficiency gains are the result of

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45 Agricultural economists have developed a sizable literature about farmers’ benefits from innovation that can be extended to the study problem. For example Cochrane (1958) or Alston et al. (1997) provide useful analyses under perfect competition and market power assumptions, respectively.
investments by the PO. If the new investment is specific to the transaction underlying the negotiation, the PO’s disagreement payoff does not increase, the bargaining position does not improve and a strong counterpart can extract the efficiency gain partly or entirely. Instead, if the investment grants the PO efficiency gains even when allocated to support other transactions, the value of the PO’s disagreement payoff increases and the bargaining position improves. Theory suggests that PO should focus on non-specific efficiency gains to avoid worsening the bargaining outcome.

**Figure 12: Specific and non-specific PO investments.**

Figure 12 illustrates the differences between a specific and a non-specific investment which occurs if the buyer’s negotiation power is prevailing. If the PO invests in a specific activity, the efficiency gain is negotiable and becomes part of the negotiation space. Consequently, it is split into shares that are proportional to the parties’ relative negotiation power (in this figure, 1/3 for the PO and 2/3 for the middleman). This because the supplier’s disagreement payoff does not change and the efficiency gain vanishes if the negotiation fails. In the case of a non-specific investment, instead, the PO can capture the entire value. The efficiency gain expands the area of the supplier’s disagreement payoff. The value is kept even if the negotiation fails and therefore the PO can credibly threat to withdraw from the negotiation if the middleman tries to extract the efficiency gain.

Summarizing, the theoretical analysis supports the following conclusions:

**C5:** efficiency gains are a necessary condition for win-win agreement in the supply chain.

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46 An investment made to support a given transaction is specific if its value decreases significantly when it is allocated to other uses. For example, an investment in dairy equipment is specific if the local dairy market is a monopsony. If the transaction with the monopsonist fails, the farmer must change production and the equipment becomes useless.

47 Examples of such non-specific investment might be: joint quality control, joint logistics, joint on-farm operations, and all those investments which value does not change with the buyer. Examples of specific investments might be: integration with the buyer’s logistics, product customization, packaging customization, and all those investments that might lose a share of value if the transaction fails.
C6: farmers can retain the value of the efficiency gain that is captured in the disagreement payoff (non-specific investment).

C7: PO can defend farmers’ efficiency gains from specific investment only if its negotiation power is not negligible and the middleman has not a ‘take all’ bargaining position.

5.4. Joint selling and market power

A key issue regarding POs’ joint selling activities is the concern that joint selling activities can foster market power, i.e., that strong POs can impose higher prices by the means of quantity restriction. Although empirical evidence in this regard is missing, economic theory suggests that if members are free to adjust their production and membership is open, POs have low capability to restrict quantity.

For instance, in a classical paper Helmberger and Hoos (1962) conclude that if a cooperative (or in our case POs) offers better prices to members, the short and long run effect is an increase in participation and therefore, in traded quantity. The economic reasoning is simple: if a collectively-bargaining PO obtains higher prices, members have incentive to increase production and non-members farmers have incentive to join. The cumulative effect is a link between price increase and quantity increase that prevent POs from generating scarcity. This result relies on a specific set of assumptions (Sexton 1995, p. 95):

- The organization accepts members’ entire production,
- Members are treated uniformly,
- Members are bound contractually to deliver their entire production to the organization,
- Members act as price-takers in dealing with the organization,
- The organization operates at cost, i.e., subject to a break-even constraint.

For convenience, we refer to this set of assumptions as the Helmberger and Hoos conditions (HHc). A regulator willing to prevent POs from exerting market power should pay attention to the institution presiding the interaction with members.

In our opinion, the HHc should be carefully evaluated in the design of PO regulation. Our analysis supports the following conclusion:

C8: The rules governing the PO-member interaction may have direct implication on competition and efficiency in the downstream markets.

5.5. Joint selling and farmers’ bargaining position

The model from Figure 9 suggests that the middleman bargaining position worsens as the supplier industry gets more and more consolidated. As the middleman’s disagreement

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48 Noticeably, existing regulation (e.g., the milk package) allows POs to restrict supply (i.e., build market power). Nevertheless, supply restrictions are constrained to specific circumstances (for example, PDOs) and must be explicitly stated in the regulation. These provisions should be considered as specific exceptions, motivated by relevant public interests. In these cases the regulator is balancing a trade-off between two socially desirable objectives: market efficiency and protection of specific targets (for example, producers of typical products).

The general framework of PO regulation seems to put a special consideration in preventing bargaining power from turning into market power. In our opinion, the general provision in the CMO regulation art 152 c (i) about “ensuring that production is planned and adjusted to demand, particularly in terms of quality and quantity” refers to an efficiency principle (for example preventing shortage or overproduction), not to the use of market power.
payoff shrinks, the negotiation space grows and – holding negotiation power constant – the negotiation outcome is expected to be more favourable to suppliers.

Yet, this simple model does not consider the impact of supplier concentration on the bargaining position of suppliers themselves. Two opposite effects are possible:

- Concentration improves bargaining position. By joining into a PO, farmers might have access to new marketing channels that would be unfeasible to pursue individually. For example, larger buyers or international traders might be interested in the larger volumes offered by the PO, while disregarding small producers. Joint investments in quality control might have similar effects. New buyers or new markets are alternative trade opportunities that can increase the firm’s disagreement payoff and improve the bargaining position.

- Concentration worsens bargaining position. Small farmers can trade in local markets and sell to a large number of small buyers. In theory a large PO can do the same, but with much larger transaction costs. Consider a very large PO, close to the maximum market share of the relevant market. Such PO will trade with large buyers preferably because dealing with a large number of small buyers implies very high negotiation and information costs. If the number of large buyers is low, concentration has two negative effects: (i) it might reduce the number of feasible buyers (worsening the bargaining position) and (ii) it constraints the PO to deal with firms that presumably have high negotiation power.49

Again, the relative magnitude of the positive and negative effects is an empirical question. The answer depends on the structure of the downstream (or upstream) market and the nature of the transaction costs.

The model suggests that the optimal size and features of a PO depends on the specific characteristics of the market. In principle, there is no certainty about the superior performance of a large PO with respect to a smaller one. The result can be summarized in the following conclusions:

**C9: In general PO joint selling is expected to affect positively farmers’ bargaining position and negatively the buyer’s one. The magnitude of the effect depends on the structure of the downstream (upstream) market.**

For instance, consider a group of farmers facing few global big traders. In this case, forming a PO improves farmers’ bargaining position and possibly negotiation power. The net benefit is expected to be non-negative. Now, consider the same group of farmers facing many small local buyers whose market share is negligible. The PO net result for farmers depends on the relative magnitude of benefits.

### 5.6. Negotiation power and bargaining flexibility

In today’s food system shifting negotiation power is not an easy task. A (relatively) small number of firms organize the governance of the supply chain, setting rules and parameters for transactions.50 Such power can be extremely resilient and difficult to counter with limited horizontal concentration. It seems unlikely that medium-scale POs are able to dictate terms to retailers’ central purchasing groups. Box 4 reported examples of possible actions POs can take to counter strong buyers’ power. The effectiveness of such tools

49 A possible solution for the coordination problem is allowing farmers to directly sell part of their production to small buyers. The PO would be in charge of negotiation with large buyers, while farmers would negotiate with small buyers. This solution can improve bargaining flexibility and lower negotiation costs.
depends on the specific conditions: it is affected by the institutional framework (for example, regulation about unfair trading practices), the starting allocation of negotiation power (for example, the possibility for the buyer to offer take-it-or-leave deals) and the starting bargaining position (for example, if the buyer is in a ‘take-all’ position, working on rebalancing negotiation power might be useless).

PO can provide benefits to members by affecting bargaining positions. The theoretical model suggests two main contributions. Fostering horizontal concentration POs can (i) worsen buyers’ position, and (ii) improve farmers’ position. The effect of such action is a more favourable negotiation outcome. Point (i) has been discussed in Section 5.2, point (ii) requires a more detailed discussion.

In Section 5.5 we found that the effect of horizontal concentration on farmers’ bargaining position depends on market structure. However, PO can improve farmers’ position by expanding the value of their disagreement payoff. The effects of such strategy are unambiguous. By expanding the disagreement payoff, POs can restrict the negotiation space and – holding everything else constant – obtain a more favourable outcome. For simplicity, we refer to the actions aiming at expanding the disagreement payoff as building ‘bargaining flexibility’, meaning that the PO has a more flexible marketing approach. This objective is consistent with current regulation. For instance, the Reg. 1308/13 lists joint investments in quality and promotion among the required activities for efficiency gains.51 These activities may expand farmers’ trade options and facilitate the building of new marketing channels. A PO having the opportunity to sell to multiple channels can be more credible when threatening to withdraw from trading with one partner than a captive supplier. Noticeably this strategy is fully compatible with the current anti-trust regulation, as the PO might – under specific circumstance - become a tool to increase the degree of competition in the market.

Considering the discussion in Section 5.3.3, investments expanding the PO’s outside options are particularly desirable. They improve the bargaining position and are less vulnerable from strong buyers’ appropriation. The results are summarized in the following conclusion:

C10: Investing in ‘bargaining flexibility’ is a key objective for POs.

This conclusion is particularly important from a policy perspective. Public support to POs (e.g., rural development funds) should favour investments in bargaining flexibility over transaction-specific investments.

5.7. Concluding remarks

The theoretical model identified the basic economic mechanism allowing POs to rebalance bargaining power along the food supply chain. Figure 13 summarizes the key findings. Assume that farmers are bargaining with a buyer over the value of a trade. The PO can improve the final outcome in three ways:

- Effects on negotiation power. The PO can improve farmers’ ability to negotiate with the buyer (see Box 4). A PO can hire professional negotiators, has better access to legal services, and more in general has access to human, financial and

50 Supply chains of large retailers or processors are examples of such strict governance. The buyers decide not only the contract features but also set the rules for the negotiation process (timing, procedures, etc.).
51 Paragraph 1, sub-paragraph 3 point (a) and (b) of Articles 169, 170 and 171
technical resources that are unaffordable for the single farmers. Such access can improve the ability to counter buyer power.

- **Effects on buyer’s bargaining position.** PO’s horizontal integration can reduce buyer’s trade options, worsening its bargaining position (e.g., Figure 10). The reduction of the buyer’s disagreement payoff – holding everything else constant – increases the negotiation space, giving farmers the opportunity of appropriating of more value.

- **Effects on farmers’ bargaining position.** Associated farmers may have access to alternative marketing channels that are unavailable to individual firms. This implies that a PO can increase farmers’ disagreement payoff. If this is the case, the negotiation space is reduced to the buyer’s detriment and farmers can keep a higher share of the TGT.

**Figure 13: Rebalancing bargaining power: the role of PO**

The theoretical model suggests that PO can benefit farmers in several ways. Even if countering large buyers’ negotiation power might be difficult given the current structure of the agri-food supply chain, PO cans still act to improve members’ bargaining position by building alternative marketing channels. Noticeably, this strategy is fully compatible with competition regulation.
6. POLICY OPTIONS AND RECOMMENDATIONS

6.1. Policy scenarios

The institutional analysis in section 3 and the theoretical model in section 5 identified critical points in the current PO regulation.

The strengthening of the standing of farmers in the agricultural value chain is a declared objective of the European legislator for changes of the CAP legislation (together with other voluntary initiatives) within the 2013-2020 CAP reform. In the previous chapters we have examined the current CAP setting and highlighted main features, and possible threats to accomplish the declared objectives. Briefly, we have stressed that provisions may be not be effective in challenging the existence and/or creation of POs.

First, there is no specific setting for a specific legal form for the recognition of a PO. For instance, cooperatives are among the most common organisational forms of establishment in the agricultural sector, especially in Eastern Member States, but they are not legally referenced. The derogation for the joint sale of produce by cooperatives does not clearly appear in the Single CMO. Consequently, operations by cooperatives could be exempted only under the general exemption, if the conditions are fulfilled. The case of cooperatives provides a hint of the paradoxical situation that could be faced in the future.

Second, derogations differ widely across sectors without a clear justification why provisions do not apply in certain sectors. The most relevant examples are:

- Joint selling (and price setting) is allowed for raw milk in the dairy sector.
- Contractual relations provisions are extended to olive oil, beef and veal, and arable crops under the fulfilment of additional conditions, and subject to further scrutiny by competition authorities.
- There is no market share cap on POs in the fruit and vegetable sector that intend to engage in collective action.
- Members of F&V PO are bound to deliver their entire production. Such obligation is not imposed to farmers in other sectors.

Third, derogations on a case-by-case approach leads to legal uncertainty. Producers and their organisations need positive and clear examples specifying which practices are allowed and under which conditions. Exemptions to contractual negotiations, e.g. in the olive oil, beef and veal, and arable crops sectors need to be better qualified, showing consistency with the general exemption to agriculture. Conditions for collective negotiations, in the sugar sector need still to be clarified, as well as those related cooperatives. Uncertainty, divergent interpretations and difficulties for POs in complying with minimum requirements for exemption may represent a deterrent to the existence/recognition of POs.

We summarize the possible policy options in Exhibit 7 using a scenario approach. In order to facilitate the policy debate, we identify four key scenarios describing alternative reform strategies. The first scenario is the Status quo, i.e., keeping the current regulation with no changes. Such scenario is the baseline for our evaluation. Keeping the status quo has the indubitable advantage of sparing the burdens of producing new regulation. However, in our opinion, this approach is not efficient in the long run due to the above-mentioned challenges.

52 For example the High Level group on the Functioning of the Food Chain and the Food Chain Initiative.
Considering the shortcomings of the baseline, we identified three possible approaches to regulation reform. In designing the alternatives we focused on two key principles: harmonization and simplification. A new regulation should be as homogeneous as possible across sectors and should minimize legal uncertainty. Sector exceptions may be necessary to take into account specificities, yet the general framework should be consistent.

**Exhibit 7: Policy Options and Scenarios**

<table>
<thead>
<tr>
<th>Option</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline:</strong></td>
<td>• No additional-regulation burdens</td>
<td>• Excessive self-assessment - Uncertainty</td>
</tr>
<tr>
<td>Status Quo</td>
<td>• Guidelines already in place</td>
<td>• Disparities in sector regulation – Incentive distortions</td>
</tr>
<tr>
<td><strong>S1:</strong></td>
<td>• Clear, tested regulation</td>
<td>• Competition concerns in specific market/countries</td>
</tr>
<tr>
<td>Adopting less</td>
<td>• Homogeneous rules</td>
<td>• Need for accompanying measures aiming at reducing cross-member</td>
</tr>
<tr>
<td>restrictive</td>
<td>• Possible strengthening of farmers’ bargaining position</td>
<td>states disparities</td>
</tr>
<tr>
<td>exemptions to</td>
<td></td>
<td>• Additional regulation burdens due to possible inconsistency with</td>
</tr>
<tr>
<td>competition</td>
<td></td>
<td>general competition rules</td>
</tr>
<tr>
<td>(Extending Milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>package or F&amp;V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>to all sectors)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>S2:</strong></td>
<td>• Homogeneous rules</td>
<td>• Untested regulation</td>
</tr>
<tr>
<td>Adopting more</td>
<td>• Guidelines already in place</td>
<td>• Adaptation burden to new rules for F&amp;V, tobacco, wine, sugar and</td>
</tr>
<tr>
<td>restrictive</td>
<td>• Reduced competition concerns in specific markets</td>
<td>dairy sectors.</td>
</tr>
<tr>
<td>exemptions to</td>
<td>• Consistency with general competition rules</td>
<td>• Political feasibility due to abolition of quota regimes for milk</td>
</tr>
<tr>
<td>competition</td>
<td></td>
<td>• Need for accompanying measures for F&amp;V, tobacco, wine, sugar and</td>
</tr>
<tr>
<td>(Extending</td>
<td></td>
<td>dairy sectors. Further regulation burden</td>
</tr>
<tr>
<td>articles 169,</td>
<td></td>
<td>• Possible ineffectiveness in rebalancing bargaining positions</td>
</tr>
<tr>
<td>170 and 171</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1308/13 to all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sectors)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>S3:</strong></td>
<td>• Simplification and opportunity to reduce legal uncertainty</td>
<td>• New-regulation burden</td>
</tr>
<tr>
<td>Intermediate(^53)</td>
<td>• Homogeneous rules</td>
<td>• Need for accompanying measures to facilitate adoption</td>
</tr>
<tr>
<td>scenario</td>
<td>• Lower transaction costs</td>
<td></td>
</tr>
<tr>
<td>(Rewriting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rules)</td>
<td></td>
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</tbody>
</table>

\(^53\) The scenario considers the following assumptions about the new regulation:
- Same rules for all the sectors with exceptions whereas strictly necessary
- Joint selling by POs
- The PO is bound accept members’ delivery
- Members are free to enter/exit the PO
- Cap market share for a single PO/APO
- PO contractual agreements cannot be extended to non-members
- PO’s production planning (art. 152 1.c.i CMO Regulation)
- Incentives to efficiency gains
- Possibility for POs or APOs multisector
The first alternative scenario (S1 in Exhibit 7) is the extension to all sectors of the least restrictive regulations such as the milk package or the discipline of the fruit and vegetable sector. This approach is based on a clear and tested regulation, which has been in place for years. It might be able to further strengthen farmers’ bargaining opportunities, removing constraints to PO actions in the sectors of arable crops, meat, and olive oil.

Our analysis identifies two main concerns about option S1. Firstly, removing the market share caps and allowing for supply restrictions (in specific circumstances) might raise concerns about the competition effects of the regulation. In theory, producers could achieve a dominant position and exploit it to exert market power. This outcome might occur in specific market or countries, beyond the intention of the regulator. Secondly, such approach could be costly to design due the additional burden of developing new regulation that is inconsistent with the general framework of competition law.

A second option (S2 in Exhibit 7) is the application of Reg. 1308/13 to sectors previously normed by other regulations. This approach extends the most restrictive provisions to sectors such as dairy or fruit and vegetables, sugar, etc. The benefits of this strategy are related to the consistency with the current competition law and the low competition concerns. Yet, the option might be not feasible due to the political implications of worsening the bargaining opportunities in sectors that have recently undergone through deep reforms (e.g., dairy and sugar). This point would call for extensive accompanying regulation (burden) to attenuate the implementation costs of the new regulation.

Our third option (S3 in Exhibit 7) is a complete rewriting of the regulation, with a specific emphasis on competition derogations. This approach allows the necessary flexibility to achieve the objectives of simplification and harmonization, lowering transaction costs and regulation uncertainty. This approach imposes the highest regulation burden, due to the extensive rewriting and possibly exposes farmers to adaptation costs. In our opinion, due to the limitation of options S1 and S2, such approach is preferable. In the next section (6.2) we provide policy recommendations suggesting the key principles to guide a possible regulation reform.

6.2. Policy recommendations

The discussion on policy options laid down the general principles around which the policy recommendations revolve. Of course, the technical features of such recommendations should be different depending on the prevailing policy option. Some scenarios require incremental adjustment of the current policy rules; other scenarios, notably S3, require a more comprehensive rewriting of the rules.

As already noted in the introduction, the nature of this analysis rests on economic principles and assumptions. It follows that the policy recommendations concern general principles driving the change of the rules but do not suggest any technical legal amendment to be introduced in the current provisions. The following policy recommendations are based on the factual elements presented in the overviews of the EU food supply chain, on the policy directions characterizing the current debate and, last but not least, on the conclusions from the economic analysis presented in sections 4 and 5.

Concerning the policy recommendations we need to take in account the different approach and trust with respect to cooperation and horizontal agreements among EU member states and regions. These disparities and their effects on POs features have been illustrated in section 2. This places some difficulties in pursuing the objective of harmonising rules and
calls for being cautious in the generalisation and interpretation of the policy recommendations following this study.

In our opinion, policy recommendations aiming at improving the EU food value chain should move along with three intervention axes (see Exhibit 8): simplification of regulation concerning agricultural exemptions to the general competition rules (art. 101 TFEU); effective strengthening of farmers bargaining power; safeguard of competition in the agri-food single markets.

**Exhibit 8: Policy recommendations in the three intervention axes**

<table>
<thead>
<tr>
<th>INTERVENTION AXIS</th>
<th>POLICY RECOMMENDATIONS</th>
</tr>
</thead>
</table>
| SIMPLIFICATION AND HARMONISATION | a) Streamlining of rules: convergence toward a single model of agricultural exemptions to general competition rules with sector specificities only where and when strictly necessary:  
  - Reducing legal uncertainty and regulation risk under self-assessment  
  - reducing distortions in resources allocation, removing policy incentives to invest in supply chain w/ less restrictive exemptions to competition rules |
| STRENGTHENING FARMERS BARGAINING POWER | a) Joint selling and production planning  
  b) PO’s minimum size requirement calibrated on the downstream/upstream relevant market structure  
  c) POs multiproduct enlarging the outside options and portfolio strategies (it requires homogeneity of rules)  
  d) Streamlining the objective of strengthening of producer’s bargaining power in Rural development instruments:  
  - Flexible investment increasing efficiency and negotiation space  
  - Legal and trading services strengthening strict bargaining power  
  - Contracts repositories increasing transparency and rebalancing strict bargaining power |
| SAFEGUARD OF COMPETITION IN THE EU AGRI-FOOD SINGLE MARKET | a) Rules for PO governance:  
  - No POs entry or exit barriers  
  - POs bounded to accept the entire members’ production  
  - POs bounded to operate “at cost”  
  b) Cap on PO market share calibrated on the structure and size of the downstream/upstream relevant market |
The first intervention axis calls for a convergence toward a single model of agricultural exemptions to general competition rules with sector specificities only where and when strictly necessary. Self-assessment practices (such as joint selling and production planning) requires legal certainty and homogenous interpretations between regulators and auditing authorities. The lack of legal certainty is a severe constraint for POs’ investment and market activities. The Commission guidelines are supposed to provide a unique interpretation but they refer only to the sectors regulated by art. 169-171 of the CMO regulation. Still, the ruling of competition derogations is the results of overlapping provisions from heterogeneous sources. A relevant issue contributing to legal uncertainty concerns the disparities of rules among different sectors. Practices allowed and conditions required for F&V or dairy sectors are significantly different from those relating to olive oil, arable crops and beef/veal sectors. In the medium-long run, sectors disparities in exemptions to competition rules might distort market incentives and farmers’ production choices. This would weaken the market orientation underlying the recent CAP reforms.

The second axis – strengthening farmers bargaining power - is the main goal of the new policy paradigm underlying the common market organization for agricultural products. As shown in section 4, to achieve effectively this objective POs should be able to provide alternative market channels and improve efficiency in the supply chain coordination. Harmonising farmers’ joint selling rule throughout all the agricultural sectors is supposed to widen market opportunities for farmers and their bargaining position vis-à-vis the downstream counterpart. On the other side, allowing POs to plan quantitatively and qualitatively their members’ production (ex art. 152 1.c.i CMO regulation) would increase the coordination mechanism along the food supply chain and save cost for both farmers and buyers.

Further, our analysis (C4-Section 4) shows that, depending on the buyers’ concentration and their negotiation power, the POs should be “large enough” to improve their bargaining position (see Figure 9). This leads us to suggest measures aimed to increase the minimum PO size as well as the aggregation in larger APOs. Such measures may concern incentives finalized to increase PO’s size as well as setting a minimum size requirement to get the Member State recognition as a PO. Increasing POs size would also contribute to extend their negotiation space making possible the achievement of scale economies and efficiency gains (C5-Section 4).

The range of products potentially traded by a single PO or APO is another critical point affecting its bargaining position. So, the more products a PO or APO can trade, the greater is the opportunity to enlarge the market outlets and plan effectively its members’ production. It follows that its “disagreement payoff” widens and its bargaining position improves along with the possibility to sell a greater and diversified range of products. It suggests to allow POs and APOs to carry out their business not only in a specific sector, but in all the agricultural sectors listed in art.1(2) of the CMO regulation. In such a case the PO/APO customer portfolio is expected to increase, improving both their bargaining position and their scope economies. Furthermore, differentiated PO might have stronger negotiation power, as they may hedge the risk of negotiation failure and may discourage buyers’ aggressive behaviour on a single commodity. Of course, this change of the regulation, to be feasible, requires the strict harmonization of rules mentioned in the first intervention axis.

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For example, a supermarket de-listing a multi-sector PO would lose a supplier of several categories at once. This might make the de-listing threat less credible.
Efficiency gains are a necessary condition for a win-win agreement in the supply chain (C5-Section 4). Support to investment and to provision of market services, as currently provided by the first and the second pillar of the CAP, may significantly contribute to achieve efficiency gains. But, at least one of two conditions is required to make farmers retaining the value of the efficiency gains: a) PO investments should not be specific for a single market outlet, but must be flexible enough to meet the requirement of different market channels (C6-Section 4); b) POs bargaining power should not be negligible (C7-Section 4). It suggests to address the CAP financial support to flexible investment and to legal and trade services aimed at strengthening the PO’s negotiation power. Usually, in the agri-food markets, a significant share of the buyers’ negotiation power is linked both to unfair trade practices and to the lack of transparency in the contractual relation. In certain conditions, legal and trade services may contribute to counteract the unfair trade practices. But, to increase the transparency of the market and rebalance the negotiation power between agricultural POs and the downstream counterparts, the legislator could introduce new rules and incentives aimed to develop contract repositories open access. These repositories may be voluntary and the agents’ participation can be stimulated by financial support and/or by the opportunity to make more visible some attributes of the product throughout the entire food supply chain, including consumers. In this regard, further research is needed to conciliate business privacy and public interest in transparency.

The third intervention axis concerns the safeguard of the competition in the EU agricultural single market. The concentration of agricultural supply and the increasing role of the POs and APOs aims to strengthen their bargaining power but, at the same time, it must avoid their potential market power exertion. Clear rules concerning the POs and APOs governance are therefore necessary to pursue this twofold objective. The theory recalled in Section 4 suggests that several conditions have to be complied in order to avoid the exertion of market power by POs and APOs. We stress the importance of three of them: i) there must be no entry and exit barriers for farmers’ participation to a PO; ii) the PO must accept all its members’ delivery; iii) the PO must operate ‘at cost’, meaning that all value must be transferred to members and the PO can retain only the resources to cover its costs and direct investments. If these conditions are satisfied, the PO has attenuated incentives to reduce the trade in order to get higher prices. In fact, if higher prices would lead to increase both the PO membership and the members’ production and deliveries.

Currently the CMO regulation, with the exception of F&V, sets a market share cap for a PO joint selling differentiated by sector. A ceiling for the PO joint selling is a very sensitive issue because, as shown in section 4, in some cases it can considerably weaken the PO bargaining position. The relevance of the international trade, the structure of the downstream markets and the negotiation power of the relevant buyers affect the optimal size of the PO joint selling according to the objective of strengthening its bargaining position (C4 and C9-Section 4). It follows that rules concerning the PO market share should carefully take in account the size and the structure of the downstream relevant market.
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GLOSSARY

**Asymmetric price transmission**: it occurs when an increase (decrease) in an input price is quickly and fully passed on to the output price, while a decrease (increase) in the former is slowly and partially passed on to the latter

**Bargaining power**: Firm’s ability to impose term in a negotiation

**Bargaining position**: the ability of a firm to profitably reduce the counterpart’s negotiation space

**Bilateral power**: when the weak agent reacts to the counterpart’s power by reducing trade (i.e., building up market power)

**Buyer power**: how downstream firms can affect the terms of trade with upstream suppliers (or bargaining power exerted by a buyer)

**Countervailing power**: the ability of offsetting in whole or in part the market and/or the bargaining power of another firm

**Disagreement payoff**: Alternative profits achieved by a party if negotiation fails

**Market power**: The ability of a firm (or group of firms) to raise and maintain price above the level that would prevail under competition

**Negotiation outcome**: the content of the agreement

**Negotiation power**: the ability to impose a negotiation outcome that is as close as possible to the most desired point in the negotiation space

**Negotiation space**: the set of negotiation outcomes parties might be willing to accept

**Oligopoly power**: market power exerted by a seller

**Oligopopsony power**: market power exerted by a buyer

**Private labels**: Goods produced by a manufacturer at the request of a retailer, sold under the brand name of the retailer and distributed exclusively by retailer that ordered them.

**Seller power**: how upstream firms can affect the terms of trade with downstream suppliers (or bargaining power exerted by a seller)

**Symmetric price transmission**: occurs when price decreases are transmitted with equal speed and/or magnitude as price increases do

**UTP**: practices that grossly deviate from good commercial conduct, are contrary to good faith and fair dealing and are unilaterally imposed by one trading partner on another
ANNEX

Technical Appendix 1: Bargaining vs. Market power

Bargaining and market are related concepts, yet fundamental differences exist. The purposes of this technical appendix are (i) to illustrate the basic mechanisms of the two types of models and (ii) to show that the assumptions about the nature of power determine the equilibrium outcome of the model. Bargaining and market power models may achieve different conclusions about industry efficiency and pricing strategies.

A simple example illustrates the differences between market and bargaining power. Consider a trade between a middleman/buyer and a representative seller. The middleman buys the product from the seller and sells it to consumer. Assume that the middleman is the strong firm (i.e., the one exerting bargaining/market power) and the seller is the weak firm (i.e., the one suffering from the middleman’s power). Figure depicts the equilibrium outcomes under market power and bargaining power. For simplicity we assume that the middleman faces a perfectly elastic demand (with price SP) and has a constant marginal cost function (assumed equal to zero without further loss of generality). The seller is a passive player whose behavior is summarized by a supply function. In a market power framework, the middleman finds the optimal quantity equating the marginal benefit from the additional unit of trade (the per-unit price SP) and the marginal cost (the increase in per-unit price that he must pay to the producer in order to elicit the increase in production). In Figure 12 the marginal cost is represented with the ‘perceived marginal cost of factor’ curve (e.g., Sexton 2000). The equilibrium quantity Q’ is set at the intersection demand with the perceived marginal cost of factor. The corresponding price paid to the producer is PP. The shaded area represents the middleman’s profits. Producer surplus is the lightly shaded area. The heavily shaded area represents the deadweight loss from oligopsony power.

A distinctive feature of the market power model is its non-cooperative nature. The middleman sets the optimal quantity and then goes to the procurement market to buy the product. The basic coordination mechanism is a spot market. In a bargaining power model, instead, there is a direct negotiation between parties such that multiple outcomes are possible. Assume, for example, that the middleman and the producer can decide whether to collaborate or to go for a non-cooperative behavior (for simplicity, the market power case). A possible solution is the following: the parties agree to maximize the gain from trade (i.e., set quantity at the perfect competition level Q) and then negotiate on the distribution of the game surplus, under the constraint that each one must obtain at least the surplus that would result from the non-cooperative game. For simplicity, we model the redistribution of surplus as a lump-sum transfer from a firm to the other.

In equilibrium, the middleman pays the producer a price SP (the perfect competition price) and asks for a lump-sum transfer T (e.g., trade spending). The transfer T is equal to the profits from the market power model plus a share \( \rho \) of the market power deadweight loss.  

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55 Economic literature refers to such transfers as upfront payments in non-linear pricing schemes (e.g., Bonnet and Dubois 2010).
Summarizing, in this simple setting, the market power and the bargaining models differ in two fundamental points.

A key result of the bargaining model is that power (either middleman’s or producer’s) does not necessarily reduce efficiency. In this special case, the total gain from trade is equal to the one from perfect competition. Instead, market power predicts a deadweight loss. The bargaining model predicts wholesale prices that are equal to the ones emerging from perfect competition, unlike market power models. The marketing margins under the bargaining model are smaller than under the market power model.

The parameter $\rho$ – in this simple example is bounded between 0 and 1 – represents the relative magnitude of the middleman’s bargaining power compared to the producer’s bargaining power. If $\rho = 1$ all the power belongs to the middleman and the producer has none. If $\rho = 0$ the middleman has no bargaining power.
Technical Appendix 2: A Bargaining model

The purpose of this technical annex is to provide a theoretical background to Figure 8. To build up the analysis, first we propose a bilateral negotiation model, then we expand it to two suppliers and then again to \( n \) supplier.

A bilateral negotiation model

We assume a two-stage game (e.g., Draganska et al. 2008). In the first stage, retailers choose retail prices (and quantity) according a typical IO framework (e.g., Sexton & Zhang 2001). In the second stage, they bargain with suppliers and the supply contract terms are determined. The outcome of the stage 1 game is summarized with a behavioral parameter \( \xi \in [0,1] \) where \( \xi=0 \) refers to a perfectly competitive industry and \( \xi=1 \) refers to monopoly. Such structure can map into a simple model a large class of dynamic competition model (Dockner 1992). As usual, the game can be solved by backward induction.

In stage 2, the parties bargain over the supply conditions. We summarize the contract terms into a two-part tariff, namely a per-unit price \( p_w \) and a upfront, lump-sum transfer \( T \) (e.g., Bonnet and Dubois 2010; Bonnet et al. 2013). This setting is consistent with the observed characteristics of supermarket contracting where trade-spending practices are an important component of the negotiations.

For simplicity we assume that the per-unit price is set according to the supplier’s supply function, i.e., \( p_w=f_S(q_\xi) \), where \( f_S \) is the supplier’s inverse supply function and \( q_\xi \) is a parameter representing the quantity traded by the retailer from stage one. This assumption ensures that the supplier has incentive to produce the quantity \( q_\xi \). The parties negotiate over surplus redistribution using the transfer \( T \).

The supplier profits (payoff) from a successful negotiation are:

\[
\pi_S = p_w(q_\xi) q_\xi - C_S(q_\xi) - F_S - N_S(b) - T,
\]

where \( C_S \) is the supplier’s variable cost function, \( F_S \) are supplier’s fixed costs, and \( N_S \) is the supplier’s negotiation cost, a function of the bargaining conditions and rules \( b \).

The retailer profits from successful negotiations are:

\[
\pi_r = p_r(q_\xi) q_\xi - p_w(q_\xi) q_\xi - C_r(q_\xi) - F_r - N_r(b) + T,
\]

where \( p_r \) is the retail price, \( C_r \) is the retailer’s marketing cost function, \( F_r \) are retailer’s fixed costs, and \( N_r \) is the retailer’s negotiation cost.\(^{\text{57}}\)

\(^{\text{57}}\) The sign of \( T \) in equations (2) and (3) implies that \( T>0 \) is a transfer from supplier to retailer. \( T<0 \) is a transfer in the opposite direction.
Let $d_{s,1}$ and $d_{1,1}$ be the disagreement payoffs from a bilateral negotiation of supplier and retailer, respectively. A rational retailer would not accept any contract $(q', T')$ such that $n_i(q', T') < d_i$. Similarly a contract $(q', T')$ such that $n_S(q', T') < d_S$ is not acceptable for a rational supplier. For any given $q_i$ define $T_{is}(q_i)$ as the upfront payment such that $n_i(q_i, T_{is}) = d_{s,1}$ and $T_{is}(q_i)$ such that $n_S(q_i, T_{is}) = d_{1,1}$. A necessary condition for a successful negotiation is that the outcome lump-sum transfer $T'(q_i) \in [T_{ir}, T_{is}]$. The interval $[T_{ir}, T_{is}]$ is defined by the bargaining positions of the parties. The relative bargaining power determines the outcome transfer, for a given quantity $q_i$. Following Inderst and Wey (2007) we define a parameter $\rho \in [0,1]$ such that $T'(q_i) = \rho T_{is} + (1-\rho) T_{ir}$. The parameter $\rho$ is a measure of the retailer’s relative bargaining power. If $\rho=1$, the retailer has full power and extracts the entire gain from trade from the supplier. If $\rho=0$, the bargaining power belongs to the supplier who can take the gain from trade.

The solution of stage 2 is a menu $(p^*_{w}, T'(q_i))$, where outcome wholesale prices and lump-sum transfers are functions of $q_i$. In stage 1, the retailer can find the profit maximizing $q_i$. The solution of stage 1 allows us to derive the complete strategy $(q^*_x, p^*_{w}, T')$.

**Two suppliers, one middleman**

Consider a stylized supply chain where a retailer can buy product X from two identical suppliers. For simplicity, we assume that there are no capacity constraints and all firms adopt production technologies with constant returns to scale. Furthermore, we assume that the negotiation cost $N_r$ is strictly increasing with the number of suppliers. These assumptions imply that the retailer prefers to negotiate with one (randomly selected) supplier. Assuming a sequential bargaining, if negotiations with the first supplier fail, then the retailer can enter in a negotiation with the other one.

The presence of an alternative supplier changes the retailer’s bargaining position in the first round on negotiation. In fact, if the negotiation fails, the retailer knows that a bilateral negotiation with the alternative supplier is still possible. Therefore, the disagreement payoff from the first round of negotiation $(d_{1,2})$ is:

$$d_{1,2} = n_{1,1}$$

where $n_{1,1}$ is retailer’s profit from the bilateral negotiation (previous section). Because $n_{1,1} \geq d_{1,1}$, the retailer’s bargaining position improves. In fact, for any given $q_i$, the constraint $T_{ir,1,2}$, which is the transfer level that makes the retailer indifferent between success and failure in negotiations, is defined as:

$$n_i(q_i, T_{ir,1,2}) = n_{1,1}.$$  

Equation (4) implies that $T_{ir,1,2} \geq T_{ir}$. The formula holds with equality only if $\rho=0$. Consequently, for any $\rho > 0$, the outcome transfer $T'_{ir,1,2} \in [T_{ir,1,2}, T_{is}]$ is constrained in a smaller interval, where the lower bound is higher. This results in higher transfer to retailers (or smaller transfer to producers) even if the change in the number of supplier does not affect $\rho$.  

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58 The disagreement payoffs are the profits that firms achieve if the negotiations are not successful. They come from the firms’ outside options, which are the next best trade alternative. In this simple one supplier, one retailer case, neither firm has an outside option. Therefore $d_r = F_r$ and $d_s = F_s + \Delta \Pi$, where $\Delta \Pi$ is the change in the profits from all other products in the retailer’s assortment due to the fact that product X is not traded. $\Delta \Pi$ is originated by two main factors: (i) complementarity and substitutability with X and (ii) basket shoppers who might decide not to shop at the retailer’s store if X is not traded.
**Generalization to n suppliers**

Now consider the special case that \( \rho \) and \( q_t \) do not depend on the number of available supply (the latter a plausible consequence of constant returns to scale). In this case \( T_{1,2} = T' = \rho T_{IS} + (1-\rho)T_{Sr} \), because holding quantity (and wholesale price) constant, the retailer would not accept a transfer that is lower than in the bilateral bargain case. Given the value of \( \rho \), the outcome transfer is \( T'_{1,2} = \rho T_{IS} + (1-\rho)[\rho T_{IS} + (1-\rho)T_{Sr}] \).

Let the number of suppliers increase to \( n = 3 \). In this case, the minimum transfer the retailer is willing to accept for the first round of negotiation is \( T_{ir1,2} \). The maximum \( T \) the supplier is willing to concede is still \( T_{IS} \), because the outside option of the supplier does not change. The resulting outcome transfer is:

\[
T'_{1,3} = \rho T_{IS} + (1-\rho)[T'_{1,2}] = \rho T_{IS} + (1-\rho)[\rho T_{IS} + (1-\rho)[\rho T_{IS} + (1-\rho)T_{Sr}]]
\]

More in general, the outcome transfer for a bargaining in one retailer \( n \) supplier model is:

\[
T_{1,n}^* = \sum_{i=1}^{n} \rho \left(1 - \rho\right)^{i-1} T_{IS} + \left(1 - \rho\right)^{i} T_{Sr}.
\]

Because \( 0 \leq \rho \leq 1 \), for an infinite number of suppliers we have:

\[
\lim_{n \to \infty} T_{1,n}^* = T_{IS}.
\]

The result shows that with an infinite number of potential suppliers a (sequential dyadic) retailer can extract the whole gain from trade. This outcome is independent of the level of relative bargaining power \( \rho \). Although this result was derived under restrictive assumptions, it can be considered illustrative of the negotiations along the agrofood supply chain. The conclusions of this model have been used to derive the simplified presentation in Figure 1.
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