Ambiguous Performance of the RDP Support to Modernisation of Agriculture in the Czech Republic: Time to Consider New Options

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Abstract

This paper responds to the ongoing debate on the improvement of the investment support in the CAP after 2020. First, the analysis of the sector performance of the past investment supports is presented, followed by the farm level dynamic counterfactual analysis of policy results. Baseline and three alternative scenarios of distributions between income and investment support are presented as they were agreed and assessed by experts and stakeholders in two focus groups. Apart from the significant effect on the expansion of livestock production, the impacts of the modernization support (M121) on farm performance are ambiguous. Participants of the focus groups will prefer maintaining the income support at the current level while reducing the intervention stimulating farms investment activity arguing by easier adjustment of activities to the actual needs of the business.

Keywords: investment support, counterfactual analysis, policy scenarios, stakeholder focus group.

Introduction

Encouraging investment activities has been considered an important instrument of boosting competitiveness of European agriculture for long time and became the core element of the productivity enhancing strategy of the Common Agricultural Policy (CAP) of the European Union. In the two last financial programming periods 2007-2013 and 2014-2020, investment support has been provided under the umbrella of the CAP's Rural Development Programme (RDP). It has included a range of measures aimed at modernisation in agriculture and forestry, adding value to agricultural, food and forestry products or diversification in non-agricultural productions like renewable energy or tourism and non-commercial activities. The European Commission foresees this support to remain an important instrument to fostering EU agriculture's competitiveness also in the future. In its 'Future of Food and Farming' document, European Commission communicated to the European Parliament that: "There is a clear need to boost investments into farm restructuring, modernisation, innovation, diversification and uptake of new technologies and digital-based […] in order to improve individual farm sustainability, competitiveness and resilience (European Commission, 2017: 16)". In the same document, European Commission (2017: 16) also identifies that the performance of RDP investment support should be improved, and the current investment gap in agriculture needs to be addressed through more use of innovative financial instruments, among others. In situations of decreasing and overall insufficient public budget, financial instruments are gaining on importance and are foreseen as the key policy mechanism for future EU agriculture aiming at satisfying growing finance needs (Hogan, 2017). There is therefore an obvious need for more ex-post assessments of current investment support under the CAP and ex-ante assessment of new policy options including financial instruments that could effectively address future agricultural investment needs.

Despite the political and societal relevancy, the number of studies assessing the RDP investment support impact is relatively low. Moreover, the empirical evidence delivered by ex-post studies is marked by inconclusive results. This may be given by the case studies diversity as the countries and regions subject to analyses differ significantly in their farm and production structures or financial and land market conditions. For example, Kirchweger and Kantelhardt (2015) show for the case of Austria that government-supported farm investments significantly foster farm growth with regard to both total livestock units and utilized agricultural area; with greater support effects on the former that is less affected by constraints of the land market. These structural effects are shown to display great dynamics as they accumulate over a longer post-investment period and to be farm-type specific. Kirchweger et al. (2015) found that investment support resulted in an increase in production, land renting and capital borrowing and detected a shift from the non-farm to farm activities, but with no statistically significant impact on the total income. Michalek, Ciaian and Kancs (2016) investigated the effect of investment support policies on investment activities of farms in northern Germany. Their results provide an evidence of a significant and almost complete crowding-out effect of investment support, which implies that farms use public support to substitute for private investment. Their data do not give any support to an inter-temporal substitution of investments. Medonos et al. (2012) showed some positive investment support outcomes in form of improved farm performance, concretely benefits in terms of improved Gross Value Added (GVA) and labour productivity, but not profit. Ratinger et al. (2013) also identified a positive impact of investment support on capital borrowing, which they interpreted as a mobilisation of the external capital in agriculture and argued that the deadweight of the measure is rather low. However, they could not confirm this finding on the sub-sample of large farms leading the authors to draw the conclusion that in the case of large farms the deadweight is high. Forstner and Ebers (2016) also provide evidence of positive productivity implications of investment support, concretely for the case of dairy farms in north-west Germany. Although, the empirical evidence of positive effects of investment support on farm performance based on these studies is still rather sparse, in their recent meta-analysis of the effect of public subsidies on farm technical efficiency found in scholarly papers, Minviel and Latruffe (2017) show that among various categories of subsidies, investment subsidies have the highest likelihood to be found with a positive effect on farm technical efficiency.

Similarly to empirical evidence of the farm performance effects of grand-based investment support, there are numerous studies investigating effectiveness and farm performance effects of financial instruments such as loan guarantees, interest rate subsidies, specialized banks or alternative financial institutions (see, for example, IFAD, 2000, Henningsen, 2009, International Finance Corporation, 2011, FAO, 2013, Westercamp et al., 2015). Also here, authors offer inconclusive and context-dependent results. The conditionality and country specificity of the empirical evidence of effectiveness of the current grant-based investment subsidy regime as well as of financial instruments rationalize and call for better targeting of investment policy to local needs and conditions. This is also reflected in the European Commission's intention to design future CAP so to establish a system allowing EU countries and regions to fulfil EU goals with their own tailor-made policies (European Commission, 2017). This, by return, calls for better understanding of financing needs and the effectiveness of the grant-based investment support and use of financial instruments at the level of each EU member state and region.

Against this background, also Czech Ministry of agriculture developed several initiatives to gain better understanding of the implications of current investment support and potential outcomes of alternative future policy scenarios. This study is one of the responses to these needs. Its objective

is to assess the RDP investment support (concretely the modernization measure M121) impact on farm performance using a comprehensive range of structural and economic indicators. In this analysis we accentuate the search of 'good' counterfactuals in the applied direct covariate matching procedure and the dynamics of the policy outcomes. The paper further aspires to deliver an ex-ante assessment of post 2020 CAP investment support options that would stimulate (sustainable) productivity growth and competitiveness improvements.

The paper is structured as follows. In the next section we outline the methodology. This is followed by the overview of investment trends in agriculture including investment support policies. The core of the paper is the presentation of the results of the ex-post and ex/ante analysis. The results are further discussed and policy and research recommendations are drawn in the concluding section.

Methods and data

The presented paper has two distinctive but closely linked parts. In the first part we gather results of quantitative assessment of the performance of the current support to modernisation of agricultural holdings, while in the second part we use the quantitative analysis results as an input in the development and assessment of scenarios of CAP options after 2020.

To quantitatively assess the effects of the current policy, we combine an analysis of the sector performance with a farm level counterfactual analysis of policy results. Concerning the latter, we follow direct covariate matching (DCM) between treated and control groups based on Mahalanobis metric (Abbadie and Imbens, 2002) with following features: four matching controls, calliper to eliminate distant nearest neighbours and a non-parametric difference in difference (d-i-d) estimator which allows for controlling unobservable, linear and time-invariant effects (Heckman et al., 1998). In the study we use a sub-sample of 1223 farming companies from the Albertina database[1] containing economic and financial data from the annual reports of companies for the period 2005-2015. This was enriched by data on land use, livestock, production orientation and farms' participation in RDP measures from the Land-parcel Identification System (LPIS) and RDP monitoring system. Similarly to Kirchweger and Kantelhardt (2015), we assess the dynamic effects of the support. We use investment support windows of three years: i.e. participations in M121 in 2008 to 2010, then 2009 to 2011, and 2010 to 2012; if farms received M121 support outside of the specified windows, e.g., in 2008 and 2011 they were excluded from the analysis. Matching is applied for each of those groups separately. As potential control farms, we use the same dataset of 636 farms that did not received support during the entire period 2007-2015. This control group is used for matching with treated farms in the different time windows. Matching is then carried out always for the year before the first year of the window. Effects are followed from the last year of the window onwards until 2015). Matching is based on a set of structural covariates (11) involving size (revenue), production conditions (the share of land located in areas with natural constraints), intensity of production (livestock density, capital/labour ratio, cost revenue ratio) and financial health of the farms (profit, indebtedness, cash-flow per labour or land).

For the ex-ante policy analysis, we chose a qualitative participatory research approach based on focus groups (FG). We organised two FG of experts and stakeholders. The first FG involved eight experts (researchers and farm advisors) and four non-farming stakeholders (suppliers of farm technologies and dealers of bank products). For the second focus group we invited four farmers

[1] http://www.albertina.cz/en/

representing various aspects of the structural variability of Czech agriculture in terms of production scale (small/large), specialisation (crop/animal production), and intensity of production (high/low). In addition, 2 researchers participated in this second focus group. The focus groups (FG) had two tasks:

(a) to identify and prioritize investment needs (in terms of technologies) and barriers for their private funding.
(b) to assess farm investment responses to various options for (scenarios of) the national implementation of CAP 2021-2007 in the area of investment support.

Concerning the former, the participants were invited to revise and modify the list of investment needs and investment barriers in a joint discussion and to mark individually the highest and the second highest priority from private (business) and social point of view (each separately).

In the ex-ante policy assessment part, deliberation was a key way for the assessment of policy options. In each FG we presented an outlined set of potential policy option forming four scenarios [Table 1].

Table 1 Definition of scenarios

		Targeted measures (RDP)			
		Current measures	Constrained investment grants, generous credit interest support	Investment grants abolished, interest support to credits	No investment support, support only to collaborative innovation projects
Income support	Current level of the income support	1 (baseline)			4
	Substantial cut of the income support		2		
	Cut of DP by 20% , LFA payments preserved			3	

Source: Outcome of the focus groups.

Note: LFA denotes less favourable areas.

The scenarios assume alternation of the income support measures on one hand and the investment support instruments on the other hand. Of the possible 12 combinations, the research team together with FG participants selected four scenarios, of which Scenario 1 represented the baseline. In contrast to Scenario 1 (baseline), the available budget for income and investment support together is reduced by 25% in each alternative scenario. Scenarios 2 and 4 represent extremes in terms of a dramatic reduction of one policy (income support or targeted RDP measure) while the (respectively) other policy is kept at more or less current level. Scenario 3 is a moderate scenario maintaining both instruments at a reduced level.

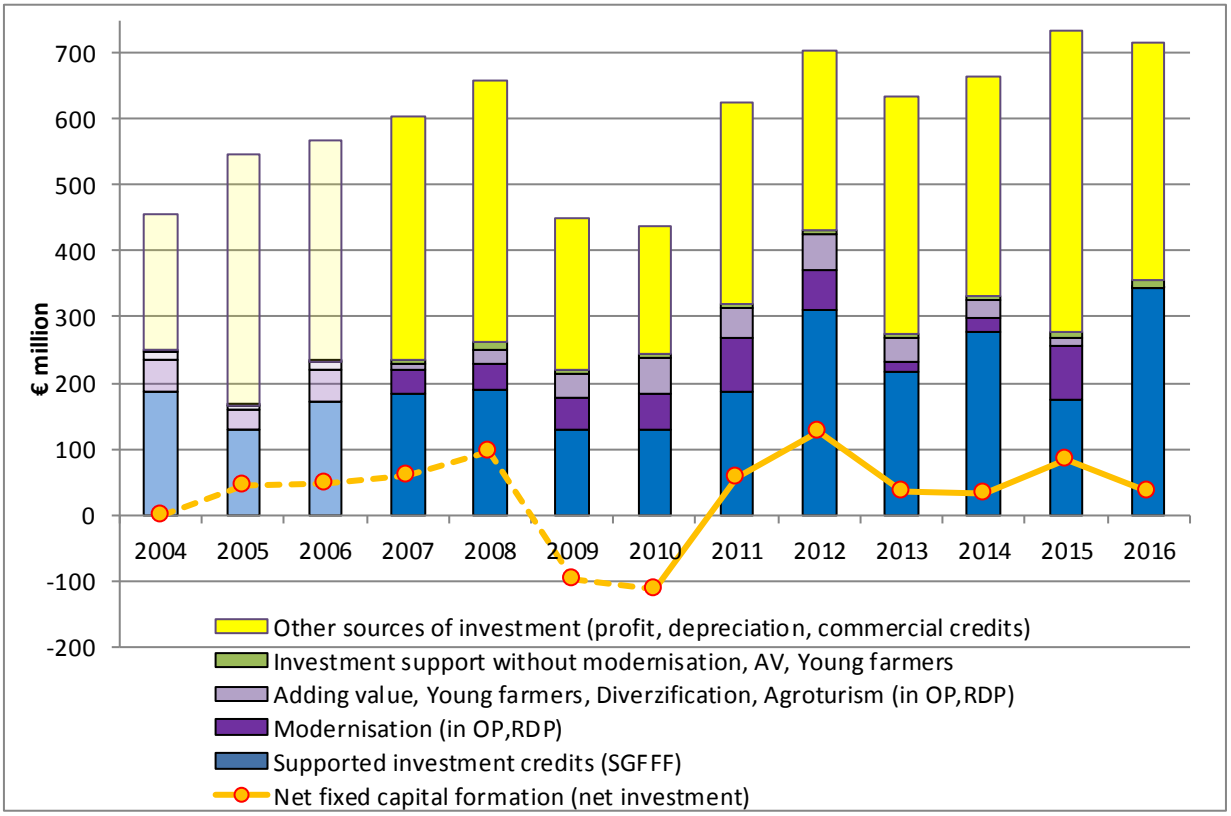
We followed modified MAPP - Method for the Assessment of Programmes and Projects (Metis, 2014). The standard MAPP includes four steps: i) presentation of development trends; ii) trend analysis (Baseline) in respect to the selected effect indicators; iii) scoring the effects of the parameters of the scenarios on individual indicators in respect to baseline (creation of the influence matrices); and iv) interpretation of the results of step 3 by creating Scenario Impact Profile. Our modification of MAPP concerned only step iv) which was done only by the research team, but in much richer way than in the standard approach. The results of the quantitative analysis entered particularly steps i) and ii). Please, note that scoring in respect to the baseline (step iii)) means that only departures in the development of indicators against their baseline values (trends) are assessed. The results were merged by simple score averaging thus giving more weight to opinions of participating farmers.

Development of the investment in agriculture and its support since the EU accession

The funds invested in agriculture (Gross Fixed Capital Formation, GFCF) in the Czech Republic steadily grew between 2004 and 2015 except of the short period of financial crisis in 2009-2010. The blue columns in the chart of Figure 1 refer to supported credits (with supported interest rates and guarantees) provided by the Support and Guarantee Funds for Farming and Forestry (SGFFF). The light and deep violet and green columns together represent the public support in investment grants. The yellow columns refer to other sources financing investments including depreciations. Investments bound to public funds accounted for 76% of the total GFCF value over the whole period 2004-2015, of which investments supported by grants accounted for nearly half (32.6%). In terms of public cost of the support, the ratio between the public outlays and the investment (GFCF) oscillated around 0.25 depending on the distribution between the SGFFF (0.12) and RDP interventions (0.38).

In the period 2007-2013, investment support was the main tool of Axis 1 of the RDP (measures M121, M123, and M124). Measure M121 (Modernisation of agricultural holdings) was the largest investment support measure. It was a highly popular measure, which resulted in the need to increase its budget twice (in total by 16% in comparison with the original plan). The other two measures, M123 (Adding value to agricultural and forestry products) and M124 (Cooperation for development of new products, processes and technologies in the agriculture and food sector and the forestry sector), were considered as too demanding in terms of project preparation, and their potential stayed in some way idle. From Axis 3 of the RDP, farms participated in two investment support measures: M311 on diversification in non-agricultural activities including bioenergy, and M313 support to touristic facilities.

Figure 1 Development in volume and structure of investment in the Czech agriculture



Source: CZSO, SGFFF, MoA, own calculations

Investment support of the RDP

M121 was designed to support modernisation of farms in areas and specialisations which were deemed having production and market potential but outdated technologies and an inadequate level of investments. The general economic objective of this intervention was to improve the efficiency of production factors (labour, land and capital). During the programming period 2007-2015, most of the support in terms of the number of projects as well acquired funds went to the livestock sector (75.6% and 76.9%, respectively). Nearly two thirds of the supported investments were directed to the technologies for animal breeding with positive impact on animal welfare and productivity. Slightly less than a quarter of supported investments were used for improving manure and slurry management; and the rest (16%) went to the construction or renovation of feed storages. Investments in plant production were directed at storages and their respective technologies (more than 60% of the supported investments in plant production).

The distribution in favour of the livestock sector was due to direct preferential criteria for livestock investment and less favourable areas (LFA), and due to the exclusion of mobile machinery from the eligible investment (with exception in year 2015 when only mobile machinery was supported). If a project was realised in LFA, then the investment support rate increased by 10 percentage points. Projects in LFA presented 63.6% of total number of projects and acquired 59.7% of the M121 funds).

Another important aspect of the implementation of the farm modernisation measure is the distribution of the support. Sixty percent of the beneficiaries received only one project under the

measure M121, which represented about one third of all projects, but only 21% of the budget of the measure. By contrast, enterprises with three or more projects accounted for only 19% of beneficiaries, but they drew more than half of the aid (57%). This uneven distribution over the projects caused also uneven distribution support over the farm sizes. The largest share of M121 financial aid was allocated to farms with over 1 000 ha. They represent 35% of all M121 aid beneficiaries and 64% of all farms in their size category (in the national farm structure). These large agricultural farms have received less than half of the aid and have generated more than half of the supported investment. The second largest group was a group of enterprises with 50 to 500 ha of agricultural land (31% in numbers), but their category in the national farm structure covered only 10%. These farms benefited from more than a fifth of the structural support. Small farms with up to 50 hectares formed about one fifth of the beneficiaries and 13% of the aid budget. The remaining category of farms with 500 – 1 000 hectares of agricultural land represented less than 12% of the beneficiaries.

National support to commercial credits

SGFFF, founded in 1994, provides support in the form of (i) funds designed to reduce the interest rate, particularly in the frame of its investment programs, or (ii) collateral for credits provided by commercial banks and/or other financial institutions. The investment programs for farmers are mainly focused on purchasing mobile equipment, construction and technological equipment, breeding animals and, since 2004, for the purchase of land. The role of the fund was particularly important in the early years of its operation, when the agricultural sector did not reach the necessary profitability, the loans were provided at relatively high interest rates and the agricultural entrepreneurs did not have sufficient collateral.

In the period under review since 2004, SGFFF has participated in arrangements of loans in total volume of € 2,628 million, representing, on average, about 33% of the annual volume of total investments. As the competition on the financial market and the financial situation of the farmers themselves improved, the average interest rate of agricultural clients declined from 7.45% in 2004 to 3% in 2016. However, the interest rate paid by farmers dropped from 2% to 1%. This form of support appears to be very effective because there is a high multiplier effect of the support calculated by the share of support and the volume of supported investments for the whole duration of the Fund with a value of 5.6. In the last five years, due to low interest rates, this multiplier has actually reached a value of 15. It is also interesting that since 2012 farmers are no longer applying for loan guarantees even though they are one of the SGFFF programs currently offered. This situation is due to the fact that agricultural entrepreneurs have at their disposal sufficient collateral accepted by banks.

Results

This part is structured in three sub-sections: (1) results of the ex-post counterfactual analysis of the investment support of the RDP 2007-2013, (2) an assessment of the future needs for investment and barriers which discourage farmers to do so; and (3) the evaluation of the options (scenarios) for the CAP after 2020. In contrast to the quantitative analysis of (1), (2) and (3) are results of the work of experts and stakeholders in two focus groups as described in the methodology section.

Results of the ex-post evaluation of modernization support (M121) of the RDP 2007 – 2013

The results of the ex-post evaluation of the RDP modernisation measure M121 are summarized in Table 2. As described in the methodological part, the impact of the modernisation support is calculated in the form of three-year moving averages instead of annual figures in order to eliminate the influence of (randomly varying) weather and market conditions on the results. We consider 18 outcome indicators that can be divided into four groups – post-support growth or change in (i) output (Revenue or GVA) expressing also structural effects, (ii) productivity (e.g. GVA/Labour Cost or Tornquist-Theil TFP), (iii) efficiency (e.g. Cost/Revenue Ratio or Capital Return), and (iv) mobilisation of external capital (Bank Credit Indebtedness and Long Term Bank Credit Indebtedness). All these indicators are listed in the first column of Table 2. For simplification, we indicate only the effect direction and statistical significance.

The results suggest that investment projects supported by M121 measure in the earlier two investment windows (2008-2010 and 2009-2011) have systematically different effect than supported investments of the later support window (2010-2012). In the first two support windows, investment aid under M121 has mainly a structural effect - it has a statistically positive effect on livestock farming (ruminants) and livestock density per hectare of agricultural land. This effect of modernization support is reflected in a delayed (up to six years after the aid) increase in total revenues. Because of the data (length of the analysed period), this belated revenue response can be observed only as a result of investment support provided in the first time window.

In parallel to these structural outcomes, M121 investment support in the second time window of 2009-2011 statistically significantly increased production costs (both total and production costs per unit of revenue) and resulted in a deterioration in cash flows per unit of revenue for several years after support. These results may indicate faster technological progress (capital replacement) achieved through modernization support, but also costs of adapting ("tuning") the new technology.

The modernization support also influences farm financial structure and thus the timing of investment. In the first years after investment support, the bank and long-term debt of supported businesses are higher than of unsupported businesses. The first time window further allows us to investigate the investment support's longer-term effect of the investment support on farm financial structure which reveals that three or more years after investing, long-term indebtedness declines and reaches lower levels than the indebtedness of unsupported businesses. This effect is statistically significant when analyzed for individual years (instead of moving averages). It would suggest that the modernization support allows faster realization of intended investments, in other words to mobilize external funds, but not necessarily additional investments. However, there could be also a partial effect of the drop of interest rate in 2011 onwards which might have allowed farmers from the control group increase their investment activity without the RDP support.

Furthermore, it is specific to the third time window of 2010-2012 that modernization support has a negative effect on total factor productivity and, more unexpectedly, also total factor productivity when considering environmental (desirable) outcomes (TFPE). It evokes a question whether investment support in conditions of favourable financial conditions (historically low interest rates) potentially motivate to temporal over-investment.

Table 2 Dynamic effects of investment support on selected structural and performance indicators in 3 year moving averages of consequent years after the investment support window

Support Window	2008-2010				2009-2011			2010-2012	
Year of effect: 2000+	2010-12	2011-13	2012-14	2013-15	2011-13	2012-14	2013-15	2012-14	2013-15
Revenue	-	+	+	+**	+	+	+	+	+
GVA	-	+	+	+	+	+	+	+	+
Profit	-*	-	-	-	-	-	+	+	+
Beef Cows (LU)	+	+	+	-	+	+	+	+	+
Dairy Cows (LU)	+	+	+	+	+	+	+	-	-
Total Ruminants (LU)	+**	+**	+**	+**	+***	+***	+***	+	+
Livestock Density	+	+***	+***	+***	+***	+***	+***	-	-
GVA/Lab. Cost	+	-	+	+	-	-	-	-	-
CF/ Lab. Cost	+	-	-	+	-	-	+	+	+
TFP	+	-	-	-	+	+	+	-**	-**
TFPE	-	-	-	-	-	-	-	-**	-**
(EBIT+Dep)/Lab.cost	+	-	-	+	-	-	+	+	+
Total Costs/Revenue	+	+	+	+	+**	+**	+**	+	+
Prod. Costs/Revenue	+	+	+	+	+*	+*	+	+	-
CF/Revenue	-	-*	-	-	-**	-*	-	-	-
ROA	+	+	-	-	-	-	+	+	+
Bank Credits	+***	+*	+	-	+**	+	+	+**	+
Longt. Bank Credits	+***	+	-	-	+	+	+	+	+

Source: Own calculations.

Note: *, **, *** indicate statistical significance at 10, 5 and 1% significance level, respectively; + and - indicate average positive and negative value of the effect of investment support (treatment) on treated farms (difference-in-difference), respectively. Please, note that ratios and indices (i.e. last eleven indicators, starting GVA/Labour Cost) are used in their logarithmic transformation as pointed out in the methodological section. Negative ATT thus mean that the ratio "after to before" of these indicators is below 1 and positive signs refer to ratio over 1.

In summary, the observed structural and economic performance effects of the modernization support are mostly dynamic. This means that the effects of the supported investments can be observed over several years or first after some time after the investment has been realized. The statistically significant impacts of the investigated investments have been also observed only in some monitored periods, therefore, they cannot be evaluated as general, but conditional. This outcome indicates possible changes in the farm economic conditions, changes in the type of

projects that farms are applying for or changes in overall financing (capital market) conditions. Apart from the significant effect on the expansion of (livestock) production, the impacts of the modernization support (M121) on farm performance are relatively weak and mostly temporarily negative. These results suggest high adjustment and learning costs of technical change (modernization) and the potential need to analyze the investment impacts over longer periods of time to observe positive economic outcomes. However, it is possible that investment aid does not contribute to the economic performance of agricultural enterprises even in a long run and farms modernize under good financial terms gradually even without support. In this case, investment support would have purely (mainly) an inter-temporal effect but no (or moderate) added value to long-term farm competitiveness. To legitimize the modernization support for the future programming period, it should be assessed in more depth for its environmental (desirable) outcomes effects.

Assessing the needs for further investment and assistance

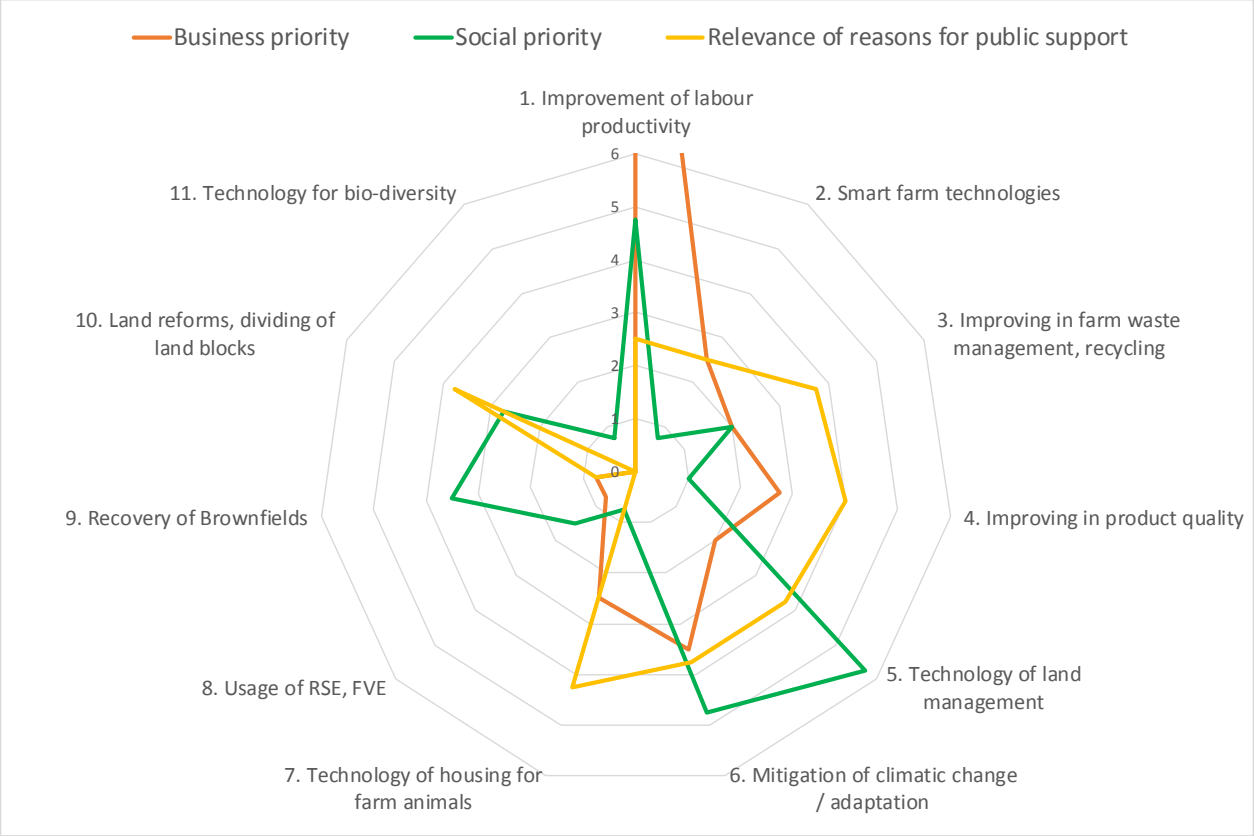
Table 3 Needs for investment provided by the focus groups of experts and stakeholders

Improvement and innovation areas	Needs for investment (pressure)	Barriers for farm businesses
1. Improvement of labour productivity	Lack of labour force (leaving)	Big investment, long-term effect incidence and low rate of return
2. Adoption of smart farm technologies	Decrease of input use (efficiency, environment), decrease of soil compression	Inexperience, risk of failure
3. Improving in farm waste management, recycling	Reasonable capacity for storage and technology for application	Low interest for insufficient benefits
4. Improving in product quality	Technology for harvesting and storages	Insufficient market response, absence of quality systems
5. Technology of land management	Land fund protection	Long-term rate of return, expensiveness
6. Mitigation of climatic change / adaptation	Irrigation systems, technical measures for water retention in landscape, agroforestry, reduction of GHG emissions	Nature of public goods, low interest to cover costs
7. Technology of housing for farm animals	Increasing requirements for animal welfare and climatic change	Big investment, long-term effect incidence and rate of return
8. Usage of renewable source of energy, photovoltaic electricity	Decrease of energy consumption and production of renewable sources of energy	Inexperience, risk of failure
9. Recovery of Brownfields	Useless occupation of next land	High costs, ownership relations
10. Land reforms, dividing of land blocks	Water retention, biodiversity, land protection	Long-term process, realization of common landscape equipment is low
11. Technology for bio-diversity	Development of more efficient equipment for biodiversity protection	Low own benefit

Source: Own compilation; output of the focus groups.

The first exercise of the FG concerned identification and classification of future investment needs and drivers in the time horizon of the next 5-10 years. Altogether, 11 areas of needed improvements and innovations in the farm production and business were stated – eight predefined by facilitators and agreed upon by stakeholders or experts and three added by them. It naturally led to the identification of barriers to their purely private financing. Both the needs and the barriers are summarised in Table 3. Consequently, the FG participants prioritised them from the business and social perspectives separately, and from the perspective of severity of the barriers to private investment (i.e. reasons for public support). The participants assigned two most important investment and innovation areas in each category (business and social perspectives, and relevance of reasons for public support). These individual judgements were summed up while assigning the most important judgements with 1 point and the second one with 0.75 points. The final results for assessment type of priority and rate of relevance of reasons for public support are presented as a web chart in Figure 2.

Figure 2 Expert evaluation of investment priorities and needs in the Czech agriculture



Source: results of the conducted focus group discussions

Experts and stakeholders considered investments into labour productivity improvement; adaptation or mitigation of climate change; technology of animal housing and improving product quality as the highest business priorities. As the highest social priorities, FG participants identified investments into technology of land management, followed by investments into mitigation or adaptation of climatic change, improvement of labour productivity, and recovery of brownfields. It is important to point out that some of the investment areas were found relevant not only for farmers but also for society. Interestingly, the high social relevancy of investments into labour

productivity improvements was marked by farmers while other stakeholders found mostly the other areas of a greater societal importance. As for financing from public sources, FG participants denominated following investment areas as most relevant: investments oriented on land reforms, technology for animal stabling and waste management, adaptation and mitigation measures with technology of land management, and investment in improving product quality. In this last evaluation, experts classified the investment priorities relatively equally.

Results of the assessment of policy scenarios

The results of the ex-post assessment of the performance of the investment support of the RDP 2007 – 2013 and of the investment needs exercise in the FG were used to specify further the parameters of the scenarios and the indicators to measure their effects. The FG outcomes of the policy scenarios' assessment were processed in three ways: first, the judgements of experts and stakeholders recorded in the influence matrices were summarised for each investment aspect/need (indicator) and valued on the scale from strongly negatively affected (--)to strongly positively affected (++) by the scenario [Table 4]; second, for each scenario we mapped the links between the core policy measures (forming the scenario) and their effects on the individual investment indicators. Comparing the three scenario maps of relations we illustrate the different nature of the scenarios and their assessments by the experts and stakeholders [Appendix]. Finally, we generated graphs for each investment indicator, comparing the effects of the three policy components of each scenario. For illustration, we chose two investment indicators – investment activity and adoption of the most progressive technologies and present them in Figure 3 and Figure 4.

All assessments of the effects of the scenarios were done in respect to the baseline (Scenario 1). The baseline represents a continuation of the current policy in the next programming period. The participants of both FG emphasised strong increase of farm investment activity and strong improvement of labour productivity if also current situation in the labour market continues. Both will be driven by the lack of labour in the market and enabled by the generosity of the policy. In contrast, no new jobs, but rather shed of labour are expected. While these developments regard mainly larger farms, the development of the position (incl. profit) of small farms was foreseen as to stagnate. For the rest of the indicators the experts and stakeholders expect medium improvements.

Now turning our attention to the summary table of the scenario assessment [Table 4], we can see that FG participants expect a cut in the income support (Scenario 2) to significantly reduce investment activity of farms and to undermine their profit. At the same time, labour productivity is expected to grow substantially and the share of farms adopting the most progressive methods to increase. The experts and stakeholders argued that under the circumstances of the substantial loss of the income support farms would be pushed to more rational (efficient) use of resources. Even if the investment activity drops, the remaining investment will go into the most promising technologies. Also, farms will adopt organisational changes which will allow releasing labour and improving labour productivity. Similar decline of investment activity and a drop in profits is expected from Scenario 3. In contrast to Scenario 2, moderate balanced reduction of income support and investments support (with abolished investment grants) in Scenario 3 will not have strong positive effect on productivity and will even discouraged farmers to invest in progressive technologies (according to participants). Scenario 4 maintaining income support but reducing investment subsidies to support of cooperation is expected to lead to least changes as against the

baseline. The only significant change suggested by experts and stakeholders will concern a further growth of farms because collected income supports will improve access to commercial credits.

In general, Scenario 2 (with the severe cut of the income support) is deemed to have strong negative effect on farm structure (on both large and small farms leaving the industry). There are two surprising aspects of the scenario assessment exercise:

i) Scenarios 2 and 4 will have very marginal effect on the "social values" of farming.
ii) While Scenario 3 was created by the authors as the "most likely" because it brings moderate changes to the policy, the experts and stakeholders evaluated it as the worst in context of the policy assisting farmers in addressing their (private and societal) investment needs.

Looking at the last three columns in Table 5, we can see what group of measures has the most important effect on the investment indicator (only one group of measures can be identified as the most important for each indicator). Note that the signs "++", "+" and "-+" refer purely to the importance and not whether the effect is positive or negative. Clearly, income support and particularly direct payments are perceived by experts and stakeholders as the most important factors of change (in some cases however with very marginal effect), while the other two sets of measures stay aside. However, looking at the maps in Appendix we can see a bit different story. In the context of what was said above, these are the investment grants, nodes of which are the biggest in all scenarios – thus their presence in the modified form (limited in size) or their abolishment affect most of the indicators in each scenario.

Examining the three maps further, we can see that Scenarios 2 and 4 are much richer on links than Scenario 3 and also that they provide more green lines (thus positive impacts) than Scenario 3. We can also clearly see the switch between the green and red lines in the antagonistic scenarios Scenario 2 and Scenario 4. Also negative and positive effects offset each other in Scenario 4 for most indicators if we return to the information put in Table 4. To make the conclusion simple, radical changes provoke both the positive and negative effects while moderate changes of the policy lead almost exceptionally to negative changes. When investment grant support reduction is accompanied with direct support reduction (Scenario 3), the effect is the most negative. Replacement of investment grant by interest support is not perceived sufficient to sustain investment activity. This may reflect current positive state of financial markets (conditions) and stakeholders' positive perception of the markets - thus lesser appreciation of the market corrective effect of interest subsidies.

Further details on the outcomes of the FG can provide decomposition of the total effect into the effects of the measures.[2] We illustrate it on two key indicators Investment Activity (Figure 3) and the Share of the Farmers Adopting the most Progressive Technologies (Figure 4).

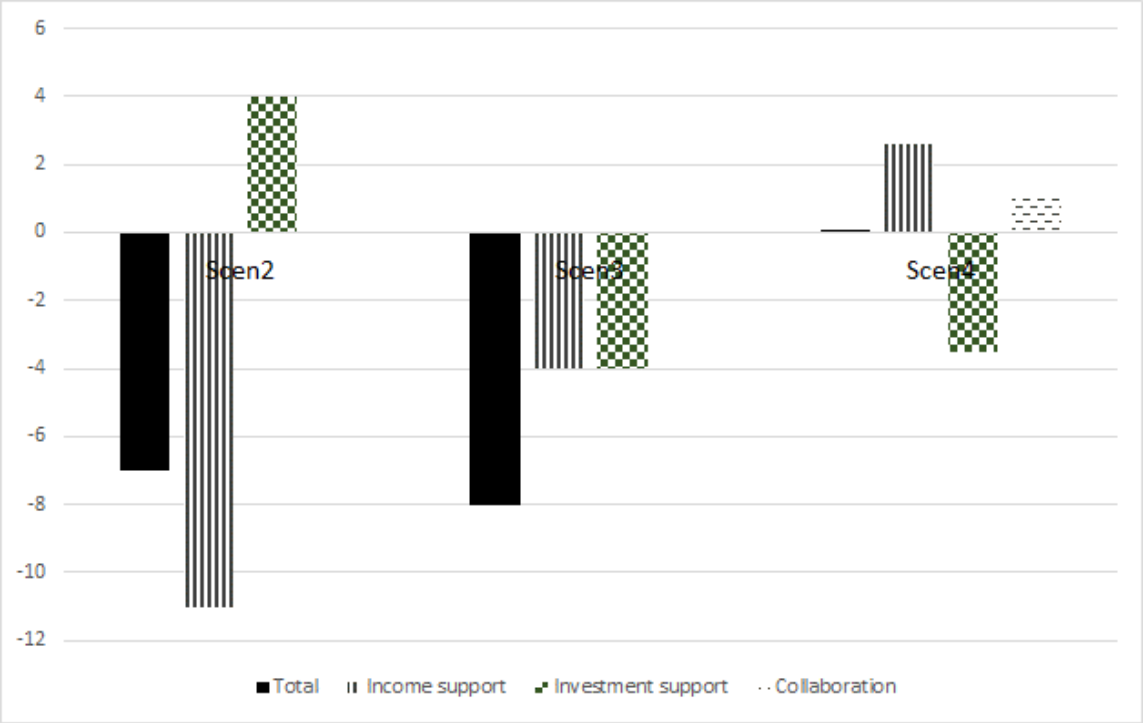
[2] In this context of the decomposition of the effects, it is worth to stress again that adding or subtracting the scores is not without problems and thus that the provided analysis of the results of the FG has to be taken with caution only und thus as indicative and not absolute. It of course holds also for the summary table.

Table 4 Summary table of the FG outcomes

Indicator	profil Scen2					profil Scen3					profil Scen4					Mesures with highest importance		
Valuation	--	-	-/+	+	++	--	-	-/+	+	++	--	-	-/+	+	++	Income support	Investment support	Collaboration
Investment activity	--					--							-/+			++		
Profit	--					--							-/+			++		
Labour productivity (GVA/AWU)					++				+				-/+			++		
The share of farmers adopting the most progressive technologies					++	--							-/+			++		
Wages					++	--									++		-/+	
New /lost jobs	--					--						-				++		
Growth of farm size stronly over 1000 ha	--							-/+							++		-/+	
Farms with less than 50 ha - leaving the business,+ continuing		-				--							-/+			+		
Speading-up /slowing-down the fulfilment of the EU legislation	--					--							-/+			+		
Improvement/decline of the product quality					++		-						-/+			-/+		
Speading-up /slowing-down working conditions			-/+					-/+					-/+				-/+	
Speeding-up /slowing-down animal welfare improvements			-/+			--							-/+			+		
Improvement/decline of the state of soil			-/+			--							-/+			++		

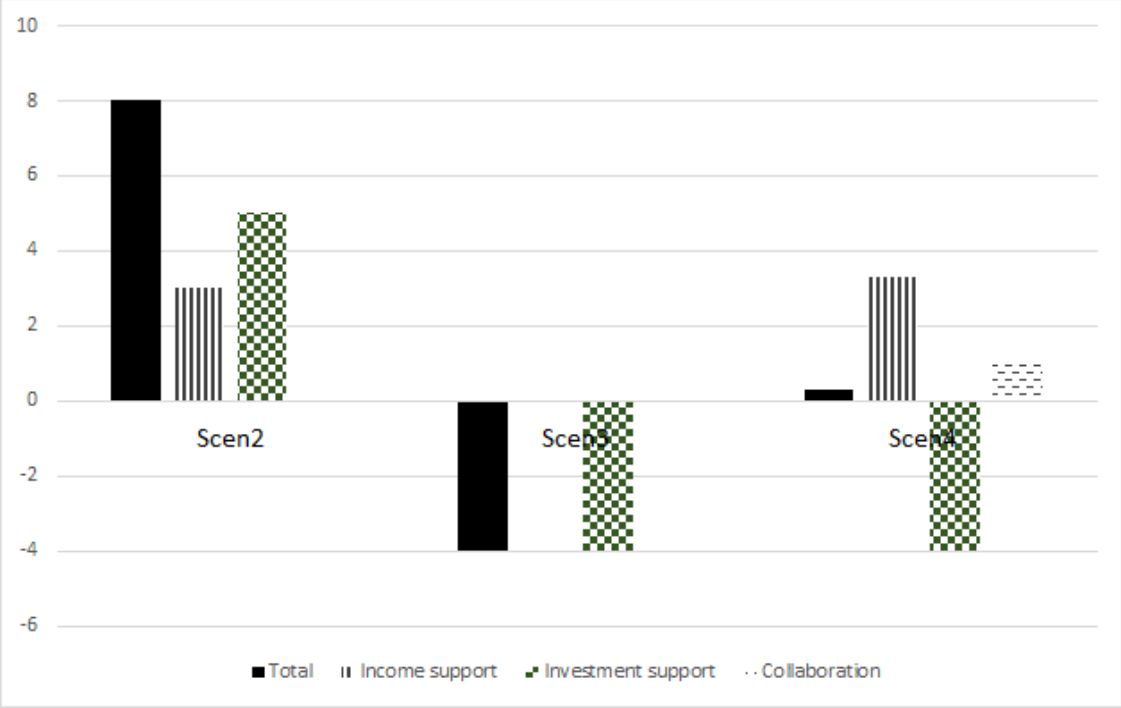
Source: Results of the focus groups discussions

Figure 3 Effect of the three scenarios on the investment activity



Source: Results of the focus groups discussions

Figure 4 The effect of the three scenarios on the adoption of the most progressive technologies



Source: Results of the focus groups discussions

In Scenarios 2 and 3, the cut of income support causes the deceleration of investment activity (Figure 2). The investment support does not provide sufficient incentives (and perhaps also conditions for lenders) to compensate for the loss of the income support in Scenario 2. In Scenario 3, the abolishment of investment grants will further worsen the incentives and conditions for investment. In Scenario 4, the importance of the income support increases, although it stays at the baseline level, because there is no support to investments. However, the loss of the investment funds is bigger. The total zero effect flows from the deployment of the funds for collaboration that doubled in respect to baseline. The story is more or less similar for the adoption of the most progressive technologies, except that loss of the income support motivates farmers to invest in these technologies. It makes, actually, the extreme Scenario 2 preferential to the moderate Scenario 3.

The compensating (opposite) effects of the different measures that we see in case of Scenario 4 can be also observed in case of Scenario 2 with respect to indicators concerning investments in working conditions and animal welfare (with the exception that there is no effect of the support to collaboration).

Conclusions

We pointed out already in the introduction that investment activity of farmers had been a subject of intervention for more than two decades. Since the EU accession, co-financed investment grants of the CAP and national interest support programme operated in parallel and to some extent the national interest support programme could complement the CAP measures (RDP since 2007). Generally, there was a thematic division between these two instruments: the grants providing more funds were used to upgrade costly immobile technologies in crop and animal production, while the support to the interest rate was directed to mobile technologies like tractors and harvesters.

The both instruments exhibited large inflexibility when they continued to provide support to production assets while interest rates dropped to their historical minimums and the economy grew significantly.

This inertia in the policy was reflected in thinking of participants when they assigned high social priority to investment improving labour productivity, while a number of infrastructural or "public good" oriented investments stayed aside their attention.

This concentration on productivity as priority for intervention given by the Article 17 Council regulation 1305/2013 is in contrast to the results of the counterfactual analysis related to the modernisation measure of the RDP which showed high ambiguity of results of such intervention. It does not mean that productivity has not grown since the EU accession, however, it would grow likely without intervention at the same scale too.

From distributional analysis emerged that Czech large scale farms that they apply and receive structural support to this extent more than three times only in one fifth of all supported businesses. According to the various growth rates in the TFP, it is also possible to assume that unsupported farms have invested in assets and technologies that can produce higher effects for them, and supported farms have been able to invest more in non-productive investment, especially in the field of animal welfare, manure storage facilities, etc. It is also to be said that in a situation where investment conditions are very favorable, farms that are able to finance these investments

themselves, especially in the case of multi-project farms, are also supported, as we have shown in the distribution analysis and pointed to the problem of leakage of support to landowners or capital owners in the form of rising rents or distributed net profits. This leads to inefficient use of public finances, and support should rather be targeted at enterprises that have received no structural support and really needed it.

A positive decision in the new programming period of the RDP 2014-2020 is the political decision to allocate financial envelopes for projects according to their size, but an increase in the size limit for projects from CZK 30 million to CZK 150 million may lead to an even greater problem in the distribution of investment support. If it is to be possible to financially support large projects up to CZK 150 million, then limitations should be given to the number of projects that can be drawn. Given the availability of external sources of funding in the financial market, especially for commercially-oriented projects, further support would be desirable for more unproductive investments, and also for climate change, water and biodiversity, advisory and collaboration for implementation of innovations.

The assessment policy alternative showed that the severe cut of the income support is expected to have strong negative effect on investment activity and farm structure (on large and small farms leaving the industry). Generally, income support and particularly direct payments are perceived by experts and stakeholders as the most important factor of change. on the side of investment instruments, the participants in the FG viewed even much constrained investment grants as critically important – hardly their lost be able to be compensated by generous interest support programme.

The radical shift between income support and investment support and vice-versa will have only marginal effect on the "social values" of farming. Surprisingly, the "most likely" scenario was regarded by the experts and stakeholders as the worst.

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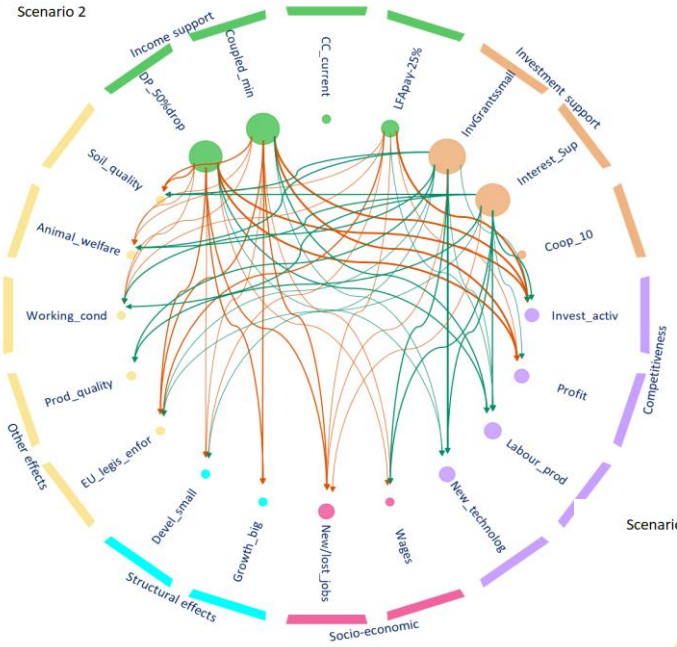
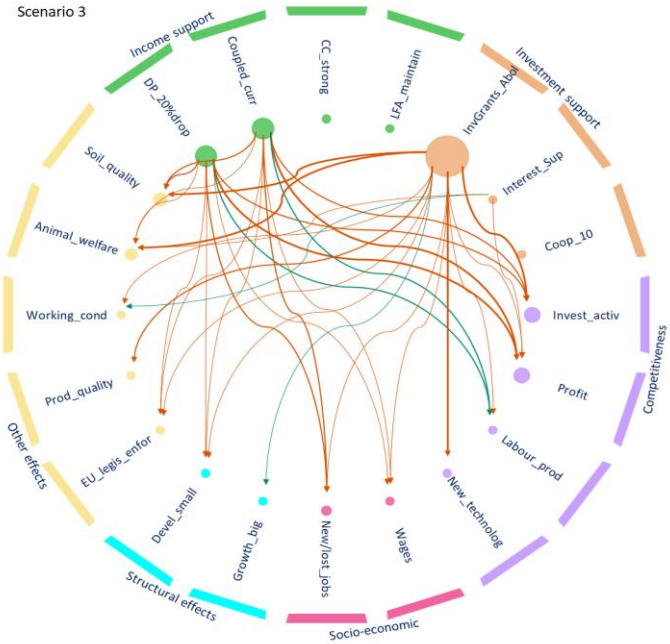
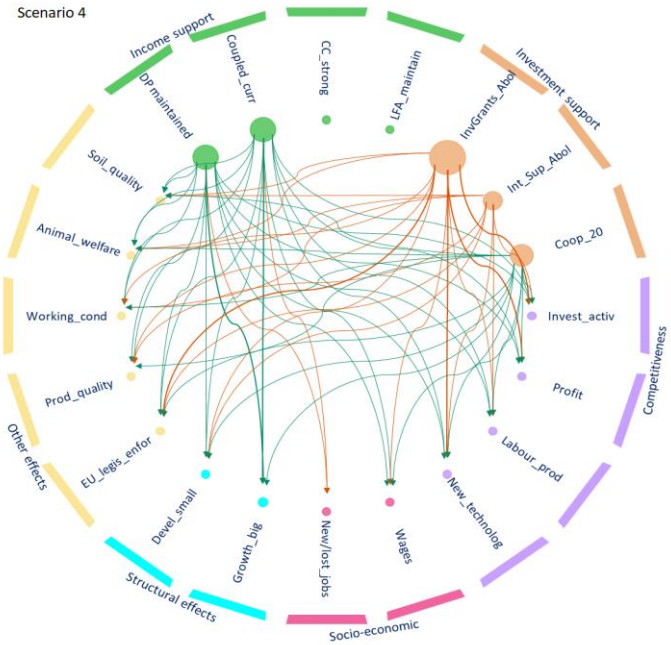
Appendix: Visualisation of links between drivers and impacts by the three scenarios







Legend

Abbreviation	Definition
Invest_activ	Investment activity
Profit	Profit
Labour_prod	Labour productivity (GVA/AWU)
New_technolog	The share of farmers adopting the most progressive technologies
Wages	Wages
New/lost_jobs	New /lost jobs
Growth_big	Growth of farm size strongly over 1000 ha
Devel_small	Farms with less than 50 ha - leaving the business,+ continuing
EU_legis_enfor	Speeding-up /slowing-down the fulfilment of the EU legislation
Prod_quality	Improvement/decline of the product quality
Working_cond	Speeding-up /slowing-down working conditions
Animal_welfare	Speeding-up /slowing-down animal welfare improvements
Soil_quality	Improvement/decline of the state of soil
DP maintained	DP maintained
DP_20%drop	Drop of DP by 20%
DP_50%drop	Drop of DP by 50%
Coupled_curr	Coupled supports at the current level
Coupled_min	Coupled supports minimized
CC_current	Cross Compliance in the current mode
CC_strong	Cross Compliance stronger
LFA_maintain	LFA payment maintained at the current level
LFApay-25%	LFA payment reduced by 25%
InvGrantssmall	Investment grants of 5 million CZK at maximum
InvGrants_Abol	Investment grants abolished
Interest_Sup	Interest support (fixed rate 3%, loan ceiling of CZK 50 millions)
Int_Sup_Abol	Interest support Abolished
Coop_10	Support to the cooperation (innovation projects up to CZK 10 million)
Coop_20	Support to the cooperation (innovation projects up to CZK 20 million)