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Alternative Implementations of the Single Farm Payment Distributional Consequences for Austria

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- Distributional Consequences for Austria

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Abstract

In 2003, the Common Agricultural Policy underwent a substantial reform. Direct payments that were linked to the production of certain crops and livestock were abolished. Alternatively, the Single Farm Payment was introduced in EU-15 Member States. These Member States were free to choose among several options on the details of the implementation. We investigate the distributional consequences of particular implementation choices in Austria by comparing the actual type 'partial decoupling historic model' with two alternative ones. Results show that – on average – these alternatives would slightly increase the net-returns of farms, but have substantial impacts on their distribution.

Introduction

The 2003 reform of the Common Agricultural Policy (CAP) brought a major change in the way its instruments affect production decisions of farmers. Since January 2005, in many EU-member states, it is no longer necessary to produce certain agricultural commodities as a precondition to obtain direct payment (this process is called 'decoupling'). Support, previously granted if crops or cattle were produced, is now provided if 'agricultural land is maintained in good ecological conditions' (this condition is dubbed 'cross-compliance').

Once the decision on the introduction of decoupled payments was made, two further questions needed to be answered: a) How should 'single farm payments' (SFP), the substitute of coupled payments, be allocated among farmers? And b), should all payments be decoupled and become part of the SFP or should some coupled payments be maintained?

The agricultural ministers could not agree on a single system on how to allocate SFP among farmers at the level of EU-15. Therefore, three options were developed and member states (or regions with the relevant authority) can make a choice among them.

- *The historic approach* (implemented in Austria, Belgium, France, Greece, Italy, Ireland, The Netherlands, Portugal, Spain, Scotland, Wales): Each farmer is granted entitlements corresponding to the payments she/he received during 2000-2002 ('reference amount') and the number of hectares she/he was farming during this period and which gave right to direct payments in that period ('eligible hectares').

- *The regional - or flat-rate - approach* (implemented in no member state): Reference amounts are not calculated at the level of individual farmers but at regional level. The sum of the payments received by all farmers in a region gives the regional reference amount. This is divided by the number of eligible hectares declared by the farmers in the year of the introduction of the SFP scheme. Finally, each farmer receives a number of (flat-rate) entitlements equal to the number of eligible hectares.
- *Mixed models*: Member States may apply different calculation systems in different regions of their territory. They may also calculate single farm payments using a part-historic/part flat-rate approach. Such 'hybrid' systems can further vary over the period between the first application of the SFP and full implementation, giving rise to 'static hybrid' systems (implemented in Denmark, Luxemburg, Sweden, Northern Ireland) or 'dynamic' ones. 'Dynamic hybrid' systems can act as a vehicle to transit from the basic (historic) to the regional (flat) rate approach (implemented in Finland, Germany, and England).

One feature of the 'historic model' model is that the distribution of payments during the reference period is maintained as long as SFP will be paid. Therefore, most farmers will not be made worse off. The other approaches would make it possible to attain distributions of direct payments that are generally considered to be 'fairer' than the historical one. Such alternatives involve that some groups of farmers who did not receive payments previously (e.g. poultry or pork producers) will benefit, at the cost of those who obtained payments during the reference period (e.g. bull or grain producers). Apart from alternative value judgements each type of implementation has different consequences such as on the land markets (discussed in detail in Isermeyer, 2003).

The intention of the Commission was to eliminate any link between direct payments and the production of agricultural outputs. However, the resistance of several farm ministers against the reform as a whole could only be broken after the Commission made concessions. According to the final decision, member states can implement the reform in such a way that some direct payments remain coupled to the production. Only German, Luxemburg and Wales, Northern Ireland, and England have chosen not to use this option, while all the other countries (and regions) retained some coupled payments (details in ECE, 2006).

Before the reform was made, several studies analysed various decoupling strategies (e.g. Kleinhanß et al., 2002). After the implementation of the reform, many studies were published which focussed on various consequences of the reform, like the beef market (Balkhausen et al., 2005), sheep production (Balkhausen, Grethe, and Nolte, 2005) issues related to the transfer of premiums entitlements (Nielsen, 2005) and country studies (e.g. Carvalho, 2005 and Schmid and Sinabell, 2004). This paper contributes to the literature by analysing the distributional consequences of alternative types of implementation of the reform at the level of single farms which are representative for a whole country. The empirical base of our study is a large number of typical farms in Austria.

In the next chapter, the data and model used for the analysis are described. FAMOS, a farm optimisation system to analyse rural development policies along with commodity policies, will be presented in more details. This model system is capable to analyze the distributional consequences of alternative implementations of the CAP reform at farm level. We compare the situation before the reform (the base-run period is 2003) with (i) the Austrian implementation of the reform (historic allocation of SFP and partial decoupling of direct payments), (ii) the historic allocation of SFP with fully decoupled payments, and (iii) a flat-rate regional approach with fully decoupled payments.

Data and Methods

FAMOS (Farm Optimisation System; Schmid, 2004) is a data-modelling system that simulates the decision making process on the basis of historical and alternative production and income possibilities for typical farms. Each farm model is solved independently using mathematical programming methods. Alternative production and income possibilities include agricultural and forestry production, secondary, and off-farm income activities, subsidy and transfer payments. All instruments of CAP and measures of the programme for rural development, in particular the agri-environmental programme and less favoured area payments, are modelled.

FAMOS aims to find the optimal combination of production and income activities, which are contingent on quality and quantity of resource endowments (e.g. land, capital, and labour), and available production technologies. FAMOS extensively uses the method of convex combinations (Dantzig and Wolfe, 1961; McCarl, 1982; Önal and McCarl, 1989, 1991) of historical and alternative mixes (e.g. land categories and uses, livestock, management regimes, feed rations), which makes the model and its results very robust. Endowments and production and income activities of individual farm models are primarily based on observed data.

The data pool is based on micro data of the IACS (Integrated Administration and Control System) from 1999 to 2002 (BMLFUW, 2005). Various agricultural censuses (from 1990, 1995, and 1999) provide farm level information on historic land and livestock endowments (ST.AT, various years). Data of the EAA (economic accounts for agriculture) from 1988 to 2004 (ST.AT, 2005) are used to guarantee consistency with national accounts at the sector level. Data analysis of the Austrian FADN (Farm Accountancy Data Network) from various years (LBG, 1996, and 1999 to 2002) provide estimates on farm specific production technologies in combination with standard gross margins from 2000 to 2003. Farm labour requirements are based on a detailed set of standard working units from 2002 (Stadler, 2002), and literature reviews. Price wedges between conventional and organic commodity prices are based on Eder (2000, 2002) and Freyer et al. (2001). We make the assumption that relative price wedges between conventional and organic commodity will remain constant until 2008. The commodity price projections for 2008 are based on OECD estimates (2004, 2005).

The agricultural census from 1999 is used to draw a stratified sample of typical Austrian farms (Hofreither et al., 2005). More than 6,800 typical farms were selected with respect to regional and structural criteria. These typical farms can be assigned to eight major production regions (from extreme alpine regions to flat lands with good production conditions), 40 types of farm production specialisation (crop, dairy, swine, etc.), two business types (full or part-time farming), two management systems (organic or conventional farming), five alpine farming zones, and eight classes of farm sizes.

Each of the modelled farms is a special case of only one *general* farm model implemented in GAMS (General Algebraic Modeling System). This generic model is consecutively loaded with individual farm data from a common database and solved in a loop procedure. Model results are exported to a common database, which can be further processed for graphical and tabular presentations.

Structure and details of FAMOS

The farm level decision making includes choices among land categories (index l), land uses (index p), livestock (index v), secondary activities (index s), off-farm income (index i), farm management (index m), and subsidy payments (index f). Each activity choice requires physical limiting resources (index w) and operational inputs (index x) and produces one or more outputs (index y). The utilisation of resources and production of outputs may have an impact on environmental quality (index e), which can be incorporated into the decision making process of farmers. The Leontief production technology and emission coefficients are derived using econometric estimates, surveys, literature reviews, and expert opinions. These are:

γ	=	economic yields,
ω	=	resource utilisations,
ϕ	=	feed rations,
β	=	resource endowments,
κ	=	crop shares, feed concentrate mixes, livestock mixes, land categories and permanent crops
φ	=	fertilizer coefficients,
χ	=	cost components and physical input quantities,
υ	=	subsidies,
ε	=	emissions,
o	=	management measures,
τ	=	transfer matrices,
ρ	=	prices, costs, and premiums.

Total farm welfare (FWELF) is maximised by selling outputs and services (VERKF), earning off-farm income (NBEIK), receiving subsidies and transfers (PRMTF), and subtracting operating costs (BMITL).

$$(1) \qquad Max\ FWELF = \begin{array}{l} +\sum_{y}\left(\rho_{y} * VERKF_{y}\right) \\ +\sum_{i}\left(\rho_{i} * NBEIK_{i}\right) \\ +\sum_{f}\left(\rho_{f} * PRMTF_{f}\right) \\ -\sum_{x}\left(\rho_{x} * BMITL_{x}\right) \end{array}$$

where all prices and premiums (p_y, p_i, p_f, and p_x) are exogenously given. Subsidies and premiums are either coupled or de-coupled from production.

The resource endowments (w) of a farm consist of land (l), livestock stands (v), working labour units (a), quotas, and others, which are described in equations 2 to 7.

$$(2) \qquad \begin{array}{l} +\sum_{l,k,m}\left(\omega_{l,p,m,w}^{PPROD} * PPROD_{l,p,m}\right) \\ +\sum_{v}\left(\omega_{v,w}^{VPROD} * VPROD_{v}\right) \\ +\sum_{s}\left(\omega_{s,w}^{SPROD} * SPROD_{s}\right) \\ +\sum_{s}\left(\omega_{i,w}^{NBEIK} * NBEIK_{i}\right) \end{array} \leq \beta_{w} \qquad \text{for all } w \notin l, v, \text{ and } a$$

In general, the demand for resources to produce outputs is less or equal than their resource endowments.

(3) $$\sum_{l,p,m}\left(\omega^{PPROD}_{l,p,m,l} * PPROD_{l,p,m}\right) \le \sum_{l}\left(\beta_l\right)$$

(4) $$\sum_{g}\left(\kappa^{LMIX}_{l,g} * LMIX_g\right) \le \sum_{p,m}\left(PPROD_{l,p,m}\right) \qquad \text{for all } l$$

(5) $$\sum_{l,p,m}\left(PPROD_{l,p,m}\right) \le \sum_{g}\left[LMIX_g * \sum_{l}\left(\kappa^{LMIX}_{l,g}\right)\right]$$

where l ∈ w. The model distinguishes between land categories (l) such as arable land, pastures, meadows, forests, etc. and seeks to find the optimal combination (LMIX) between observed sets of land categories $\kappa^{LMIX}_{l,g}$. Therefore, changes in land categories are captured on the basis of historical changes, which have consequences on crop production (PPROD).

Changes in livestock production are captured in equation 6 and 7.

(6) $$\left(\omega^{VPROD}_{v,\text{"}STP\text{"}} * VPROD_v\right) \le \sum_{g}\left(\beta^{VMIX}_{v,g} * VMIX_g\right) \qquad \text{for all v}$$

(7) $$\sum_{g}\left(VMIX_g\right) \le 1$$

where v ∈ w. The optimal livestock mix (VMIX) is contingent on historical livestock mixes $\beta^{VMIX}_{v,g}$. To obtain annual equivalents in livestock outputs (VPROD), turnover coefficients ($\omega_{v,\text{"STP"}}$) are used for each livestock category (v).

Labour endowments and balances are described in equations 8 to 10. Two types of labour are considered in the model, family labour (FAMAK) and hired labour (FRMAK), where FAMAK is limited by endowment β_a.

(8) $$GESAK_a \le \begin{array}{l} +\sum_{l,k,m}\left(\omega^{PPROD}_{l,p,m,a} * PPROD_{l,p,m}\right) \\ +\sum_{v}\left(\omega^{VPROD}_{v,a} * VPROD_v\right) \\ +\sum_{s}\left(\omega^{SPROD}_{s,a} * SPROD_s\right) \\ +\sum_{s}\left(\omega^{NBEIK}_{i,a} * NBEIK_i\right) \end{array} \qquad \text{for all } a$$

(9) $$FAMAK_a + FRMAK_a \le GESAK_a \qquad \text{for all } a$$

(10) $$FAMAK_a \le \beta_a \qquad \text{for all } a$$

where a ∈ w. Total labour demand (GESAK) is the sum of labour requirements in crop production (PPROD), livestock production (VPROD), secondary (SPROD), and off-farm activities (NBEIK).

Total output sold on the market (VERKF) is the sum of outputs from annual (k indexes annual crop outputs) and perennial (b indexes forest outputs, and d indexes outputs from vineyards and orchards) crop production, livestock production (v), and secondary activities (s).

$$(11) \qquad VERKF_y \le \begin{array}{l} + KVERK_y \\ + VVERK_y \\ + \sum_{l,b,m} \left(\gamma_{l,b,m,y}^{PPROD} * PPROD_{l,b,m} \right) \\ + \sum_{l,d,m} \left(\gamma_{l,d,m,y}^{PPROD} * PPROD_{v,d,m} \right) \\ + \sum_{s} \left(\gamma_{s,y}^{SPROD} * SPROD_s \right) \end{array} \qquad \text{for all } y$$

where k, b und d ∈ p. Yield coefficients (γ_y) are assigned to activities that produce one or multiple outputs. Output balances for annual crop production (KVERK) and livestock production (VVERK) are further described in equation 12 and 18.

$$(12) \qquad \begin{array}{l} +KVERK_y \\ + \sum_{l,k,v,z} \left(FULIF_{l,k,v,z,y} \right) \end{array} \le \sum_{l,k,m} \left(\gamma_{l,k,m,y}^{PPROD} * PPROD_{l,k,m} \right) \qquad \text{for all } y$$

where k ∈ p. The production of crops and forages can be either sold (KVERK) or used on the farm to feed the livestock (FULIF). The feed balances are further described in equations 13 to 17. Generally, the nutrient demand from livestock production (VPROD) need to be met by nutrient supply from on farm production (FULIF) and feed purchases (FUZKF). Feed nutrient coefficients ($\phi_{z,n}$) are separated by a seasonal dimension (index s) such as summer, winter, and whole year feeding systems, and feed nutrient components (index n) such as energy, protein, dry matter. Livestock specific feed rations are endogenously assembled in the model using feed stuffs (index fa) such as hay, pasture forage, green fodder, corn and grass silage, and concentrates, and also need to meet minimum requirements for energy, protein, and dry matter.

$$(13) \qquad \begin{array}{l} + \sum_{l,k,y} \left(\phi_{l,k,z,y,n}^{FULIF} * FULIF_{l,k,v,z,y} \right) \\ + \sum_{x} \left(\phi_{v,z,x,n}^{FZUKF} * FUZKF_{v,z,x} \right) \end{array} \ge \phi_{v,z,n}^{VPROD} * VPROD_v \qquad \text{for all } v, z, \text{ and } n$$

$$(14)\quad \begin{array}{l} +\sum_{l,k,y}\left(\phi^{FULIF}_{l,k,z,fa,n} * FULIF_{l,k,v,z,fa}\right) \\ +\sum_{x}\left(\phi^{FZUKF}_{v,z,fa,n} * FUZKF_{v,z,fa}\right) \end{array} \geq \phi^{FMIN}_{v,z,fa,n} * \phi^{VPROD}_{v,z,n} * VPROD_v \qquad \text{for all } v, fa \text{ and } n$$

$$(15)\quad \begin{array}{l} +\sum_{l,k,y}\left(\phi^{FULIF}_{l,k,z,fa,n} * FULIF_{l,k,v,z,fa}\right) \\ +\sum_{x}\left(\phi^{FZUKF}_{v,z,fa,n} * FUZKF_{v,z,fa}\right) \end{array} \leq \phi^{FMAX}_{v,z,fa,n} * \phi^{VPROD}_{v,z,n} * VPROD_v \qquad \text{for all } v, fa \text{ and } n$$

where fa $\in$ y und x. Feed rations are assembled such that minimum or maximum levels of feed stuffs are met ($\phi_{v,z,fa,n}$). The choice on concentrates is obtained by making convex combinations among exogenously given concentrate mixes (index g), which is described in equation 16 and 17.

$$(16)\quad \sum_{g}\left(\kappa^{KFMIX}_{v,z,kf,g} * KFMIX_{v,z,g}\right) \leq \begin{array}{l} +\sum_{l,k}\left(FULIF_{l,k,v,z,kf}\right) \\ +FUZKF_{v,z,kf} \end{array} \qquad \text{for all } v, z, \text{ and } kf$$

$$(17)\quad \begin{array}{l} +\sum_{l,k,y,kf}\left(FULIF_{l,k,v,z,kf}\right) \\ +\sum_{kf}\left(FUZKF_{v,z,kf}\right) \end{array} \leq \sum_{g}\left[KFMIX_{v,z,g} * \sum_{kf}\left(\kappa^{KFMIX}_{v,z,kf,g}\right)\right] \qquad \text{for all } v \text{ and } z$$

where kf $\in$ y. Single concentrate components (index kf) such as barley, wheat, soybeans, minerals, etc. form typical concentrate mixes (g). This approach avoids unrealistic concentrate choices, because it endogenously weighs exogenously given typical concentrate mixes.

The livestock outputs (VVERK) sold on the market are produced on farm (VPROD), which may require young animal purchases (VIZKF).

$$(18)\quad \begin{array}{l} +VVERK_y \\ -\sum_{v,x}\left(VIZKF_{v,x=y}\right) \end{array} \leq \sum_{v}\left(\gamma^{VPROD}_{v,y} * VPROD_v\right) \qquad \text{for all } y$$

Livestock transfers on farm are captured by the proper signs (+/-) in the coefficient matrix ($\gamma_{v,y}$) for livestock production activities.

The choice (PFMIX) on annual and perennial crops and trees grown on arable, forest, and other lands is also obtained by forming convex combinations among historical and alternative crop and tree mixes (g).

$$(19)\quad \sum_{g}\left(\kappa^{PFMIX}_{l,p,g} * PFMIX_{l,g}\right) \leq \sum_{m}\left(PPROD_{l,p,m}\right) \qquad \text{for all } l \text{ and } p$$

(20) $$\sum_{p,m}\left(PPROD_{l,p,m}\right) \leq \sum_{g}\left[PFMIX_{l,g} * \sum_{p}\left(\kappa_{l,p,g}^{PFMIX}\right)\right] \quad \text{for all } l$$

These observed crop and tree mixes (g) account for rotational and other technical limitations, which the particular farm has been faced in the past. However, this approach allows to extending the set of mixes by alternative crop and tree compositions to analyse for instance the economic potential of new crops or alternative crop rotations (e.g. non-food crops, GMO-crops).

Furthermore, the model can also choose between historical and alternative management schemes (MANIX) using the approach of convex combinations.

(21) $$\sum_{g}\left(o_{l,p,m,g}^{MAMIX} * MAMIX_{l,p,g}\right) \leq PPROD_{l,p,m} \quad \text{for all } l, p \text{ and } m$$

(22) $$\sum_{m}\left(PPROD_{l,p,m}\right) \leq \sum_{g}\left[MAMIX_{l,p,g} * \sum_{m}\left(o_{l,p,m,g}^{MAMIX}\right)\right] \quad \text{for all } l \text{ and } p$$

Including alternative management schemes, which the farm can choose from, allows to analysing the economic and environmental potential in meeting environmental standards or of other environmental policies (e.g. water or climate policies).

The fertilizer nutrient balances for nitrogen, phosphorous, and potassium are described in the following two equations by equating nutrient supplies form livestock production, N-fixation, and purchases (DUZKF) and demands in producing annual and perennial crops and trees.

(23) $$\sum_{l,p,m} DUTRF_{l,p,m,j,n} \leq \varphi_{v,j,n}^{VPROD} * VPROD_{v} \quad \text{for all } j \text{ and } n$$

(24) $$\begin{aligned} &+DUTRF_{l,p,m,j,n} \\ &-DUZKF_{l,p,m,j,n} \end{aligned} \leq \varphi_{l,p,m,j,n}^{PPROD} * PPROD_{l,p,m} \quad \text{for all } l, p, m, j \text{ and } n$$

where n $\in$ x. Fertiliser nutrient coefficients (φ_n) for supplies (manure, N-fixation, and commercial fertilizer) and demands (crops and trees) assure proper nutrient accounting on the farm. A fertilizer transfer variable (DUTRF) links supply and demands, which is also stratified by manure types (j) such as liquid and solid manures. Costs in applying different fertiliser types are accounting the following cost equation.

$$
(25) \quad BMITL_x \leq \begin{array}{ll}
+\sum_{l,k,m} DUZKF_{l,k,m,x} & +\sum_{g}\left(\chi_{g,x}^{LMIX} * LMIX_g\right) \\
+\sum_{l,k,m,j} DUTRF_{l,k,m,j,x} & +\sum_{g}\left(\chi_{g,x}^{VMIX} * VMIX_g\right) \\
+\sum_{v,z} FUZKF_{v,z,x} & +\sum_{l,p,g}\left(\chi_{l,p,g,x}^{MAMIX} * MAMIX_{l,p,g}\right) \\
+\sum_{v} VIZKF_{v,x} & +\sum_{a}\left(\chi_{a,x}^{FAMAK} * FAMAK_a\right) \\
+\sum_{l,p,m}\left(\chi_{l,p,m,x}^{PPROD} * PPROD_{l,p,m}\right) & +\sum_{a}\left(\chi_{a,x}^{FRMAK} * FRMAK_a\right) \\
+\sum_{v}\left(\chi_{v,x}^{VPROD} * VPROD_v\right) & \\
+\sum_{s}\left(\chi_{s,x}^{SPROD} * SPROD_s\right) &
\end{array} \quad \text{for all } x
$$

The cost accounting in producing agricultural, forest, and secondary outputs is described in equation 25. It includes also the costs in changing land categories, livestock, and management systems using the mix variables (LMIX, VMIX, and MAMIX). These costs are evaluated at the margin, which also serve also to calibrate the model to some base year.

The farm may receive subsidies, premiums and transfers (υ_f), because of certain production or management activities, or of being in less favoured areas, or of any other criteria.

$$
(26) \quad PRMTF_f \leq \begin{array}{l}
+\sum_{l,p,m}\left(\upsilon_{l,p,m,f}^{PPROD} * PPROD_{l,p,m}\right) \\
+\sum_{v}\left(\upsilon_{v,f}^{VPROD} * VPROD_v\right) \\
+\sum_{s}\left(\upsilon_{s,f}^{SPROD} * SPROD_s\right)
\end{array} \quad \text{for all } f
$$

These subsidies and premiums are usually subject to many policy analyses (e.g. analysing decoupled single farm payments) and can be easily changed for comparative static analyses.

Emission coefficients (ε_e) can be assigned to all crop and livestock activities and sum up to total farm emissions (EMISO).

$$
(27) \quad EMISO_e \leq \begin{array}{l}
+\sum_{l,p,m}\left(\varepsilon_{l,p,m,e}^{PPROD} * PPROD_{l,p,m}\right) \\
+\sum_{v}\left(\varepsilon_{v,e}^{VPROD} * VPROD_v\right)
\end{array} \quad \text{for all } e
$$

The environmental impacts of alternative management measures can be evaluated at activity and whole farm scales.

Impact analysis of single farm payments with FAMOS – the scenario details

FAMOS is applied to analyse the impacts of alternative implementations of the single farm payments on selected farm indicators in Austria. A set of 6,814 typical farms is modelled and their optimal production plans are compared using the following scenarios:

Base-run:

> This scenario simulates an average situation between 2000 and 2002, the reference period for the calculation of single farm entitlements and reference hectares. Premiums, crop and livestock allocations, and quotas are based on individual observations, yields, and prices are based on regional averages.

Austrian implementation – historic model and partial decoupling:

> This scenario simulates the Austrian implementation of the single farm payment in 2008: The suckler cow premium and part of the slaughter premiums (40%) remain coupled to outputs. The milk quota premium is decoupled, based on the milk quota that dairy farms had during the reference period. The model does not allow afforestation on agricultural lands (reflecting cross compliance restrictions) and requires minimum standards of maintenance.

Full decoupling and historic model:

> This is the simulation of a full decoupling scenario in 2008. All other assumptions described above apply here as well.

Full decoupling and the flat-rate regional model:

> This scenario simulates full decoupling of the single farm payment in 2008 using the regional approach i.e. a flat farm payments system (326 €/ha; see table 1). Remaining assumptions described above apply here as well.

Alternative implementations of the single farm payment – scenario results

Single farm payments are calculated according to the situation during the reference period (an average of observations of 2000 to 2002). The same period is used as reference scenario (base-run) in the following comparisons with alternative SFP implementation scenarios of the CAP reform 2003 in Austria. Statistics on the distribution of SFP per hectare for the whole sample and for sub-samples (according to alpine farming zones and the economic size units; ESU) are given in table 1.

Table 1: Reference scenario – statistics (mean, median, and percentiles) on distributions of the partially and fully decoupled Single Farm Payments in €/ha

	mean	median	percentiles			
			20%	40%	60%	80%
partially decoupled Single Farm Payments (SFP) in €/ha (Austrian implementation)						
whole sample (n=6814)	212.2	180.4	61.8	138.6	225.2	319.2
zone 0, non mountainous regions (n=2136)	302.1	287.4	124.2	245.0	315.0	360.9
zone 1 (n=1434)	214.0	202.7	82.5	166.7	243.3	315.8
zone 2 (n=1373)	182.7	159.2	61.8	128.0	194.4	284.6
zone 3 (n=1350)	151.3	120.5	43.3	92.1	148.9	227.0
zone 4, very mountainous regions (n=521)	92.3	67.6	30.2	52.4	87.8	147.7
0 - <4 ESU (n=422)	165.5	130.7	51.5	99.5	170.3	267.6
4 - <8 ESU (n=566)	164.4	137.7	52.1	101.8	167.4	257.0
8 - <16 ESU (n=1,245)	233.2	156.4	54.5	121.5	195.8	291.7
16 - <40 ESU (n=2,578)	201.6	180.8	62.3	140.4	222.7	317.0
40 - <100 ESU (n=1,612)	223.3	213.9	70.9	163.4	265.2	332.0
>=100 ESU (n=391)	285.8	296.8	137.5	265.2	315.7	342.5
fully decoupled Single Farm Payments (SFP) in €/ha						
whole sample (n=6814)	326.1	272.0	141.1	230.1	312.0	394.4
zone 0, non mountainous regions (n=2136)	456.7	325.5	195.3	300.8	338.0	457.6
zone 1 (n=1434)	310.5	290.9	168.1	253.5	323.7	412.2
zone 2 (n=1373)	277.0	256.5	138.7	225.7	296.0	387.9
zone 3 (n=1350)	254.3	220.3	122.2	190.7	259.5	348.9
zone 4, very mountainous regions (n=521)	174.3	159.5	81.5	134.1	190.3	247.3
0 - <4 ESU (n=422)	276.7	247.6	115.2	205.0	286.4	392.1
4 - <8 ESU (n=566)	273.2	239.0	130.1	198.4	283.1	374.1
8 - <16 ESU (n=1,245)	469.1	264.0	148.3	226.1	303.5	407.5
16 - <40 ESU (n=2,578)	294.4	270.9	143.3	230.3	313.4	402.4
40 - <100 ESU (n=1,612)	293.1	283.5	138.0	240.4	317.3	389.3
>=100 ESU (n=391)	342.5	311.9	185.6	289.9	329.8	380.5

Source: own results, based on model simulations; alpine farming zones defined in Tamme et al., 2002.
ESU = Economic size units (one ESU is the sum of standard gross margin per farm in 1,000 Euros); size classes based on 2003/269 EC.

The data in table 1 (and figure 1 in the appendix) are not reporting the actual distribution of SFPs (see BMLFUW, 2006) but those calculated according to the criteria (i.e. partial and full decoupling scenarios). The calculations show that the distribution of payments is not symmetric (the median is left to the mean). Farms in the first quintile get a premium per hectare that is smaller by the factor five compared to farms in the fourth quintile. Farms in the plains – compared to those in the mountains – and large farms – compared to smaller ones – have higher SFPs per hectare. Since SFPs are effectively historical transfers of the first CAP pillar before the 2003 reform, the results in table 1 show that larger farms in regions with favourable conditions (outside less favoured areas) benefited over-proportionally from direct payments – on average. The distribution of SFPs across quintiles shows on the other hand that there are marked differences within the classes defined in the tables.

Table 2 (and figures 2 to 4 in the appendix) lists changes in farm net-returns (i.e. whole farm gross margins) which are compared with the reference situation. In the scenarios we do not isolate the effect of the introduction of the single farm payment, ceteris paribus, but we consider all other changes in the policy and market environment in a simultaneous way. Such a comparison shows overall effects of a policy reform which involves market responses (price changes) and policy responses at EU level (adjustments in other farm related programs).

The data reflect four types of changes:

- First, the changes of market conditions between the reference period and the year 2008 are reflected in the data (mainly price drops / increases) are exogenous shocks which lead to adjustments in the production plan of the farms;
- Secondly, the introduction of the SFP and its variants of decoupling will have different consequences on farm production and management decisions in the model.
- Thirdly, alternative allocations of SFPs according to the historic or the regional model have different consequences of the distribution as well.
- Apart from the adjustments in the 'first pillar of the CAP' the scenarios took account of likely changes in the programme for rural development (to be introduced according to new criteria in 2007), as well (details based on BMLFUW, 2006).

Single Farm Payments and other programme subsidies (from agri-environmental programme and less favoured areas payments) are elements of farm revenues and are therefore accounted for in the comparison reported in table 2. Some farm payments – like investment aids and diversification support of the new programme of rural development – are **not** accounted for, yet. Consequently, the data do not reflect all policy instruments and the actual situation is therefore likely to look slightly better for the farms who can expect a positive medium and long-run impacts on farm net-returns through theses instruments. We consider them to be negligible in the short-run and therefore do not take them into consideration in these static comparisons.

The data in table 2 show that – compared to the reference period 2000-2002 – most farms will be worse off in nominal terms in 2008 (the median is negative in all scenarios) if market conditions are close to the projections of OECD (2004 and 2005). Farms in least favourable areas (in very mountainous regions) as well as the smallest farms will face the largest losses in net-returns. We did not account for technical change which might slightly diminish the consequences of the policy reform.

Table 2: Statistics (mean, median, and percentiles) on the distributions of changes in net-returns for partial and full decoupling scenarios in %

	change of net-returns relative to reference scenario in %					
	mean	median	percentiles			
			20%	40%	60%	80%
partial decoupling – historic model (actual Austrian implementation)						
whole sample (n=6,814)	-6.2	-4.1	-9.7	-5.4	-3.0	-0.7
zone 0, non mountainous regions (n=2,136)	-5.7	-3.0	-8.9	-4.4	-1.7	0.0
zone 1 (n=1,434)	-5.7	-3.8	-8.9	-5.2	-2.6	-0.7
zone 2 (n=1,373)	-5.8	-4.1	-9.0	-5.3	-3.0	-1.0
zone 3 (n=1,350)	-7.2	-5.1	-10.9	-6.3	-4.0	-1.8
zone 4, very mountainous regions (n=521)	-8.6	-6.0	-13.1	-7.5	-4.9	-2.8
0 - <4 ESU (n=422)	-9.4	-4.3	-13.5	-6.0	-2.4	0.0
4 - <8 ESU (n=566)	-8.4	-5.3	-12.5	-6.5	-3.6	-0.7
8 - <16 ESU (n=1,245)	-7.3	-4.7	-11.5	-6.3	-3.4	-1.1
16 - <40 ESU (n=2,578)	-6.1	-4.2	-9.5	-5.5	-3.2	-0.9
40 - <100 ESU (n=1,612)	-4.9	-3.8	-8.1	-4.9	-2.8	-0.7
>=100 ESU (n=391)	-3.2	-1.8	-6.1	-2.9	-0.9	0.1
full decoupling – historic model						
whole sample (n=6,814)	-3.8	-2.9	-7.9	-4.1	-1.6	0.5
zone 0, non mountainous regions (n=2,136)	-3.8	-2.1	-7.3	-3.4	-0.9	0.9
zone 1 (n=1,434)	-3.3	-2.8	-7.5	-4.0	-1.4	0.7
zone 2 (n=1,373)	-3.4	-2.9	-8.0	-4.1	-1.8	0.5
zone 3 (n=1,350)	-4.2	-3.5	-8.5	-4.7	-2.4	0.0
zone 4, very mountainous regions (n=521)	-5.9	-4.4	-9.8	-5.7	-3.2	-0.8
0 - <4 ESU (n=422)	-3.2	-1.4	-10.1	-3.0	-0.1	4.3
4 - <8 ESU (n=566)	-4.0	-2.5	-10.0	-4.8	-0.9	2.9
8 - <16 ESU (n=1,245)	-3.7	-2.7	-8.7	-4.1	-1.3	2.0
16 - <40 ESU (n=2,578)	-4.0	-3.1	-7.7	-4.2	-2.0	0.2
40 - <100 ESU (n=1,612)	-4.0	-3.3	-7.4	-4.4	-2.1	-0.1
>=100 ESU (n=391)	-2.9	-1.7	-5.5	-2.9	-0.8	0.0
full decoupling – flat-rate regional model						
whole sample (n=6,814)	-0.1	-0.0	-8.6	-2.0	1.9	8.8
zone 0, non mountainous regions (n=2,136)	-3.0	-1.1	-11.6	-3.5	-0.0	5.4
zone 1 (n=1,434)	-0.6	-0.7	-8.7	-2.8	1.1	8.4
zone 2 (n=1,373)	1.1	0.2	-7.4	-1.4	2.6	9.1
zone 3 (n=1,350)	1.7	1.4	-6.8	-0.7	4.1	10.4
zone 4, very mountainous regions (n=521)	6.1	5.1	-4.3	1.9	7.8	16.9
0 - <4 ESU (n=422)	2.2	4.2	-8.1	0.0	7.7	18.1
4 - <8 ESU (n=566)	-0.0	1.1	-8.3	-0.2	4.5	11.9
8 - <16 ESU (n=1,245)	-0.2	0.2	-9.9	-1.5	2.7	9.1
16 - <40 ESU (n=2,578)	-0.5	-0.4	-8.9	-2.7	1.8	8.1
40 - <100 ESU (n=1,612)	0.5	-0.8	-8.1	-2.8	1.1	7.5
>=100 ESU (n=391)	-1.2	-0.5	-6.9	-1.3	0.0	2.6

Source: own results; alpine farming zones defined in Tamme et al., 2002.
ESU = Economic size unit (one ESU is the sum of standard gross margin per farm divided by 1,000 Euro); size classes based on 2003/269 EC.

The larger extent of losses is a consequence of the type of implementation of the CAP 2003 reform in Austria. Several direct payments are still coupled such as 100% of the suckler cow premiums and 40% of the slaughter premiums. Therefore, some production activities will be maintained that would otherwise be substituted by more efficient ones or left idle. The distorting effect can be seen when the results of the 'partial decoupling' scenario are compared to the 'full decoupling' model. As shown by Schmid and Sinabell (2004) some important variables like output of livestock products and farm employment are higher in the scenario 'partial decoupling'. Policy makers obviously put more emphasis on these variables and were willing to accept the trade-off of (slightly) lower net-returns.

The scenario of 'full decoupling with a flat-rate according to the regional model' is an alternative that was not considered to be a political feasible option in Austria. When we compare the results with the other scenarios it becomes evident that this scenario is a more egalitarian model: averages and medians are closer, farms in very mountainous regions and smaller ones would be better off than in the reference situation. But also farms in the 4th quintile (80%) would have benefited from such a scenario. Nevertheless there would be major transfers between farmers and therefore winners and losers would be more apparent. This seems to be a reason why the flat-rate regional model was not implemented in a single one of the EU-15 member states.

Summary and conclusions

In 2003, the Common Agricultural Policy (CAP) was substantially reformed and the new instrument of Single Farm Payments (SFP) was introduced. Each of the EU-15Member State had to decide on the model of implementation of the SFP. In general, there are three models available: (1) The *historic approach* where each farmer is granted entitlements corresponding to the payments she/he received during 2000-02 and the numbers she/he was farming during this period and which gave right to direct payments in that reference period; (2) The *regional – or flat-rate – approach* (implemented in no member state), where the sum of payments received by all farmers in a region gives the regional reference amount, which is divided by the number of eligible hectares. (3) The *mixed models* which basically act as a vehicle to transit from the basic (historic) to the regional (flat) rate approach.

This article analyses the distributional consequences of alternative implementations of the SFP for typical farms in Austria (historic approach). About 6,800 typical farms are modelled using FAMOS (the farm optimization system; Schmid, 2004), which is a data-modelling system that simulates the decision making process of farmers on the basis of historical and alternative production and income possibilities. The typical farms are selected with respect to regional and structural criteria using the agricultural census of 1999. All farm can be assigned to one of the (i) eight major production regions in Austria, (ii) 40 types of farm production specialisation, (iii) two business types, (iv) two management systems, (v) five alpine farming zones, and (vi) eight farm size classes. Each of the modelled farms is a special case of only one general farm model implemented in GAMS (General Algebraic Modeling System). This generic model is consecutively loaded with individual farm data from a common database and solved in a loop procedure. This data-modelling system allows continuous model development and data up-dating and integration.

Comparative static analysis were analysed using a base-run scenario (observed situation in 2003), the Austrian implementation in 2008 (historic model with partially decoupled premims), and two alternative implementations of full decoupling scenarios in 2008. The model results show that average decline in farm net-returns are highest with the Austrian partial implementation of the single farm payments. Most farms will be worse off in nominal terms in 2008 if market conditions are close to the projections of OECD (2004, 2005). Farms in least favourable areas as well as the smallest farms will face the largest losses in farm net-returns. Austrian policy makers obviously put more emphasis on maintaining certain production activities (e.g. suckler cows) in distinct regions compared on gaining higher average farm net-returns. The ‘full decoupling with the flat–rate regional model’ would have lead to more egalitarian outcomes: farms in mountainous regions and smaller ones would have benefited from such an implementation.

Choices on the allocation of single farm payments among farms or regions are based on value judgements, distributional consequences are merely a farmer issue. Choices on the decoupling strategy (partial or full decoupling) have effects that go beyond the agricultural sector. Coupled direct payments have the following consequences: more resources (land, labour and operating inputs) are used for the particular activity and outputs are slightly higher (in Austria beef production). Upstream and downstream industries as well as regional labour markets are therefore affected in different ways depending on how the CAP reform is actually implemented. From such an angle it looks that agricultural ministers in EU member states made deliberate choices concerning the consequences for their rural economies.

Agricultural ministers could not agree on the regional flat-rate approach of SFP to better address distributional deficiencies of the CAP. They have supported two new instruments: *modulation* and *degression*. Farms having entitlements of 5,000 € and above will not get the full amount (modulation increases from 3% to 5%). Similarly, degressions will trigger when the actual CAP expenditures do not meet the planned overall budget. It can already be observed that farmers take strategic actions (e.g. splitting farms) to infiltrate the 5,000 € limit for modulations which could have been avoided if the regional flat-rate approach has been implemented. Therefore, we expect that new regulations will flourish that aim at 'correcting' this and similar developments. It seems that one major objective of the reform – to lessen the administrative burden – will not be attained, while others – e.g. better market orientation – seem to be attainable.

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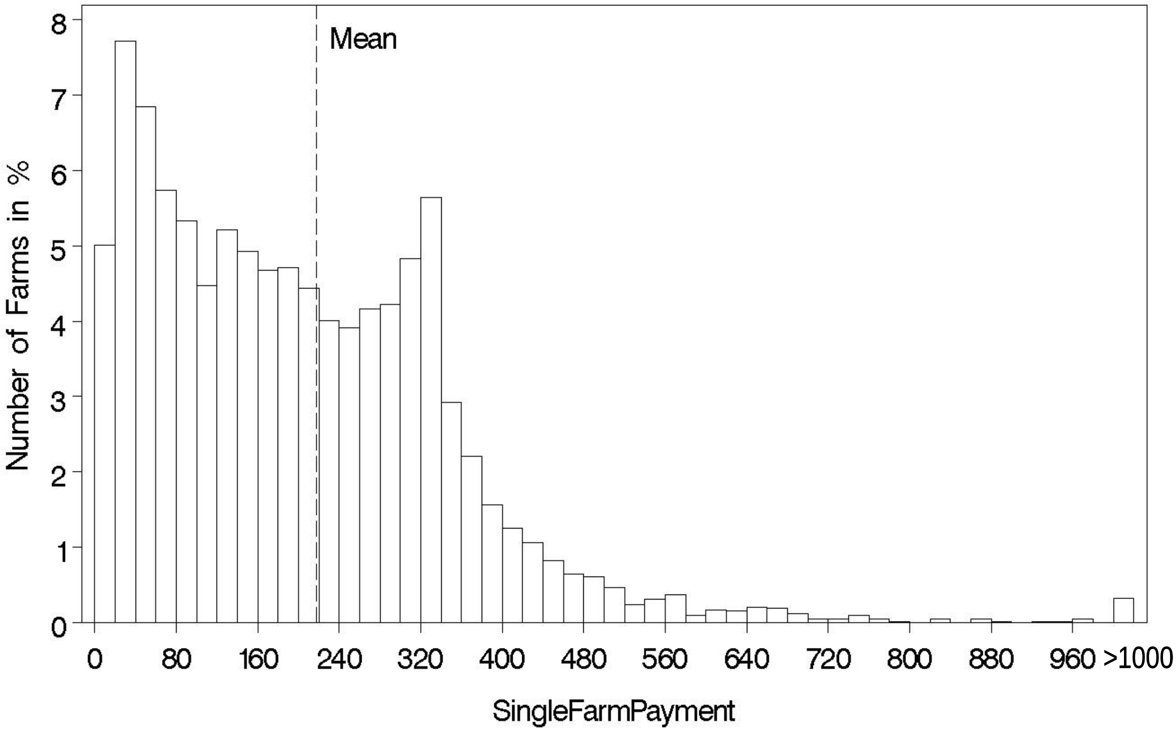
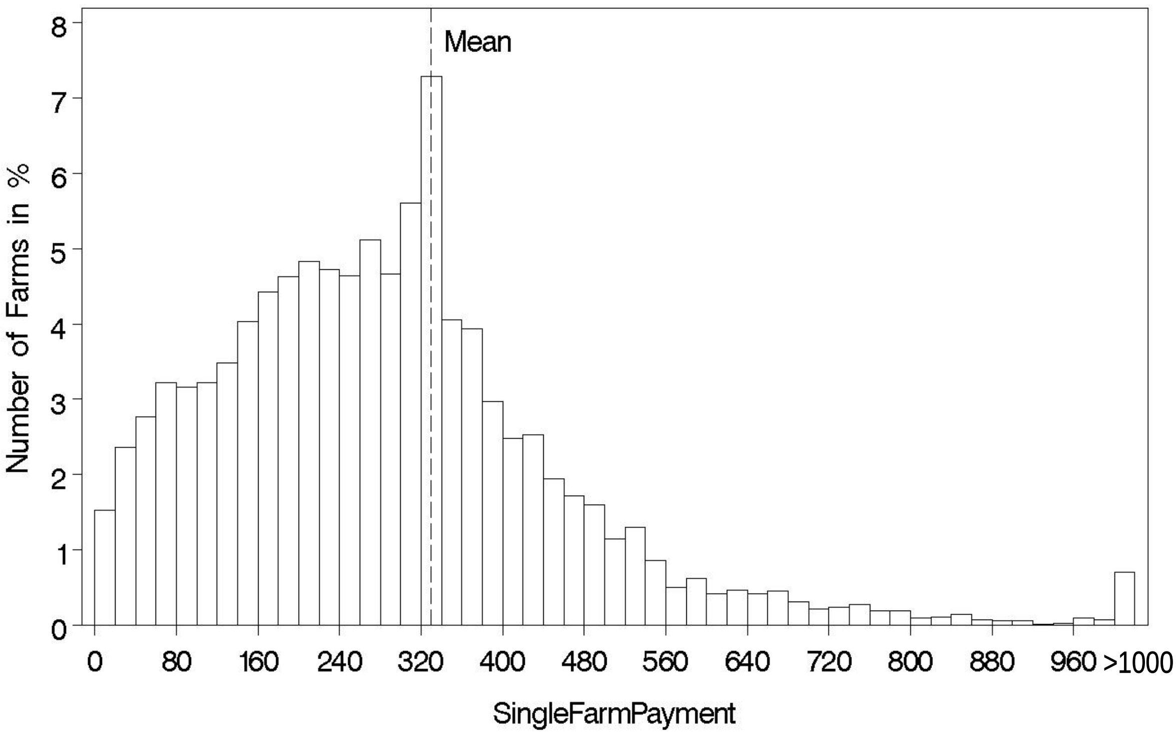
Appendix

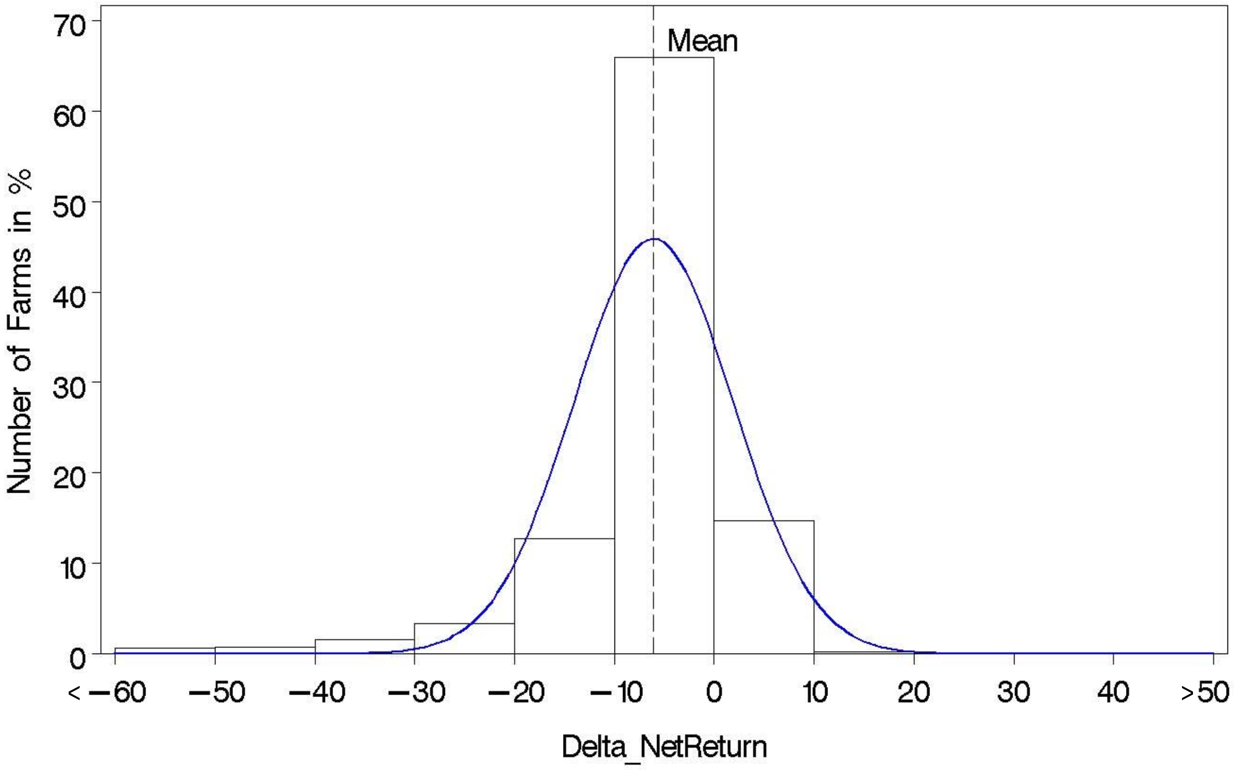
Figure 1: Frequencies of partially (top) and fully (down) decoupled single farm payments in €/ha (n=6814)





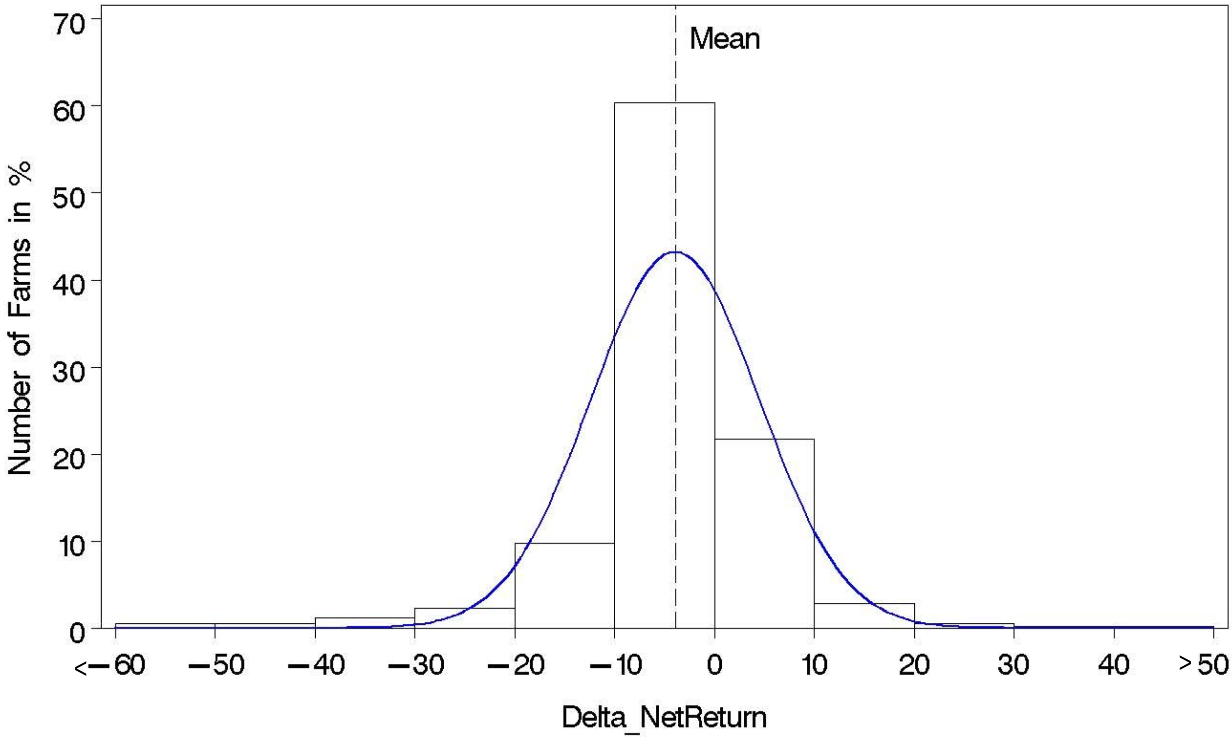
Source: own results.

Figure 2: Frequencies on change in farm net-returns for partially decoupled single farm payments (Austrian Implementation) in % (n=6814)



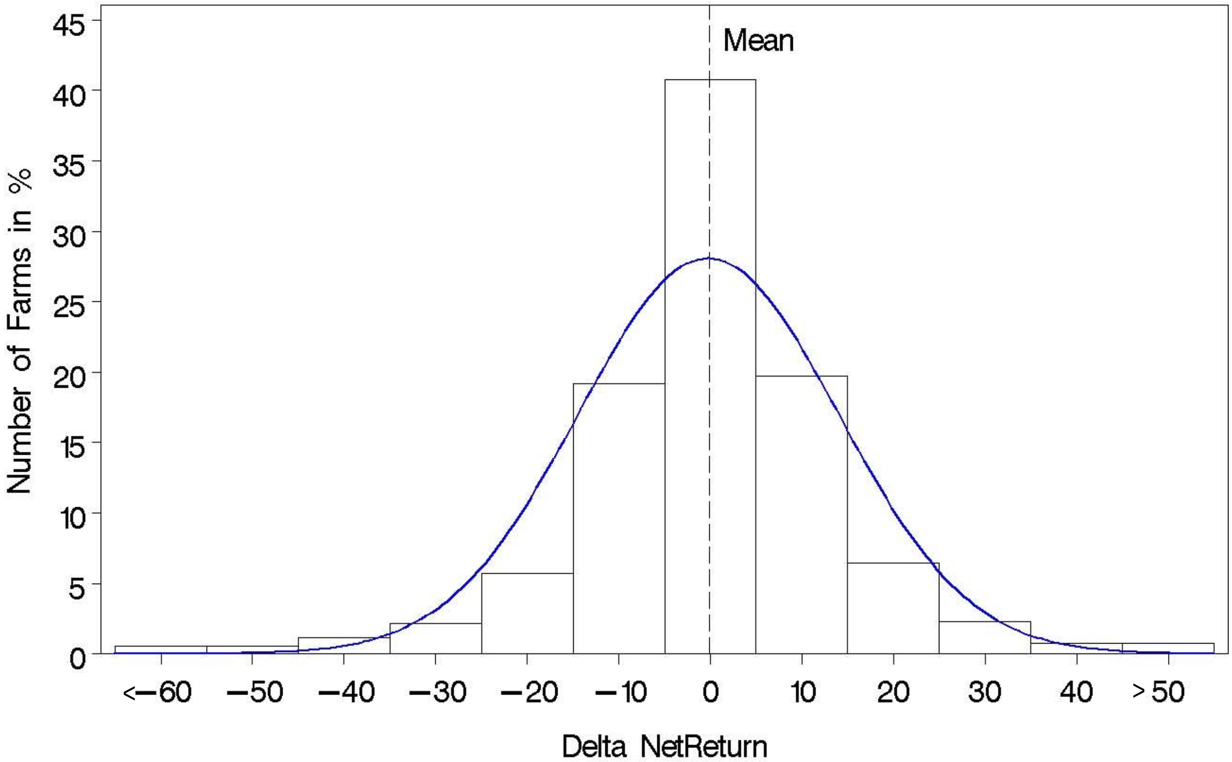
Source: own results.

Figure 3: Frequencies on change in farm net-returns for fully decoupled single farm payments (historic model) in % (n=6814)



Source: own results.

Figure 4: Frequencies on change in farm net-returns for fully decoupled single farm payments (flat-rate regional model) in % (n=6814)



Source: own estimation.

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