



Regionality in Norwegian farmland abandonment: Inferences from production data



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ABSTRACT

Economic subsidies continue to be in focus as potentially important drivers of agricultural change. Their exact functioning as drivers in very complex systems are not all that well analysed or documented however, and their effect e.g. in terms of environmental output are currently being questioned. In the work reported here, we focus on how the regionality of the farming system may influence the potential effect of agricultural subsidies, also in terms of farmland abandonment. We do this through using multiple linear regressions (MLR) and geographically weighted regression (GWR) on the Norwegian database on agricultural production data, combined with farm location data. Our findings demonstrate how the outcome of certain support systems may differ between regions, and how a region may dominate national statistic. We conclude that as subsidies continue to be a key tool in achieving agricultural policy aims, we need a better understanding of how the subsidy systems work. To understand the impact of a change in subsidy it is necessary to consider the local context in which it operates, e.g. demographics, bio-physical resources and feasibility of land rental. Spatial data and techniques such as spatial MLR and GWR are increasingly accessible to policy makers and should be used to provide insight into the local impacts of current policy. However this understanding must also emphasize farmer motivation and decision making and these investigations must be regionally based.

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Introduction

Following WWII, the main focus in agricultural landscapes was the production of food (Roetter, Van Keulen, Kuiper, Verhagen, & van Laar, 2008; Stanners & Bourdeau, 1995). The overall aim was to increase food production; however, this increased production was also to occur in a more efficient manner and at lower costs (Berardi, Green, & Hammond, 2011). An important policy tool in driving this development at least in Norway, was economic subsidies to farmers, enabling investment in technology and improvement of land through drainage, levelling etc (Kjørven, 1994).

This policy and the accompanying subsidies, as well as a number of simultaneous developments such as plant and animal breeding programmes, had the desired effect. For example, total European

production of cereals increased from 199 million tons in 1970 to 283 million tons in 1990 (Stanners & Bourdeau, 1995), while Robinson and Sutherland (2002) report an almost fourfold increase in yield from Great Britain.

The intensification, effectivisation and “technologification” of agriculture that led to the increased production and reduced number of farms and farm labour, also involved multiple landscape changes, however. For example, amalgamation of fields occurred at a large scale (Almås, 2002) and many less productive fields and semi-natural grasslands were abandoned (Fjellstad & Dramstad, 1999; Rønningen, 1993a). In the following years, significant environmental costs have been documented (see e.g. Howley, Donoghue, & Hynes, 2012 and references therein). Today it is commonly acknowledged that we are left with an increasingly “polarized” agricultural landscape where areas are either used very intensively or not at all (McInerney, 1994; Robinson & Sutherland, 2002; Rønningen, 1993b).

As the environmental side-effects of the agricultural changes received greater attention, European agricultural policies changed. In practice, this implied that a wide range of environmental

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measures were gradually implemented into agricultural policy and management – and agricultural subsidies changed to reflect this. In the 1992 reform of the Common Agricultural Policy (CAP), environmental issues were given specific consideration, in that one of the five main objectives was “... to protect the environment and develop the natural potential of the countryside” (Stanners & Bourdeau, 1995). In Norway, new environmentally focused requirements were introduced in the general subsidies from 1991 onwards, and the Government White Paper from 1993 (St.prp. 8 (1992–1993), 1993) emphasized that environmental concerns were to be given increased attention in Norwegian agriculture in the future.

Since then, environmental objectives have been broadened, and now include a range of issues e.g. ensuring public access and management of cultural heritage sites, combatting pollution of lakes and waterways and halting the loss of biodiversity (Meld. St. 9 (2011–2012), 2011). Thus the role of the farmer as a manager of environmental qualities has also been increasingly recognized, and this is to some extent reflected in the subsidy system. While there is limited exact knowledge on the functioning of the agri-environmental measures, a recent report (Stokstad, 2014) indicates that the extent and severity of changes have declined. The focus has mainly been on effects of a continuing conversion to more large scale intensive production and efficiency measures, however, with a complex system of economic subsidies as a key tool to combat the negative side effects and ensure a more sustainable development (OECD, 2007). Still, area in use for agricultural production remains the most important measure by which agricultural subsidies is distributed in Norway.

Recently, the actual impact of the large amount of money spent on agricultural subsidies has been in focus (Kleijn et al., 2004; Kleijn & Sutherland, 2003). A number of studies are now available to shed light on this matter. Some take a more general environmental perspective (Ecoscope, 2003; Pretty et al., 2000; Puschmann, Reid, & Lågbu, 2008). Others have focused on the effect subsidies have on more specific issues, for example particular species (Herzog, 2005; Kleijn et al., 2004; Kleijn & Sutherland, 2003; Primdahl, Peco, Schramek, Andersen, & Onate, 2003; Roth, Amrhein, Peter, & Weber, 2008; Tahvanainen et al., 2002; Tschamtkke, Klein, Kruss, Steffan-Dewenter, & Thies, 2005), or from an applicant perspective (Fish, Seymour, & Watkins, 2003; Toogood, Gilbert, & Rientjes, 2004; Wilson & Hart, 2000; Wilson, Morris, Arroyo, Clark, & Bradbury, 1999). Conclusions are not yet unambiguous, however.

Accompanying the increased production, efficiency, use of technology and intensity in most agricultural productions was a reduction in labour need and a reduction in number of farms. This development could be seen in many countries. For instance, in Great Britain a 65% decline in the number of farms, and a 77% decline in farm labour since 1945 has been reported (Robinson & Sutherland, 2002). From the US, Berardi et al. (2011) reported a decreased number of farms from seven to two million since the 1930s. In Norway, total number of active farms declined from ca. 213 000 in 1949 to ca. 45 500 in 2011, a decrease of more than 75% (Statistics Norway, 2012). Employment in agriculture in Norway was halved between 1960 and 1980 (Almås, 2002). It would be surprising if this development did not have effects on amenity values in the agricultural landscape in general, and in the less productive landscape in particular.

More recently, the abandonment commonly of less intensively managed land, is receiving attention in agricultural policy. An increasing number of studies have now documented negative side-effects also from changes within these landscapes (e.g. Brickley, Harper, Aebischer, & Cockayne, 2000; Suárez-Seoane, Osborne, & Baudry, 2002 and references therein). For instance, it has been documented that certain more traditional agricultural practices

created particular biotopes, of which some are described as High Nature Value Farmland (European Environment Agency, 2004; Oppermann, Beaufoy, & Jones, 2012). In these as well as in other agricultural biotopes there are a number of species dependent on agricultural practices, or on agriculture keeping the land open, now in decline (Bignal & McCracken, 2000; Henle et al., 2008). Also regarding cultural heritage, concern has been expressed, as reforestation can damage cultural heritage remains and reduce their accessibility (Kuiper & Bryn, 2013). From a landscape aesthetic perspective, it is apparent that in a country where the two major land cover types are forests (38%) and mountainous areas (44%), agriculture provides important landscape variation in many locations (Vinge & Flø, 2012).

It is apparent that the policy makers now also must include effects of abandonment and reforestation among their concerns. And again, subsidies are seen as an important tool to prevent undesirable changes. In the last few years, subsidies aiming to increase grazing for example have been strengthened and these are now listed as environmental measures (Statens landbruksforvaltning, 2008).

The question of whether the subsidies activate farmers to maintain the landscape qualities or biological diversity they aim to, has received some attention also in Norway (see e.g. Brunstad, Gaasland, & Vardal, 2005; Bjørkhaug, 2006; Bjørkhaug & Richards, 2008). A question that has received hardly any attention, however, is how the subsidy systems in place function as a policy tool related to the continuing farm abandonment. This appears to be a highly relevant question, for several reasons. For instance, it has for several decades been an almost all-party political goal to maintain farming throughout the entire country (Almås, 2002), whereas the rate of farm abandonment has clearly been varying between regions (Statistics Norway, 2012). In this context it is worth noting that the total farmed area in Norway has not been much affected by the exodus of farmers from the industry (Statistics Norway, 2012). One would not therefore expect particularly strong explanations of a weak trend in farmed area. In the study reported here, therefore, the focus is on farm counts.

Clearly, economic subsidies to farmers still are considered as a key policy tool (Howley et al., 2012). Yet if the aim simply is to limit the trend of farmers leaving agriculture, which productions should then be in focus? How should these subsidies be distributed to have the maximum effect? Can they be determined on a national level? Are economic subsidies as a mechanism effective for influencing development in Norwegian agriculture, given changes in so many other aspects of agriculture and agricultural landscapes? The question remains as to whether geographical differences in how subsidies operate are missed by a general focus on national level reporting.

These are the main questions addressed in this paper. We will look at the agricultural productions and certain features of agriculture as explanatory variables when we study farm abandonment. We will discuss our findings with a particular focus on management of agricultural landscapes for their aesthetic and environmental qualities.

Material and methods

Datasets used and preparations needed

Every parcel of agricultural land in Norway (actively farmed or not) has a unique code. To receive agricultural subsidies Norwegian farmers have to annually submit detailed information to the Norwegian Agricultural Authority (NAA) about their respective products, as well as the land they manage (i.e. regardless of if it is rented or owned by the claimant). The subsidy claim is made under the farm code of the farmer's 'home farm' (we use the term for

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