Social and Economic Consequences of Direct Payments Capping and Redistribution on the Czech Large-scale Farms

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Introduction

Following a public consultation European Commission has adopted the Communication on *The Future of Food and Farming* (EC, 2017) in which a new framework for a model of Common Agricultural Policy (CAP) after 2020 was presented. It targets on the improved farm incomes and particularly the fairness of direct payments distribution among farms pointing out that still 20% of EU farmers receive 80% of the payments. To reflect such inequalities, a new model has put forward measures that are aiming at income redistribution mechanism between farms: a compulsory capping of direct payments that reduce payments for large farms or redistributive payments favouring small-medium farms.

This paper addresses three fundamental objectives. First, we investigate the economic effect of the redistributive payment and capping on large scale farms in size breakdown. We assess those effects by using various revenue/income indicators in relation to input, labour and capital stock. Redistributive payments assume to re-allocate part of direct payments from the above-average farms to the rest of small farms and further the application of payment capping for large-scale farms. Next, we look at the farms´ changes in production structures that result from the direct payments re-allocation. This being investigated for two formerly proposed alternatives – 60 and 100 ths. € per farm, respectively above which enterprises will not receive any direct supports. Third, we identify the current structural and performance differences between the affected categories of farms (cut of payments) compared to those counterparts that would potentially benefit from the measure.

In the next paragraph we review the theoretical background that results in controversial debate to the theme of large scale farms and the role of public policies. After that, result chapter provides data regarding the implication of payment rearrangement for agriculture and selected farming systems followed by discussion. The paper concludes with few recommendations to policy makers how to make the impact of future redistribution "softer" that would not compromise the viability of some sectors.

Background to the study on large scale farms

Large-scale farms are subject to long-term social and political debate. Political debate about large scale farms is relevant to the placement of the farm within the countryside and large scale farms (especially horizontally integrated businesses) challenge the 'agri-ruralist' debate about the traditional family farms, that are dominant for Western European countries (Frouws, 1998). This debate mostly includes perceptions of scale (Van Lieshoutet al.,2011). The most noteworthy feature of a large farm is its power, which originates from its size, resources and political relations on a local level and in the context of a rural development (Gagalyuk et al.,2013). The political power is held privately, therefore it introduces important ethical and societal questions about the compatibility of large scale farms with democratic values (Binswanger et al.,1993).

Capping controversy

Recurring criticism of the Common Agriculture Policy is that 80 % of the EU direct payments are benefited by the 20% of the farms (Velazquez, 2011). Sahrbacher at al. (2012) argues that these 20% operate on 80% of the agriculture area, creates approx.. 80 % of the agriculture production, and employ almost the same share of total workers. Capping is supported by EC that argues that large scale farms realize economies of scale, therefore do not require direct payments.

Results from experiments simulating proposed capping show creation of intersectoral distortions that in the long run cause welfare losses (Sahrbacher at al. 2012).

The neoclassical model of structural change

The neoclassical model underlines the link between the farm size, returns to scale and efficiency. Focal point of the theory is on whether returns to scale in production can help in explaining the relationship between farm size and economic efficiency and the identification of the "optimal" farm size (Chavas, 2001). Growth in farm size can have positive impacts on the farm competitiveness, when allowing to reach economies of size and, consecutively to reduce production costs. Specifically, under the assumption of free entry and exit, increasing returns to scale provide an incentive for farms to either exit the sector or expand (Chavas, 2001). Farm size may bring a competitive advantage assuming that the technical innovation is often partial in favor of large scale farms due to the fact that some new technologies are beneficial only in farms operating over a certain scale of production (Glauben et al., 2006).

Besides technology, examination of imperfect resource mobility is vital in order to understand size choice. This can strongly affect entry-exit decisions in agriculture market (Chavas, 2001).

Alternative models of structural change

The economic factors influencing structural change have been analyzed by alternative models. Boehlje (1992) reviews alternative models that explain structural change in agriculture. Besides the technology model which mainly refers to economies of size and adoption and diffusion of technology: the human capital model, the financial model, the sociological models and the institutional model are reviewed by Boehlje (1992). The first model assumes that managerial input that plays a critical role to underlying cost and production relationships of any firm. Furthermore, managerial capacity can be a fixed factor and is generally heterogeneous across firms. Therefore, the availability of a managerial input influences the ability to process information and to evaluate and implement new technologies (Boehlje, 1992). The financial model combines production and financial theory into an integrated firm behavior model. The basic notion is that the entrepreneur maximizes wealth which is a function of annual income plus capital gains (or losses). The financial model permits to explore the option that the decision regarding the amount of durable (and nondurable) inputs used in the farming operations is not just a function of relative factor prices but also of the expected relative capital gains or losses (Boehlje, 1992).

The sociological model is concerned with the family farms. This model is described by the family firm life cycle that involves three stages. The first stage is the entry or establishment stage, the second is the growth and survival stage, and the third is the exit or disinvestment stage. The last stage comprises of two processes which are the retirement and intergenerational transfer of property. The sociological model attempts to analyze the family farm typical features that strongly influence farm decisions and economic results. Moreover, the model explains the importance of decisions which are not subject to frequent discussions. This present a reason for restricted resource mobility (in the short run) in agriculture and for the dynamic adjustments of land, capital and farm labour that occur over many years within agriculture sector (Chavas, 2001).

Boehlje (1992) refers to the institutional model as the structure-conduct-performance paradigm of industrial organization and its variants. The institutional model is established on a broader set of theoretical bodies developed by the theory of the firm, transaction cost economics and evolutionary economics.

The rise of incomes from non-farm activities serves as an incentive to leave agriculture sector, and the remaining land is left to fewer larger farms. The exodus of farm labor and the growth of farm size are two features of the same economic process (Kislev et al., 1982). Technological innovations made available labor saving technologies, therefore the substitution of other factors for labor.

The increase of farm size is believed to be caused by the economies of scale. Technological innovation is partial in favor of large scale farms due to new technologies that are convenient only in farm operating over a given scale of production (Weiss, 1999). The implementation of such labour-saving technologies has been easier for larger farms (Glauben et al., 2006).

Robinson (1975) has supported the idea that agricultural policies can preserve the inefficient farms, and reduce the number of farms that would have quit. By way of explanation the agricultural policies reduce the pace of structural change. This theory relies on the hypothesis that smaller farms are less efficient and have higher costs than larger farms due to the presence of economies of scale (Robinson, 1975). Recurring low farm product prices are a cause for farms' limited net income, therefore its exit. These resources can be concentrated into larger farms that can continue to grow in size.

Different conclusions are made by Cochrane (1979) who refers to the "cannibalisation" mechanism. When farm size is positively correlated with policy support, the residual profits generated by this support may be larger for larger farms. This enables larger farms to bid resources away from smaller farms. This consequently raises the value of assets such as farm-land, which is not in the bidding ability of smaller farms. Larger and more efficient farms may obtain larger surpluses from subsidies due to their relatively higher market income levels. When support is provided by price policies, the "cannibalisation" mechanism is very likely to appear, given that the support is proportional to production and that a larger share of production is generated by large farms.

In the short-run agricultural policies keep smaller or less efficient farms from being forced out of business. While in the long run, the same policies may accelerate farm structural change in terms of reducing the number of small farms and increasing the size of remaining farms.

Methods

First we use a predictive model applied for individual data on farm subsidy recipients. Data was provided by the Payment Agency of the Czech Republic for the initial year 2015. That allowed us to project future farm subsidy on an individual basis under the alternative scenarios. Further, we use various descriptive statistics to analyse structural variations between selected categories of farms.

Model FARMA 4.x

The farm model (here denoted as "*FARMA 4.x*") used for this analysis is a mathematical linear optimization model at farm level with a profit function as follows:

$$\max \pi = TR - TC \ ,$$

Where π is a farm profit, TR is total revenue (from crop and livestock activities) including subsidies, TC is total costs including labor and fixed costs.

- *FARMA 4.x* is a farm optimization model that simulates the effects of agricultural and environmental political conditions under the sets of production, economic, social and environmental-related conditions for predefined farming systems.
- Notably, each farming system represents the most typical farm situated in respective natural and production conditions as well as in production region.
- The optimization function can be pre-determined (profit maximization, net value added, cost minimization, etc.) while the limits on the production structure can be set up.
- Totally data on 37 commodities, that account for 97 % of national production, are incorporated and their structure can be modelled.
- The model allows to incorporate some environmental-related limits upon the optimization procedure like organic matter in the soil, nutrients management, restrictions on the erosion-prone crops, etc.
- Relation between crop, livestock and external environment is predefined in a sub-module *Agro-ZV* that ensure the technological requirements are followed. For each livestock category feed requirements according to the yield are defined.
- Costs and yield data is taken from annual surveys: Farm Cost Survey and Farm Accountancy Data Network both of which are administered in UZEI.

Selected farming systems for the analysis of mandatory capping

To analyse the effects of potential payment capping, we selected four farming systems that well represent structural and production conditions of the Czech farms. To do this, data and classifications (size, specialization) provided by Farm Accountancy Data Network were employed. We use farm specialization, size and production region as criteria for the farming system specification. As regards size only farming systems that have fallen in the *very large farms* category got into the analysis for capping because the average farm size in other categories is below the assume limits for reduction. Selected hypothetical farms and their characteristics are specified in the table 1 below. These farming systems well characterise the predominant farm structures (large farms specialised on crops, mixed production, large milk producers) that are believed to be impacted by payment redistribution the most.

Table 1. Selected farming systems for the simulation of direct payments redistribution - capping

	FS1	FS2	FS3	FS4
Specialization	Crop	Mixed	milk	Milk
Production region	VERY GOOD/Maize/sugar-beet	VERY GOOD/Maize/sugar-beet	GOOD/Potatoes	MARGINAL/ Sub-mountain
Size (ha)	1286	2060	1292	1101
Labor input (AWU/100 ha)	2,07	3,01	3,61	3,82
Reduction in SAPS due to €60 ths. cap introduction (%)	65,5	78,5	65,5	62,7
Reduction in SAPS due to €100 ths. cap introd. (%)	42,6	64,2	42,6	37,9

Source: Farm Accountancy Data Network of the Czech Republic

Assumptions and scenarios adopted

In principle, this analysis builds upon the CAP "architecture" of the current financial period (2013-2020) because the new system of measures is not known yet. That assumes the structure of measures and allocated funds that enter the analysis applies figures as regards year 2020 and the respective scenarios of payments redistribution are put in place accordingly. In this programming period direct payments in the EU consists of several components: basic decoupled direct payment (in the Czech Republic represented by single area payment scheme /SAPS/), payment for greening measures, coupled payments and young farmers. According to legislation, countries that apply capping measure limit the basic payment component while the other parts (coupled premiums, greening and premium for young farmers) are not subject to reduction any more. This is also true for the minimum obligatory 5% cap that need to be apply for the payments above €150 ths.

The new framework of CAP "architecture" will also affect the mechanism of capping and payment redistribution. Thus for the purpose of this analysis, we assume following alternatives: capping of payments may relate to total direct payment envelope or, the alternative model projects the capping would apply only to basic direct payment component.

For the sake of simplicity, we chose primarily the mechanism as it is valid now: only basic payment component will be subject to reduction and the other parts, that account for around 56% of direct payment will be exempted from that and would not be cut. The further analysis only shows the relative reduction of payment for both discussed alternatives.

Redistributive payment assumes that farms above the specified size (average national farm size) are partially reduced and the payment goes to the below-average size farms.

So far the alternative scenarios that differ in the cap ceiling on farms were as follows: €60 ths. and €100 ths. per farm. In fact, these payment limits can be expressed in the hectare land limits that will be eligible for payments. In the Czech Republic those limits above which farms would not receive any direct payments vary between 240 to 750 ha for the two scenarios. For the economic simulations we adopted the three scenarios:

i) **Sc. 1 - BASE** – status quo, direct payments and other subsidy set at the level of the year 2016.

ii) **Sc. 2 - REDUCED** – SAPS was reduced for each farm that size exceed to maximum 440 ha

iii) **Sc. 3 – REDUCED+optimization** - SAPS was reduced for each farm that size exceed to maximum 440 ha + farm production structure was given manoeuvring space to optimize.

Results and discussions

Table 2 shows total extent of reduction payments in two alternative assumptions – if the capping applies only on SAPS component (i) and cap put on total direct payments (ii). There are two alternative ceiling levels (€60 and €100 ths. per farm). The share of reduced payments would vary between 32% to 50% of the national envelope, depending on the base for the cap reduction and scenario applied. Due to particular prevalence of large farms in the Czech Republic (similar structure also in Slovakia and former eastern regions in Germany) the total amount of reduction thanks to capping would be the largest among EU countries.

Table 2. Proportion of direct payments reduction according to the maximum ceiling set by capping

	NO CAPPING (CZK)	CAPPING €60 THS.	CAPPING €100 THS.
i) CAP ON TOTAL DIRECT PAYMENTS (CZK)	100	50%	40%
ii) CAP ON SINGLE AREA PAYMENT (CZK)	100	45%	32%

Source: own calculation based on data on payment recipients provided by Payment Agency of Czech Republic

Distribution of direct payments reflects the dual character of farms in the Czech Republic because basic component is paid on per hectare ground. As above indicated, approximately 20% of farms that are 100 ha or more in size, account for almost 90 % of total agricultural area that places the country on the top in the average farm size in EU. And such specific land-use structure therefore determines unevenly distributed payments: some 10% of largest farms received 78% of direct payments. The figure 1 below shows how much that "biased" allocation of funds would change if the capping and re-distribution is in place. The largest shift, as compared to current status, display payment ceiling at €60 ths. per farm if calculated for full payments, followed by capping imposed only on SAPS component.

Figure 2 (further below in the text) shows redistribution effects of capping and redistributive payment from large to small farms in land size breakdown. Farms above the size of approximately 500 ha would lose the payments and this is true for all analysed measures and options. In fact, redistributive measure that would apply 89 ha size limit display relative larger benefits for smaller farms compared to the loss of those above the limit ("net" contributors). These small units would be around 30% better off due to redistributive mechanism while large ones would lose on average only 7% of payments.

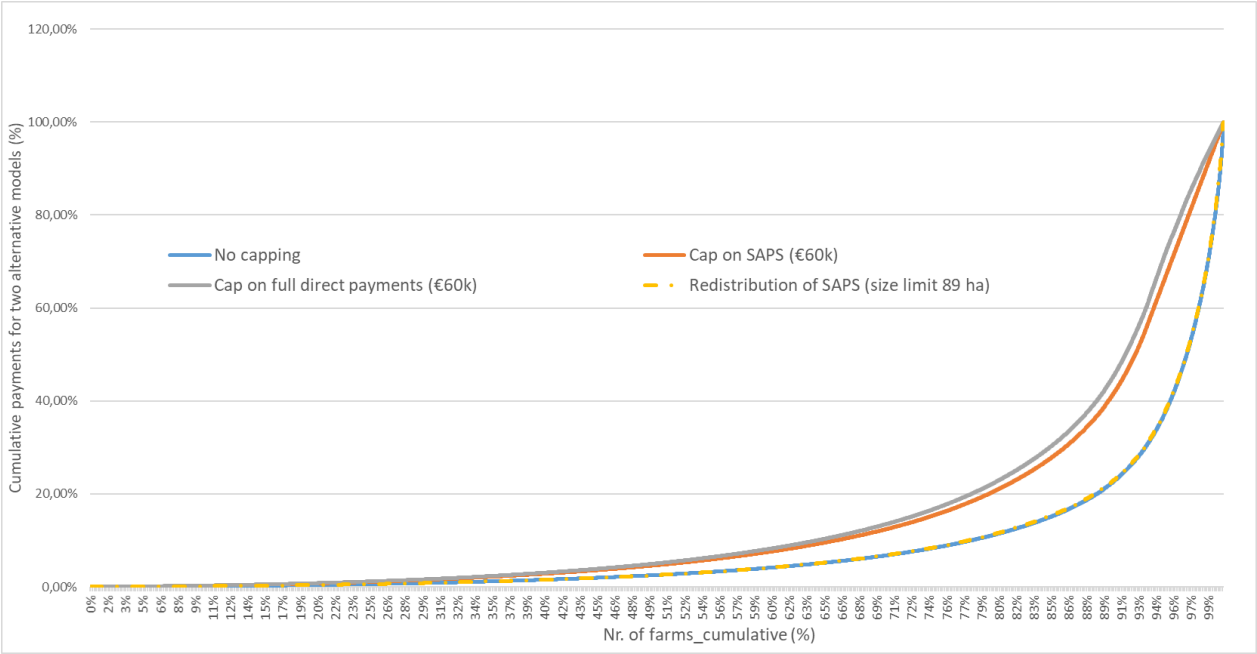

Figure 1. Expected distributional effect of direct payments before and after capping and redistribution measure
Source: own calculation based on data on payment recipients provided by Payment Agency of Czech Republic

Production characteristics of farm categories

This part describes production differences between a group of farms that would be subject to potential payment reduction and the other group.

Direct payments in EU are no longer coupled to production volume of farms. Therefore, one might hypothesise that reduction of direct subsidies should impact a farm regardless of production volume - investment activity, cost reduction, production rearrangement, number of workers and salaries, etc. However, it is reasonable to expect that placing upper limit on direct payments would result in indirect production effects as well would impact the farms´ production structure with different intensity. Farm managers would have to search for reserves to save costs and production that could be more efficient. That comes from the management theory which assumes that under (unexpected) financial squeeze operational measures and production optimization towards costs savings are addressed first. Notable, this is also a frequent argument of lobbyists and farm unions that point out to the indirect production effect of the capping that would result in unwanted fall of some production branches.

The FADN data disclosed that payment recipients above the cap limit show production intensity, as measured by gross value added on land, higher by 15% as compared to the farms below the limit. This is relevant and politically sensitive factor, as the national agricultural policy aims at stimulating sector performance, like stabilisation or increase in volume. According to some proponents the capping introduction may contradict achieving those targets. In the following chapter we look on the economic consequences of the redistribution measure in more details.

Farms that would be subject to payment reduction display Net Value Added per AWU on average higher by 50% to those smaller ones.

Production structure of farms, that would be subject to capping, differ to those farms under the limit. Indeed, the majority of dairy cows (90%) are kept in (very) large farms that would fall above the limit to the cap, however suckler cows are evenly distributed between the two analysed

groups. Hence dairy production will by implicitly affected by the cap limits (this is also true for redistributive measure) which nevertheless should be only to limited extent due to two implicit factors. First, dairy production is capital intensive sector and future decision about production restrictions would imply additional costs. Investment reproduction might slow down due to budget pressure. Second, milk producers often invested into bio-gas stations in the past and its operation is conditional upon running the livestock. In some cases, there was obligatory to use waste from livestock. There is reasonable to expect the final effect of potential capping on dairy sector will be conditional on the existence and mechanism of coupled and other subsidies.

As far as other ruminants like sheep and goat concerns, these categories prevail (90% of all stock) particularly among small farms that would not be limited on the direct payments. Contrary to dairy stock, sheep and goat stock might even increase and implicitly benefit from the redistributive payments.

Smaller farms show significantly higher density of ruminants on agricultural land as compared to their larger counterparts.

Farms potentially reduced on payments have largely diversified their activities and income from diversification could partial (temporarily) compensate for the reduced payments due to the cap imposed. Farms potentially expose to the payment limits are significantly more diversified in which income from non-farm activities increase proportionally to the size of a farm. Those potentially affected by capping report twice higher income from diversified activities and even ten times higher income from diversification to renewable sources of energy compared to the farms below the limit. The prevailing sub-sectors that farms diversify the most, as measured by sales, are non-renewable energy and provision of external services. Specifically, bio-gas stations dominate the farm diversification activities, of which 91% were set up in the farms that could be limited on the payments. There is however unlikely the income from off-farm activities would compensate for the loses from conventional agricultural production in a long-term perspective.

Notably, potential labour squeeze on farms affected by the redistributive or capping measures is politically sensitive. Enterprises above the limit for capping use 65% of workers (measured as annual working units, AWU) and it is believed the capping would make their continuous reduction faster because enterprises would first search for labor cost saving. However, if calculated in relative terms, these enterprises display significantly less AWU on land (by 30%) than the counterparts not affected by capping. However, labor squeeze on large farms could be partially absorbed by those not affected.

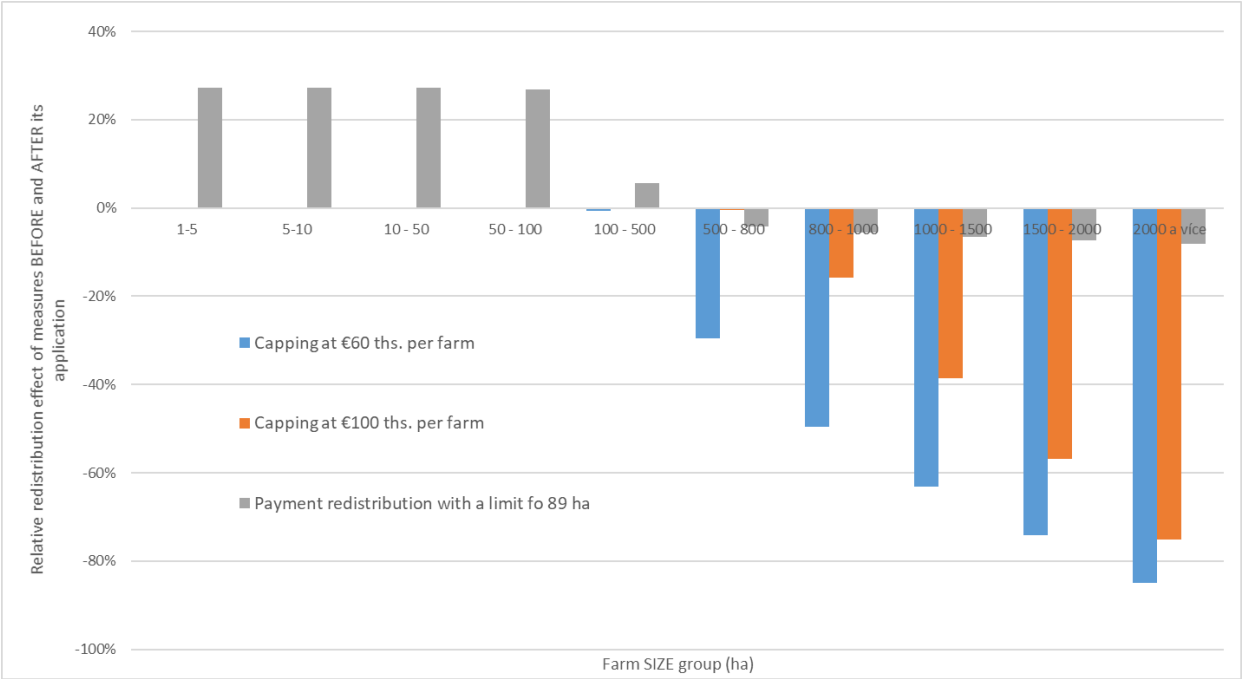

Figure 2. Relative effect (% change in SAPS amount) in redistribution/reduction between farm size groups
Note: capping subject only to SAPS component. Source: own calculation based on data on payment recipients provided by Payment Agency of Czech Republic

Economic consequences of capping introduction

Here, the economic consequences of the payment capping are shown. We used four farming systems as it was shown in Table 1. Only €60 ths. ceiling on payments was tested. Results for individual scenarios (as depicted in Figures 3 – 5) are expressed here in relation to the scenario 1 (BASE).

Perhaps the most tremendous decline due to payments cap (scenario 2) will register FS3 (milk specialization) in potatoes region. Its loss would double as this farm highly depends on subsidies – 40% ratio of subsidy to net value added. If a farm optimizes production structure, which would go mostly at the expense of livestock reduction, the loss diminishes, but profit is not still generated (scenario 3). In this FS all categories of livestock but chicken was at the end reduced up to 50%.

Notably, all investigated farms reported profit drop in a scenario two (payments reduced without changes in production structure) which was particularly large by a farm operating in so called potatoes region and farms that specialize on milk.

The most significant total subsidy fall registered mixed-oriented farm from maize-sugar beet region and so the net value added and profitability, respectively. This is the farm that is the most affected by future payment ceiling because optimization scenario does not create space for improvement - this farm type account for nearly half of area in comparison with other farms; there is only minor difference between optimization scenario (Sc.3) and reduced SAPS (Sc. 2) as regards profit or net value added. In both alternatives these two economic indicators go down, but this should not threaten the viability of the farm because profit in relative term is the highest among the four hypothetical farms. Downward trend is registered also for number of workers. The farms from the best production conditions transferred part of arable to the grassland in a maximum extent allowed.

Farming system (FS4 - dairy producer in sub-mountainous regions) is relatively better off to the dairy farm in potatoes region even though this farm is the one which is relying on subsidies largely; half of net value added comes from subsidies. Though income falls down, the farm - if production is partially restructured - make profit again. Yet, production restructuring goes mostly to the expense of livestock cut except chicken breeding. Notably, such a change in production composition brings a farm back to profit higher than under Base scenario.

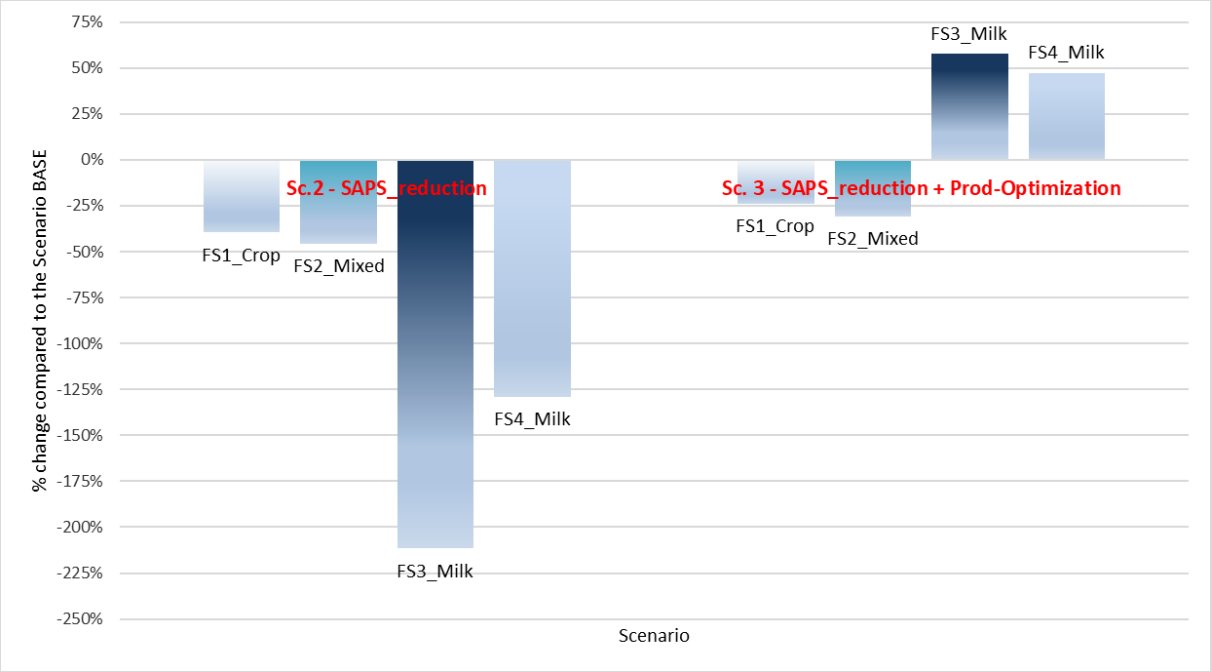

Figure 3. Relative change (%) in profit in scenarios compared to Sc. BASE situation for defined four farming systems (FS)

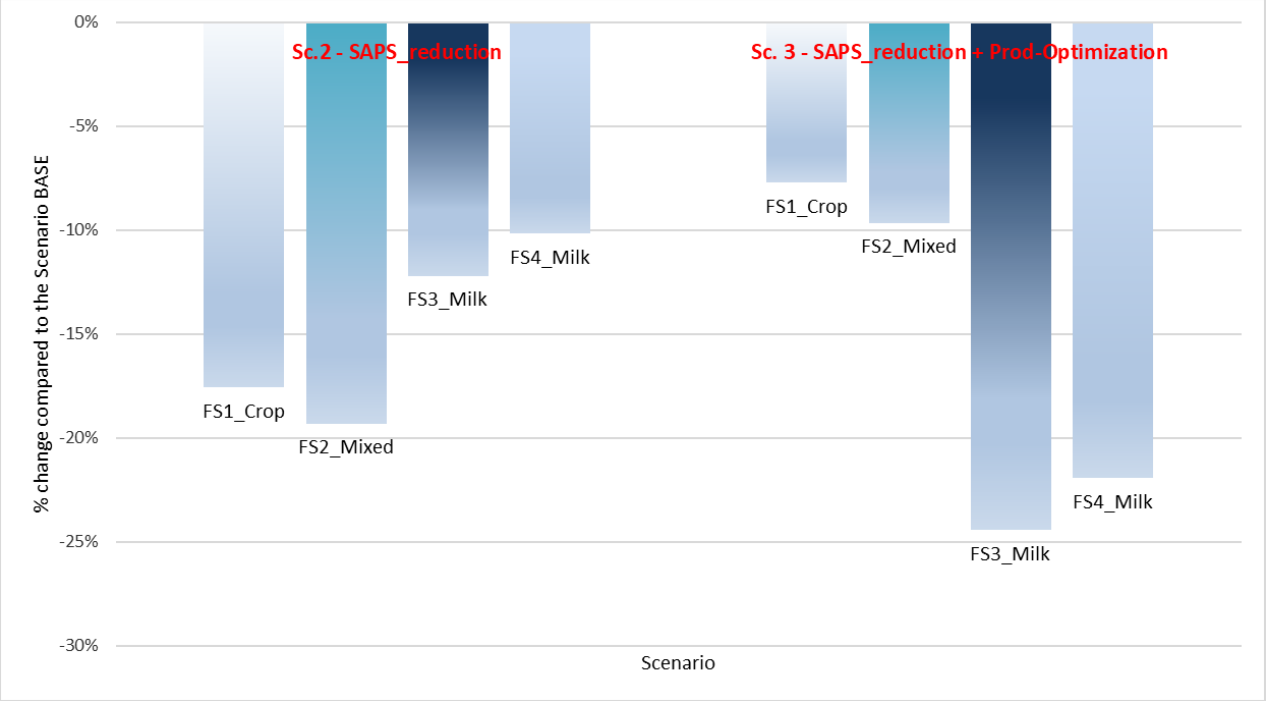

Figure 4. Relative change (%) in net value added in scenarios compared to Sc. BASE situation for defined four farming systems (FS)

Figure 5. Relative change (%) in labor per 100 ha in scenarios compared to Sc. BASE situation for defined four farming systems (FS)

Conclusions and policy recommendations

This study investigated potential impact of capping and re-distributive payment on Czech agriculture that is still dominated by large-scale farms. We selected four farming systems that represent very fertile to worse production conditions as well as three basic specializations: cash crop, mixed and dairy.

According to farm optimization model, economic outcomes of relatively large farms that prevail in the best production conditions of maize and sugar-beet region get worse. It needs to be stressed that the viability of those farms should not be threatened as they continue generating sufficient profit. If capping is introduced though, around one third to one half of current payments would be completely cut and it would reduce profit in all investigated representative farms. However, the economic simulations of selected farming systems show likely medium or mild impact of mandatory payment cap on the profitability of farms that still differ according to production conditions and specialization.

Further, the farm model has shown that improvement of economic results would go particularly on the expense (reduction) of livestock, particularly dairy and suckler cows. This finding partially supports the notion on implicit (negative) effect of capping on livestock sector.

There are likely justifiable certain exemptions from the payment reduction that would make the "shock" reduction in the payments smoother and perhaps more acceptable. These relives would partially or temporally help recipients to adjust to new conditions. Some compensations that should be considered are:

- Step-wise reduction of payments that would provide farmers with a temporally "phase-out" stage during which farms could adjust to reduced payments.

- Deduction from reduced payments that would be provided to farms keeping herds (ruminants). As it was shown above undesirable production consequence of capping could be reduction in livestock due to worse relative economic results compared to crop-specialized farms. Specific categories of animals would receive a "discount coefficient" that would determine the potential deductions. These coefficients could be related to age of animals, feed energy requirements or some other quantifiable factor. Acceptable administrative requirements need to be considered.
- Deduction given to farms that provide some social/employment role. This option would assume deduction based on a number of employees on farm. The option might propose both linear or non-linear deduction of labor. Some drawbacks of that option are administrative requirement as well as functional controlling mechanism. In this case, recipients would have to report number of employees and presumably also total labor costs. This mechanism has already been introduced analogously in 2013-20 programming period that allows deduction of labor costs from the payments subject to reduction. Currently, the introduction of capping or redistribution mechanism, so the deduction of labor costs, is voluntary.
- Discount provided for specific land conservation management. Those recipients that would implement some of measures from the pre-defined list of land conservation management could subtract part of the payments that would not be subject to reduction. The offered list of management practices would have to go above the obligatory requirements specified in another regulation.

There is also frequent argument that redistribution mechanism could lead to "artificial" split of enterprises into smaller units, which would practically make the measure inefficient. That would rather bring additional administrative costs for farmers while compromising main objective of the measure. It needs further investigation if, for example, introduction of historical reference area of a farm would be feasible and compatible with regulations.

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