



Agricultural policy and climate change: An integrated assessment of the impacts on an agricultural area of Southern Italy

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ABSTRACT

The European Union (EU) has recently reformed its Common Agricultural Policy (CAP) and, in parallel, has completely abolished the production quotas for milk. These changes will have important consequences for the use of land, of inputs (i.e., water and chemicals) and on the economic performance of rural areas. It is of interest to evaluate the integrated impact of these modifications and of climate change (CC), since the latter could neutralize or reverse some desired effects of the former. For this purpose, this paper evaluates the potential impact of the abolition of milk quotas, as well as of the reform of the first pillar of CAP in two different climate scenarios (present and near future). A bio-economic model simulates the possible adaptation of various farm types in an agricultural area of Southern Italy to these changes, given the available technological options and current market conditions. The main results show that the considered policy changes have small positive impacts on economic and environmental factors of the study area. However, some farm types are more affected. CC can effectively attenuate or reverse several of those effects, especially in some farm types. These results can inform the planning of future changes to the CAP, which will have to act in the context of deeper climate alteration.

1. Introduction

The European Union (EU) has recently reformed its Common Agricultural Policy (CAP) and, in parallel, has completely abolished the production quotas for milk. These changes will have important consequences for the use of land, of inputs (i.e., water and chemicals) and on the economic performance of rural areas in a context where farmers already cope with great uncertainty due to climate change.

To achieve the sustainability objective, the CAP 2014–2020 changed the basic tool of its first pillar, integrating the basic payment with additional allowances that farmers receive only when applying certain *agricultural practices beneficial for the climate and the environment*. This funding of EU-wide mandatory *green* standards through direct payments (*greening*) requires, among others, crop diversification and the maintenance of existing pastureland (Matthews, 2013). In addition, the CAP reform allocates part of the financial resources to coupled payments and provides *convergence* of the farm-based unitary entitlements to national average, which increases the basic payment to some farms and decreases it for others.

Many studies have been conducted to assess the impacts of the direct payment changes, especially using mathematical programming models. In the following section, a literature review has been conducted. Among the most recent, Cortignani et al. (2017), Gocht et al.

(2017) and Louhichi et al. (2017) show that greening has limited impacts, that coupled payments result in more significant changes to gain environmental benefits and that the largest economic impact is due to convergence.

From February to May 2017, the European Commission held a public consultation on modernizing and simplifying the CAP (European Commission, 2017). Open to all interested EU organizations and citizens, it asked a series of questions about principles and priorities for the future CAP to inform a Commission Communication on the CAP post 2020, due in spring 2018. The results of the public consultation clearly demonstrate the important role the CAP is seen as playing and must continue to play with regard to maintaining and enhancing the environment in rural areas generally and on agricultural land specifically. Climate issues are also flagged as an area where the CAP should do more in the future, although views differ on where the focus of policy intervention should lie. The challenge now for the Commission is to develop proposals for a modernized and, in some sense, simplified CAP for the post 2020 era that champions these environmental and climate objectives as part of a package of measures that promote an economically robust and sustainable agricultural sector for the future.

Climate change (CC) affects agricultural land use and the economic performance of farms (Blanco et al., 2017). Many recent studies highlight these potential effects in different parts of Europe. Dono et al.

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(2016) showed that a greater use and availability of water is vital for adapting to CC in Italian Mediterranean agriculture. Nunes et al. (2017) studied an agricultural area of Portugal and reach the same conclusion about the role of water availability for the resilience of the farming sector to CC. Steidl et al. (2015) evaluated the impact of CC on hydrologic conditions and the agro-economy of an area in north-eastern Germany. They showed that a possible future increase of irrigation needs and water deficits for the entire area and for specific crops might limit the profitability of irrigation. Schönhart et al. (2016) showed that CC could increase productivity and the economic performance of the Austrian agriculture but could deteriorate the environmental conditions in rural areas. Mittenzwei et al. (2017) determined the combined effects of policy and climate uncertainty in Norway. They note that the uncertainty of CC and the policy may affect the performance of the farming sector, with repercussions for production, land use, income and social welfare. Finally, the CAP reform itself recognizes the relevance of these impacts when it defines sustainable growth in relation to CC mitigation and adaptation as an objective (European Commission, 2010; European Commission, 2011).

The purpose of this study is to assess the potential impact of the milk quota abolition and the reform of the CAP first pillar integrated with the potential effects of CC. The impact of these changes is evaluated under two climate scenarios (present and near future), whose outcomes are compared to derive the separated and integrated effects. We chose a relatively near future horizon (2020–2030) because this perspective is of great interest to study the interactions between possible CC, the current policies, and the responses of the existing farming systems. The analysis concerns a study area of central-west Sardinia (Italy), where different farm types operate, and assesses the potential impacts on land use, inputs (water, chemicals, feeds), and economic results. A Discrete Stochastic Programming (DSP) bio-economic model represents the existing productive conditions, specified for the main farm types, with uncertain conditions for crop yields and water requirements. A recent study in this area used a DSP model to evaluate the impact of CC (Dono et al., 2016). The current study modifies various structural aspects of that model, especially relating to livestock activities, allowing for adaptation strategies that modify the consistency of herds and flocks as reactions to policy changes and to CC.

The following overview highlights some major aspects of the reform of the first pillar and milk quota abolition, with a literature review of some recent research. The *Materials and Methods* section describes the study area, along with the climate, agronomic and livestock simulations submitted to the bio-economic model. The *Results* section reports the simulated scenarios and the impacts on the use of land, inputs, and economic results. *Discussion* and *Conclusions* reports critical reflections about this study and presents the policy implications and some policy considerations for the future of the CAP.

2. Overview of the agricultural policy reforms evaluated in this study

2.1. Normative aspects

The Common Agricultural Policy (CAP) provides two pillars; the first relates to direct payments and Common Market Organizations (CMOs), and the second relates to rural development policy. The first pillar has been historically the most financially important; the CAP reform for 2014–2020 redesigned its direct payments system, known as Single Payment Scheme (SPS), into different payments, including the basic payment, *greening* payment and coupled payments.

The basic payment has the same characteristics and functions of the SPS but with fewer financial resources. In fact, part of the national ceiling also funds the *greening* and coupled payments.¹ In addition, in

the Member States that apply the historical SPS (e.g., Italy), the value of farm-based unitary entitlements will move towards the national average of the basic payment. This mechanism, referred to as *convergence*, will either increase or decrease the unitary entitlement of single farms. Italy decided to apply the Irish model of *convergence*, which creates a single region at the national level and provides a smooth transition from the pre-reform level of basic payments towards more homogeneous levels by 2019, but not a uniform value.

The coupled payment provision concern the sectors or regions where specific farm types or agricultural sectors are of particular importance for the economic, social, and environmental objectives. Coupled payments can have a significant impact on farmers' land allocation decisions, influence the use of other resources and thus have an impact on the environment. In the interested area, and in the rest of Italy, coupled payments occur for durum wheat, processed tomatoes and rice crops.² Furthermore, coupled payments cover the livestock sector and affects dairy cows and ewe lambs.

The *greening* payment provision only affects farms that apply agricultural practices deemed beneficial for the climate and the environment in addition to respecting the cross-compliance constraints. The requirements of the *greening* practices aim to protect the necessary environmental conditions for agriculture and include three basic elements:

- a diversifying cultivation by growing at least two crops on farms where the arable land exceeds 10 ha (and at least three crops where arable land exceeds 30 ha) and by limiting the main crop to 75% of the arable land (and the two main crops to 95% of the arable land where arable land exceeds 30 ha);
- b maintaining permanent grassland at the national, regional, or farm level;
- c maintaining Ecological Focus Areas (EFA) on at least 5% of the arable land of the farms larger than 15 ha. The EFA may be fallow land, terraces, landscape features, buffer strips, hectares of agro-forestry, strips of eligible hectares along forest edges, areas with short-rotation coppice, afforested, with catch crops or green cover, or areas with nitrogen-fixing crops.

The mid-term review of the CAP 2014–2020 (*Omnibus* Regulation) will determine some changes to direct payments, especially for *greening* and coupled payments. The European Parliament has dealt mainly with simplifying some commitments to beneficiaries and to controllers that had become difficult to sustain. The *Omnibus* Regulation will come into force on 1st January 2018, and in the coming months, the Member States will define the implementing laws at a national level.

The abolition of milk quotas has acted on a policy that has been in place since 1984. In that year, the European Union (EU) applied a supply quota for milk to prevent the overproduction that resulted from milk price supports. These price supports for milk were subject to critique, as they distort global trade. In the 1990s, the World Trade Organization urged the EU to abolish its system of price supports, in response to which the EU decided to gradually liberalize its dairy policy. Since 2003, the support prices were reduced, and the supply quotas were enlarged in steps. In recent years, world market prices for dairy products increased strongly, decreasing the gap between EU prices and world market prices. Therefore, the EU decided to completely abolish the milk quotas since April 1, 2015.

(footnote continued)

payments (58%), *greening* payments (30%), coupled payments (11%), payments for young farmers (1%).

² Northern Italy also introduced a payment for soya, while other parts of Italy now offer payments for cereals (durum wheat), oilseeds (rapeseed and sunflower), and legumes (grain and fodder).

¹ Italy has allocated the following financial resources to first pillar payments: basic

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