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Owned or rented—does it matter? Agricultural land use change within farm properties, case studies from Norway

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ABSTRACT

In Norway and many other countries agriculture has moved toward less, but bigger farms. Total agricultural area has not been much affected mainly due to land tenancy. In this study we used aerial photographs to map land use and land cover in agricultural areas at present and in the mid-sixties. Three study sites were chosen, representing areas of differences with respect to drivers of change and possible differences in their landscape outcome. Maps from the two periods were used to produce transition matrices for the three areas as well as within each farm property. Our main finding on acreage change is that fully cultivated land increases and pastures decreases. A novel feature in our study is that we also include land use changes within single properties. In all three places a large share of the fully cultivated land in the sixties remains fully cultivated land irrespectively of whether the land is in use by its owner or is rented. When we looked at increases of fully cultivated land, the results are mixed. In the less favorable region, ownership to land versus rented land helps explain the variation in gain of fully cultivated land as well as maintained total agricultural area. However, in the case study from the grain region, whether a farm property today is in use as own land or rented, do not help explain the variation in changes within the data sample of farm properties larger than one hectare.

1. Introduction

Researchers are attempting to reveal and to understand land cover and land use change (hereafter land use) and how it is a result of our interaction with the physical environment. Land use change studies that emphasize changes in agricultural land over time deal with both remotely sensed data gathered by satellite imagery (e.g., Angonese and Grau, 2014; Huang et al., 2012; Uuemaa et al., 2013) and aerial photography (e.g., Van Eetvelde and Antrop, 2004; Fjellstad and Dramstad, 1999; Hietel et al., 2004; Ihse, 1995). In this study we use maps manually interpreted from aerial photographs, which allows for increased details with respect to agricultural land use categories and their extent. The agricultural area in Norway, excluding areas used for free ranged grazing in the mountains or forests, makes up only 3.2% of the total land area (Norwegian, 2015). Thus, the cultural landscape created by farming is important for variation, recreation opportunities and maintaining an open view. Land use changes involving agricultural land are, however, primarily the result of the decisions taken by the owner of the land. Hence, the agricultural areas are shaped by the farmers (Schaller et al., 2012). Agricultural policy, technological changes, and the market situation for farm products are among factors that influence the landowner's decision. One choice is whether to rent out the land or to continue farming yourself. In Norway farm sizes have been growing over time due to an increasing tenancy rate (Dramstad and Sang, 2010).

In this paper we investigate the land use changes related to agriculture and effects of ownership on these changes. The increasing amount of rented land is of concern for the authorities. Possible differences in land use change on owned and rented land suggest that the regulation around change of ownership of farm properties should be considered. We investigate (i) land use changes in three different agricultural landscapes, (ii) the difference in land use change between owned and rented land, and (iii) how allocation change (swap) within each study area is divided within or between agricultural properties. The swap follows the concept of Pontius et al. (2004) and is illustrated in Angonese and Grau (2014), while using properties as domain is the novelty of this paper. The swap of productive land within a property has quite different implications for the available land at the property level than a swap between properties.

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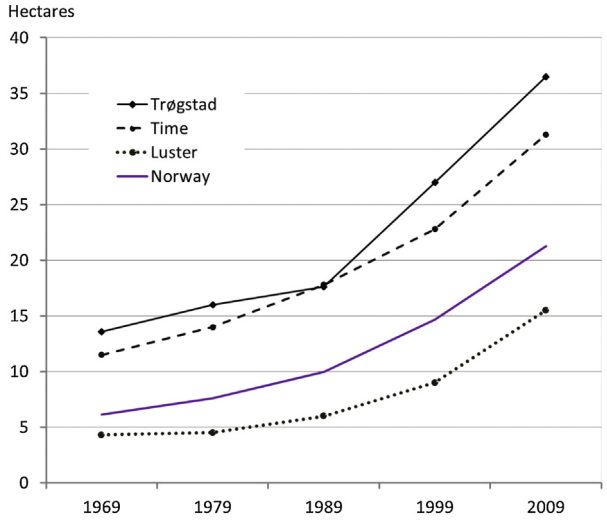

Fig. 1. Average farm size in hectares between 1969 and 2009 in the municipalities Trøgstad, Time and Luster, and average size for Norway (Statistics Norway, 2014).

2. Farm structure

In Norway the number of farms has decreased, while the total agricultural area has stayed reasonably constant since the 60s. Consequently, the size of farms in operation has been growing over time. In this paper we look at land use changes in three areas located within the three municipalities Trøgstad in east, Time in south and Luster in west of southern Norway. They represent three different main production regimes found in Norway. Trøgstad in east is within a grain production region, while in Time in south and Luster in west animal production dominates. In the Time municipality the number of farms is 60% of that in 1969, while the share is less in Trøgstad with 40%, and only 28% in Luster. Most of the agricultural area is kept in production. In some cases acreage has increased. The farm sizes in these three municipalities have increased as illustrated by Fig. 1.

Several factors have influenced the changes in farm size. Even before 1969 the farm sector had been a net supplier of labor to other sectors for a long time. In 1969 farming had become much more mechanized, but still the profitability within the sector was low compared to other sectors. To further utilize new technology, efficiency gains had to be taken out by increasing the size of the farms or use of the labor resource outside the farm. However, the change in Norwegian agricultural policy around 1975, triggered by an increase in the world food market prices, reduced the incentives to grow in size for larger farms. The change in policy caused better economic conditions for the "family farm" (Almås, 2002). Economic incentives were used to favor "family farm" sized farms and a regionally differentiated production was encouraged to stimulate maintained agriculture all over the country. Grain production was favored in the south eastern parts of Norway where Trøgstad is located. There were no or few economic incentives for the larger farms to expand acreage. Agricultural policy has been used to slow down the structural change (Grue, 2014). Overproduction of meat and milk with the introduction of milk quotas in 1983 (OECD, 2007) and concession limits for pork and poultry further limited the growth of dairy farms and the number of grain fed animals. Area, headage and deficiency payments varied with region as well as farm size (OECD, 2007; OECD, 2014). These economic incentives favored relatively small farms. Despite this, in total, the averaged farm size increased even in the seventies. Advances in technology made it possible to manage larger farms with the same input of labor. However, pluriactivity has been and still is important for the household income at Norwegian farms (Eikeland and Lie, 1999; Bergfjord et al., 2008), and may help explain the relatively small farms found in Norway.

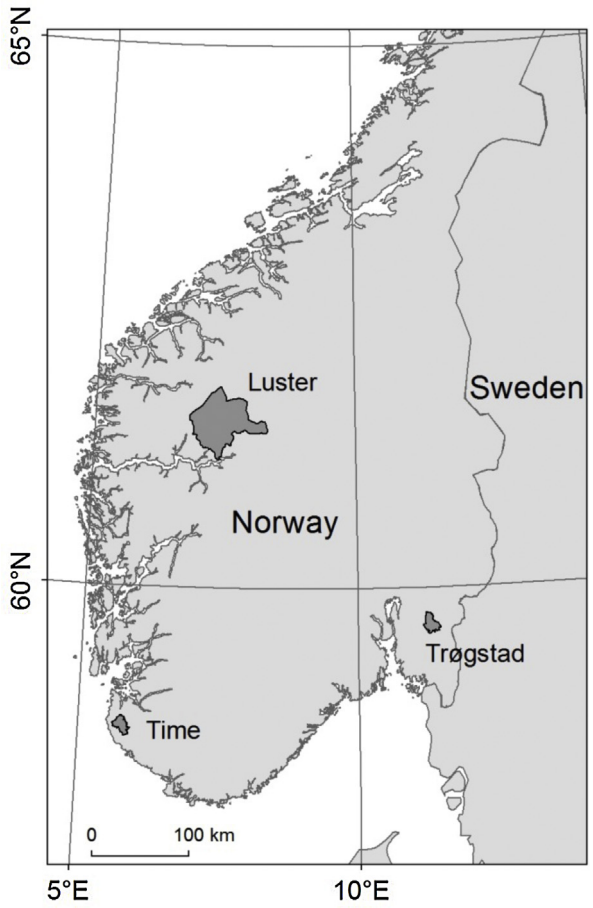

Fig. 2. Location of the three municipalities that contain the study areas.

Fig. 1 also illustrates that the increase in average farm sizes is increasing significantly after 1989, particularly in the grain region, which Trøgstad in the east is an example of. The 90s was a period characterized with market reforms and internationalization (Almås, ibid.). Several factors stimulated more tenancy. Around 1990 the maximum area for receiving acreage support for grain fields was increased. Renting out land became a fully legitimate way of operating land in 1995 due to a change in the Agricultural Act (Forbord et al., 2014). Milk quotas had limited the growth of both dairy farm sizes and numbers. However, it was possible to combine milk quotas from several farms to establish larger herds, given that the farm operation was a cooperative (Grue, 2014). In 2004 acreage support was also given for areas above 40 hectares with grass.

3. Materials and methods

3.1. Study areas

The study areas are located in the three municipalities Trøgstad, Time and Luster (Fig. 2), and represent three different types of farming production regimes. The area in the west, a valley in Luster, is chosen to represent an area where nature clearly limits the available agricultural land, due to steep hills with bare rocks surrounding the agricultural area. Its fully cultivated land is spread out in the bottom of a valley. The area in the south, Time, is located within a reasonably commuting distance to city centers and thereby