Karl M. Ortner

Bundesanstalt für Agrarwirtschaft, Marxergasse 2/4, 1030 Wien, Austria
Karl.Ortner@awi.bmlfuw.gv.at

Evaluation of investment support in rural development programmes: results for selected measures

Abstract: *The Common Monitoring and Evaluation Framework (CMEF) for Rural Development Programmes (RDP) by the European Commission's Directorate General for Agriculture and Rural Development provides for common indicators to estimate effects of the respective measures. Their estimation has to rely on assumptions which may influence the results substantially and render them incomparable across measures. This caveat applies in particular in respect of net effects and of periods in which market prices fluctuate. The estimated effects of investment support measures can be used for benefit-cost analyses to compare the performances of measures. In the mid-term evaluation of the Austrian RDP these performances were found to differ widely. Using net (rather than gross) effects is likely to decrease the reliability of performance estimates but did not change the ranking of measures. Due to its positive effect on Gross Value Added, investment support renders private investments profitable and can be a profitable investment on its own. However, government intervention is justified only by the promotion of public rather than private goods.*

Keywords: *Evaluation, rural development, investment, cost-benefit analysis, policy, EU, CAP, Austria*

Introduction

The mid-term evaluation of Rural Development Programmes (RDP) in the EU had to be performed according to the Common Monitoring and Evaluation Framework (CMEF) for Rural Development Programmes which was issued by the European Commission's Directorate General for Agriculture and Rural Development (DG Agri). The CMEF provides for a particular set of common "baseline, input, output, result and impact indicators" which are linked to a hierarchy of objectives of the programmes and measures implemented within them. While the first three types of indicators can be observed and monitored, impact indicators must be estimated; accordingly they are based on observations and assumptions about the relationship between them, called the intervention logic. The CMEF is ambiguous on result indicators: On the one hand they are defined as gross effects, i.e. effects at the level of the beneficiaries, on the other hand there is an assumption that these effects can be measured, i.e. observed. In this paper I argue that it is important to distinguish changes which can be observed and effects which must be estimated.

The CMEF asks for the estimation of net effects of the programme overall and of its constituent measures in terms of seven "impact indicators". These differ from "result indicators" in that they exclude deadweight, substitution and dislocation effects but take account of multiplier effects. Although theoretically correct, the estimation of these additional effects has to rely on assumptions whose conformity with reality cannot be taken for granted. In fact, deadweight costs depend heavily on expectations about the profitability of investments at the time when they are undertaken. The assumption that these expectations remained stable during the period 2007-2009 when prices of agricultural products fluctuated extremely is but one factor that makes the estimation of impacts of the RDP difficult and introduces arbitrariness to the estimates obtained.

The paper demonstrates these points using examples from the mid-term evaluation of the Austrian RDP. It argues that moving from result to impact indicators (i.e. from gross to net effects) renders the estimates of effects increasingly unreliable. However this step must be taken in order to allow for an assessment of the efficiency of different measures, in terms of which measures produce more value for money. In this respect the indicators defined in the CMEF can be used further to perform benefit-cost-analyses. In Austria the results of these analyses produced a clear ranking of measures in terms of their relative merit. The benefit of supported investments accrues to the beneficiaries. Are there benefits for consumers, taxpayers or the population overall? Are there effects on public goods, in addition to private goods (measured by gross value added)? The answer to these questions ought to be the ultimate test to justify government involvement.

Measures

1.033 million € of public support was allocated during the first four years of the programme for measures other those concerning the agri-environment, animal-welfare and compensatory allowances (CA for disadvantaged areas). Approximately half of this support was provided through the measure "modernization of agricultural enterprises" (M121), followed by Leader (M4), "adding value to agricultural and forestry products" (M123), and "setting up of young farmers" (M112). In the following analysis the focus will be on investment measures whose effects were estimated using similar methods, i.e. farm modernization (M121), diversification (excluding bio-energy projects, M311b), small and medium enterprises (SMEs, M312) and – for comparison - tourism (M313), a measure which in Austria does not support investments.

Indicators

The CMEF mandates 16 result and 7 impact indicators; the former are defined to measure gross effects, the latter are a subset of them designated to measure net effects. Net effects exclude so-called additionality, i.e. deadweight, leakage, substitution, displacement, spillover and multiplier effects (Tyler et al. 2009). Deadweight is the share of outcomes that would have occurred if there had been no intervention at all. Leakage (not mentioned in the CMEF) is the share of effects that accrues outside the geographical area in which the programme is active. Substitution is an effect that is counteracted by a negative effect of the same magnitude, f.i. in the case of employment of supported persons replacing unsupported persons. Displacement is the effect that would have occurred if the payments of the programme had been spent on something else (other sectors or other goods) in the programme area or if taxes to finance the programme payments had not been collected there. Spillover effects occur in areas which are not targeted by the measures. Multipliers take into account economic activities that are generated as a consequence of income created by the project (income multipliers), of local supplier purchases (supplier multipliers) and long-term development effects (dynamic effects, f.i. induced inward migration). Leverage effects are effects on other indicators which follow from the effect on an indicator, f.i. a change in the GVA of a beneficiary may lead to a change in her or his profit or asset base.

Since it is time-consuming and difficult to quantify all types of additionality effects, the evaluation of deadweight effects was considered sufficient for the purpose of the mid-term evaluation. According to Tyler et al. 2009, deadweight accounted for more than 80 percent of the additionality effects overall in their sample of evaluations.

Investment measures will have an impact on at least three of the seven impact indicators prescribed by the CMEF: They are likely to produce (gross and net) effects in respect of gross value added and employment. A third impact indicator, labour productivity, will be affected by definition; gross value added per working unit

changes if an investment produces effects on gross value added and/or labour input. Accordingly effects on labour productivity follow directly from effects on GVA and employment, measured either by result (gross) or impact (net) indicators.

Methodology

Effects at the level of beneficiaries can be estimated using econometric models or matching. The latter involves the comparison of developments of two groups of enterprises: In the first group are enterprises that received treatment, i.e. public support (beneficiaries). In the second (control) group are enterprises that did not receive support but which are "similar" to the former in all other characteristics. If support would be allocated randomly to the population of enterprises, random sampling would ensure the similarity of enterprises in the beneficiary and the control groups. In practice, since beneficiaries usually have to satisfy certain eligibility conditions, they are different. In order to ensure similarity, matching methods can be used to select for each participant in a scheme a "similar" non-participant who is just as likely to participate. Propensity Score Matching (PSM) estimates this likelihood and chooses for each participant one or more of the most similar non- participants. The accuracy of the estimates obtained from PSM depends on the sample size and the availability of data on all variables that jointly influence the participation decision of the enterprises (Caliendo, 2006).

The comparison of the means of the two groups yields the average treatment effect on the treated (ATT) which is the difference that participation makes to the beneficiaries of support. The estimate of ATT is correct if, in the absence of support, both groups would arrive at the same outcome. The matching methodology endeavours to assure that this assumption holds and the associated selection bias is minimised. It must also endeavour to minimise "hidden" bias which occurs when not all variables which inform the decision to participate are available or known. F.i. the motivation of a farmer to continue farming will hardly be known, and thus a certain level of bias cannot be avoided. In order to determine which variables (data on individuals, groups, markets etc.) might be influential, we have to consider their variations and co-variations over time, space or both, identify specific patterns of co-movement, and eventually discern variables which cause and others which measure effects. The result of these reflections is an intervention logic which stipulates causal relationships from an intervention to its results and impacts. The intervention logic is the basis either for setting-up of an econometric model which explains changes of indicators as a function of exogenous variables, or for choosing the most appropriate variables for matching.

The time it takes for an intervention such as investment support to yield effects must be taken into account. Changes of variables over time usually do not coincide with effects of an intervention because other variables contribute to these changes. A change of an indicator over time for the group of participants coincides with an effect only if for the group of non-participants the

indicator remains unchanged. In order to eliminate the effects of other intervening factors, changes over time of both groups have to be compared. If their changes differ, the difference will be due to the treatment which one group received and the other did not; that is (ideally) the only variable by which the two groups differ. This is the so-called Difference in Difference- (DID-) method to estimate the ATT mentioned above; it is illustrated in figure 1.
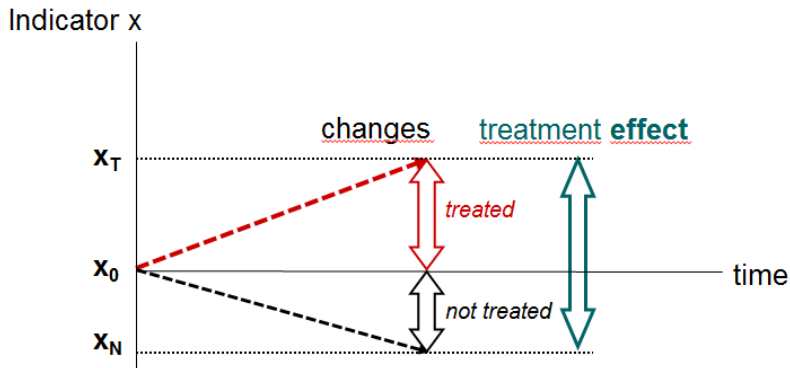

Figure 1

Some result indicators of the CMEF are expected to represent effects rather than changes over time. While changes can be observed, effects cannot except in the (unlikely) case that the value of the indicator for the control group remains constant.

Changes of some variables are important because they affect the profitability of investments which in turn affects how much would have been invested without support. The higher the profit of an investment is expected to be, the more likely is it that an investment of a particular volume will be undertaken even in the absence of support. In other words: Positive changes in the business environment are an incentive to invest which may substitute for and even wipe out the incentive effect of support. The net effect of support therefore depends on the situation in the markets. Positive expectations will increase deadweight effects and diminish net effects of support, and negative expectations will lead to investments that would not occur without support. Investment support partly substitutes for market signals as a determinant of investments.

These considerations render the estimation of impacts (net effects) difficult. Another point to be noted before moving on to results of the mid-term evaluation is that the sample from which data are chosen should be representative for the population. Due to data limitations that will sometimes not be possible; f.i. farms participating voluntarily in the Farm Accountancy Data Network (FADN) represent only a certain range of farm sizes, excluding very small and very large enterprises[1]. Although the following

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[1] 6000 to 150 000 EUR Standard Gross Margin (a measure of value added).

analysis is representative for only a subset of the Austrian farms receiving investment support its results will be applied to all beneficiaries for lack of alternative estimates.

Results

PSM and DID were applied by Dantler et al. (2010) on Austrian FADN data for fodder farms whose size exceeded 50 000 EUR Standard Gross Margin and who received investment support in 2003 or 2004. The group of participants included 61 farms while the control group included 81 farms of the same type (dairy) and the same size class who had not received any investment support from 2000 to 2009.

Four years after receiving support, the beneficiary farms had increased ("changed") their income by 15 055 EUR while the change of income of non-beneficiaries of investment support amounted to 4 224 EUR. Thus the effect (ATT) of participating in the farm investment support scheme (measure 121) was a rise in gross value added of 7 863 EUR on average per farm. The labour input of participants decreased slightly less than that of non-beneficiary farms, which means that investment support had a small positive effect on employment (Table 1). These (ATT-) effects are independent of other intervening factors; in particular they are independent on the huge price fluctuations that occurred between 2007 and 2009 in agricultural markets.

Table 1. Changes and data of Austrian fodder farms without and with investment suppor

Variable	Changes (t_4-t_0)		ATT[*]	Beneficiaries
	Control group	Beneficiaries	Difference in difference	t_4
Income agriculture and forestry (€)	10 856	15 055	4 198	46 185
Depreciation (€)	559	4 224	3 665	24 606
Gross value added	11 415	19 279	**7 863**	70 791
Investment support (€)	-	11 372	11 372	
Livestock units	0.28	2.52	2.24	41.46
Utilised agricultural area (ha)	0.90	0.69	0.26	39.21
Self-employed annual working units	-0.05	-0.04	**0.01**	1.98
Labour productivity (t_4)	31 943			35 753

* Average treatment effect on the treated

Source: Dantler et al. (2010)

Benefits and costs

In order to translate these results into a benefit-cost-analysis, an assumption is required about the length of time during which the benefits of participation in the scheme flow and how they change over time. In that respect we assume the following: It takes four years for an investment to achieve maximum effect;

thereafter the effect remains constant until in the 18th year it starts to decrease gradually and disappears in the 21st year (Figure 2). This pattern corresponds approximately to the assumption that the full effect lasts 17 years or that 70 % of the investments are into buildings with a lifetime of 20 years and 30 % into machinery with a lifetime of 10 years.

An average investment support payment under measure M121 for fodder farms in Austria yielded some 134 000 € gross value added (GVA) in nominal terms over the expected lifetime of the investment. Using an interest rate of 2 % for the calculation of the capital value of the accumulated effects, an average participant in the investment support scheme achieved 111 000 € more gross value added than a comparable non-participant. If an interest rate of 3 % were deemed to be more appropriate to discount future earnings, the base year value of accumulated GVAs would be 99 000 €. Interest rate and lifetime of investment are thus assumptions which bear crucially on the results of the evaluation.
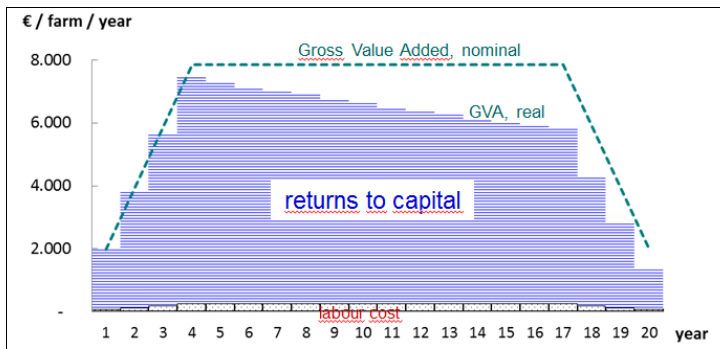

Figure 2. Effects of participation of a farm in investment support (M121) on gross value added and labour cost

Dottet line: effect on GVA, columns: GVA value at base year (t_0), subdivided into a) remuneration of (effect on) labour and b) returns to capital = remuneration of investment costs (t_0, lined area)

The effect on GVA is the remuneration of the additional capital and labour spent to generate this effect. In the sample farms analysed the effect of M121 support on labour input was quite small (Figure 2). The resulting additional labour input requires a compensation of some 3 000 EUR for an average beneficiary farm. The rest of the effect on GVA, 108 000 EUR per holding (at base value) on average, is the remuneration of investment costs which amounted to 52 000 EUR per holding (on average). Thus an investment of 1 EUR produced a return (benefit) of 2.1 EUR. Considering that the benefit accrued to a farm manager who, because of investment support, paid only part of the investment costs, namely 41 000 EUR, the benefit per farm manager was 2.6 times higher than her/his investment costs.

At this point it is necessary to emphasise that a benefit must not be mistaken for a profit; it deviates from it in the same way as effects deviate from changes (as demonstrated in Figure 1). Profitability depends mostly on changes in the

marketplace (supply and demand of tradable goods) and partially on government payments. The effect of investments on GVA is positive but the profitability of the same investment can be positive or negative. Lower producer prices reduce the profitability of an investment but not its effects. In an economic downturn farmers may not invest even if they could collect investment support except, maybe, to get ahead of their competitors. On the other hand, if investments are profitable even in the absence of investment support, farmers will invest and collect support for investments which they would undertake anyway. Thus we have to distinguish gross and net effects; only the latter can be attributed to support payments.

Incentive effect and net effect

If investment support to beneficiaries leads them to invest more than in the absence of support, the effect of the additional investment rather than the overall investment is attributable to the support payment. Since the incentive effect of support depends on the profitability of the investment which is given by market conditions, it is cumbersome to estimate it properly. An evaluation usually has to pursue an easier path, i.e. to rely on assumptions. F.i. if a support payment induces beneficiaries to increase their originally planned investment by as much as the amount of support granted, an average beneficiary of investment support in Austria would have invested 30 000 EUR without support rather than the 41 000 EUR observed with support (table 2). This would have generated 65 000 EUR GVA (assuming that the average productivity of investment remains unchanged). The effect attributable to support (net effect) is the difference between the situation with and without support; it amounts to 46 000 EUR GVA if the incentive effect is equal to the subsidy granted. In that case the net benefit of support is twice the benefit of the investment overall. If the incentive effect were twice as high as the support payment, the benefit of support would triple in the comparison to the benefit of the investment overall.

Table 2. Calculation of net effects of investment support per holdin

Effects (changes) per holding (€)	gross effect	farm level	without support	net effect
GVA nominal	134 000			
GVA real (2 %)	**111 000**	111 000	65 000	**46 000**
labour costs real	3 000			
returns to capital real (benefit)	**108 000**	**108 000**	63 000	**45 000**
Investment (cost)	**52 000**			
of which **government**		11 000		**11 000**
private		**41 000**		
of which because of support*			11 000	
anyway			30 000	
benefit / cost	**2.1**	**2.6**	2.1	**4.1**

* Incentive effect

The assumptions above demonstrate that the size of the incentive effect is a most critical component in the estimation of net effects or impacts of support. Its estimation is not straightforward because the incentive effect depends on the situation in the market: If the expected profitability of an investment is high, it will be undertaken irrespective of support, and the incentive effect of support will approach zero. On the other extreme, an investment may be undertaken due to support even if it is unprofitable without support. In that case the investment is due to government support only, irrespective of market opportunities. Incentive effects and the corresponding net effects depend on market developments and the corresponding expectations of investors. If these are not taken into account in the estimation of net effects (on impact indicators) their estimates are possibly biased and inaccurate.

Comparison of results

Rather than relying on possibly inaccurate assumptions, the following comparison between the effects of various support measures is done on the basis of gross effects on gross value added in nominal terms. These effects were estimated according to the requirements of the CMEF as result indicators in the mid-term evaluation of the Austrian RDP 2007-2013 using a comparable methodology. The effectiveness of support in respect of GVA varies substantially between measures (Table 3). It is highest for support to the establishment of small enterprises (M312) and lowest for support to touristic infrastructure and marketing activities (M313). The supposedly high effectiveness of M312 relies heavily on the expectations of beneficiaries to expand their business; whether these expectations materialised remains open for investigation. The low level of effectiveness of M313 with respect to GVA may be due to the fact that the responding beneficiaries may have underestimated the long-run effects of investments into touristic infrastructure (25 % of the supported costs were investments) and branding.

Table 3. Comparison of measures and effects of the Austrian RDP

2007 - 2009		**support** payments	**costs** supported	gross effect (nominal) on **gross value added**	
measure		mio €		€ per € of **investment**	€ per € of **support**
M121	**modernisation**	266	1.200	3.126	**2.6**	**11.8**
M311b	diversification[1]	14	54	111	2.1	7.9
M312	small enterprises	1	3	46	15.3	44.2
M313	tourism	13	20	16	0.8	1.2

[1] **excluding bio-energy projects**

For a comparison of effectiveness it is important to bear in mind that the measures have manifold objectives. Considering the effectiveness with respect to only one objective (GVA) is insufficient and can lead to wrong conclusions. F.i. in the case of support to tourism (M313) an important objective is to im-

prove living conditions for tourists and inhabitants in rural areas. Progress in this direction is not represented by GVA; its estimation requires specific methods because the corresponding benefits carry no price tag. For a final judgement on a measure, its effectiveness in respect of all of its objectives must be taken into account. In order to facilitate this judgement and make it more reliable it is advisable to implement measures each of which pursues a single target.

Conclusions

Our analysis demonstrated that effects cannot be observed and measured but have to be estimated, in particular when market conditions are changing as they did between 2007 and 2009. Since the CMEF is ambiguous in that respect, the data provided as „result indicators" in the mid-term evaluations of the RDPs are likely to reflect changes rather than effects of the programme and its measures. In order to estimate effects, a theoretical concept or model is required which assumes certain cause-effect-relationships, presumably in accordance with the intervention logic proposed by the CMEF for each measure. The assumptions about relationships and the size of the parameters used for the estimation of effects influence the estimates considerably. In order to improve the reliability of the estimates of effects these assumptions should be substantiated or replaced with evidence obtained using appropriate statistical (econometric) methods and applied to data that has been observed in the relevant settings over time.

The assessment of effects of government intervention should be based on net effects. However, the estimates of net effects and the benefit-cost-coefficients derived from them can take a wide range of values, depending not only on assumed or estimated relationships and parameters but also on deadweight and other additionality effects. These are even more difficult to quantify accurately because their size depends crucially on the profitability of an investment in the marketplace. Market-oriented investments are driven by market forces in the form of expected returns from the production and sale of marketable goods. Effect-oriented investments are driven by government objectives. But the sizes of net effects in respect of these objectives still depend very much on the expected returns (profitability) in the market.

Supporting the modernization of agricultural holdings (M121) in Austria appears to be a profitable investment by the government under the given assumptions: Support of 1 EUR brings about a benefit (return to capital) of at least 2.1 EUR during the lifetime of the investment on average, 4.1 EUR if the incentive effect of support equals its size. The benefit of investment support accrues to the recipient of support in the form of additional profit (relative to similar non-recipients). The effect of M121 on labour (employment) is slightly positive.

Positive effects on employment of a measure do not easily pass as beneficial from an economic point of view because they reflect additional effort or pains taken to generate the desired outcomes. Increased labour input must thus be compensated by commensurate wages or, in the case of self-employed labour, profit, to be financed by additional GVA. The appropriate level to compensate labour input (wage rate) is an issue. An increase in employment can reduce unemployment and save unemployment compensatory payments. It also generates income taxes for the public sector. These have been accounted for by using net wages for the valuation of labour costs and benefits (referred to as returns to capital). The motivation for the high regard in which politicians hold bringing more people into the work force may be the desire to improve income distribution, inclusion into society and the self-esteem of the unemployed or to facilitate structural change. Agricultural policy is quite successful in that respect, particularly through agri-environmental measures and the compensatory allowance for disadvantaged areas (Neuwirth et al. 2009).

An increase in GVA normally comes about by an increase in the volume of production; it can also result from an increase in the quality of goods and a decrease in variable costs. The positive effect of a measure on production (supply) can be considerable; it causes c. p. decreases in the world market prices which benefit consumers worldwide and harms producers. The CMEF neglects these market effects which can be substantial at the EU and the global level. It also does not distinguish between national and EU level effects. F.i. an RDP supporting tourism attracts tourists who would have spent their holidays in an area where another RDP operates. This positive effect of the programme is neutralised at the EU level.

Public expenditures are supposed to generate higher benefit-cost-ratios than private investments because they have to recoup the costs of collection and distribution of the taxes which finance them. The justification of public expenditures rests on the objective to produce larger quantities or higher qualities of public goods and services that are not produced under free market conditions by the private sector at volumes which are desirable economically. Investments with the aim to produce private goods are not something a government should pursue, except as a means to achieve progress in the provision of public goods, f.i. a more equal distribution of incomes. However in the case of M121 these investments enhance the income of beneficiaries on average much more than some alternative government interventions, f.i. the single farm payment. Whether the same can be said at the margin remains open for investigation. On the other hand the government can achieve even higher benefit-cost-ratios, f.i. with support through M312 in Austria (if the stated expectations of the beneficiaries materialise, see Table 3) or with payments for research and development, training and advisory services which usually turned out to be quite beneficial (see Ortner 1985, Alston et al. 2000).

Of the seven impact indicators of the CMEF, three refer to private (marketable) goods (GVA overall and agriculture, labour productivity) and four to public goods. This reflects the fact that private goods are easier to measure and com-

municate. But growth in the supply of private goods is not necessarily beneficial because its positive effects can be cancelled out by pollution, loss of natural resources, unacceptable labour etc.. The task of the government is to make sure that concerns are respected and public desires fulfilled. Public expenditures (and taxes) can only be justified by the promotion of public goods. It appears to be necessary to more thoroughly reflect on the goals of RDPs and to interpret them as possibly being subordinate to more profound public interests. The assessment of RDPs and other government interventions cannot be confined to the impact indicators prescribed in the CMEF which is particularly short on indicators concerning the quality of life of inhabitants. Efforts to overcome this lack of knowledge are underway (see f.i. http://wikiprogress.org/index.php/Main_Page, Quendler 2011).

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