DOI: 10.1007/s10272-010-0335-6

Davide Viaggi*, Meri Raggi**, Vittorio Gallerani* and Sergio Gomez y Paloma***

The Impact of EU Common Agricultural Policy Decoupling on Farm Households: Income vs. Investment Effects

This paper analyses the effects of decoupling (as introduced in the 2003 reform of the EU Common Agricultural Policy) on farm income and investment behaviour. The results of a dynamic multi-objective household model for 80 farm households in 8 EU countries are analysed and presented through a measure of investment-income elasticity as a reaction to decoupling. The results highlight the differing and contrasting reactions of farm households to policy changes. The main conclusion is that the diversity of farm specialisations and the dynamics of long-term adaptation should be taken into account more explicitly in the evaluation of policy impacts on EU farming systems.

Agricultural policies play a major role in the viability of the farming sector throughout the world. In the European Union (EU), agriculture and rural areas are particularly affected by the EU Common Agricultural Policy (CAP). The CAP is a major policy initiative, accounting for roughly 40% of the EU budget and comprising a major share of farm income. Not surprisingly, the CAP is considered one of the major drivers of change in agriculture and rural areas, through both direct income effects and the orientation of farming activities. At the time it was initially implemented in 1962, the CAP was mainly characterised by subsidies to agricultural production, based on price support. With the MacSharry reforms in the 1990s, these subsidies were converted to area payments, i.e. support was paid per hectare for specific crops. In 2003, the European Commission approved a further major reform of the CAP based on the decoupling of direct payments (Council Regulation (EC) 1782/2003). Under this new policy approach, referred to as the Single Farm Payment (SFP) scheme, the previous payments have been converted into entitlements. Each farmer can activate the entitlements he/she possesses (and hence receive the related payments) by demonstrating that an eligible land area is being operated. Eligibility is determined by the cultivation or maintenance of land under Good Agriculture and Environmental Conditions (GAEC). Under the SFP, only a few crops are ineligible (in particular vegetables and fruit) for payments. In fact, decoupling entails that income payments are now detached from the production of specific crops, as well as from their yield. This is expected to remain a major cornerstone of the CAP for years to come, as shown by the 2008 "Health Check" of the CAP[1].

The decoupling of agricultural policies is expected to increase the flexibility of farm decision making, as farmers are no longer forced to cultivate a specific crop to receive a specific payment. Furthermore, they can even receive payment without cultivating their land if they maintain it in accordance with the requirements of the GAEC. More specifically, the effects of shifting from a coupled to a decoupled policy regime have been conceptually addressed in the literature[2], pointing out, among other things, the following expected effects: a) a change in crop mix; b) increased farm income due to the greater flexibility associated with guaranteed payments; c) increased investment potential due to more relaxed budget constraints; but d) decreased incentives for cultivation and investment due to the possibility of receiving payment even without crop cultivation. Most studies based on static models emphasise some degree of reaction highlighting, in particular, the first two effects. This kind of simulation outcome tends to be particularly evident in EU-wide models.[3] In contrast, the few existing studies based on a survey approach report little reaction on the part of farmers to decoupling, at least as far as the combination of farm activities is concerned.[4] Effects c) and d)

* Department of Agricultural Economics and Engineering, University of Bologna.

** Department of Statistics, University of Bologna.

*** Institute for Prospective Technological Studies – EC - JRC Seville.

The paper was funded by the IPTS, JRC-European Commission within the project "Investment behaviour in conventional and emerging farming systems under different policy scenarios", CONTRACT 150369-2005. However, the views expressed in this paper are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

1 European Commission: Preparing for the "Health Check" of the CAP reform. (COM (2007) 722, Brussels), 2007.

2 e.g. OECD: Decoupling: a conceptual overview. (OECD, Paris), 2001.

3 For a review and an example, see A. Gohin: Assessing CAP Reform: Sensitivity of Modelling Decoupled Policies, in: Journal of Agricultural Economics, Vol. 57, No.3, 2006, pp. 415–440.

4 R. B. Tranter, A. Swinbank, M. J. Wooldridge, L. Costa, T. Knapp, G. P. J. Little, M. L. Sottomayor: Implications for food production, land use and rural development of the European Union's Single Farm Payment: Indications from a survey of farmers' intentions in Germany, Portugal and the UK, in: Food Policy, Vol. 32, 2007, pp. 656–671.

are less tractable in theoretical terms and less detectable in practice, as the prevailing effect can depend on several factors such as: a) the relative profitability of crops versus uncultivated land; b) the overall farm strategy and its connections with household choices, particularly when labour allocation is involved; and c) delays in the carrying out of investments/disinvestments due to the age of assets, technical complementarities between different processes and uncertainty.[5]

In this paper, we focus on the relationship between decoupling, farm income and investment as a consequence of the 2003 reform of the CAP. This paper builds on the results of Gallerani et al.,[6] who provide an analysis of the impact of decoupling on investment behaviour for 80 individual farm households in different scenarios through a dynamic multi-objective household model. Our objective is to provide a classification of farm households through the use of a simple measure of farm income-investment elasticity in order to identify and discuss the main patterns of reaction to decoupling.

Methodology

Simulations in Gallerani et al.[7] were based on farm household dynamic models using multi-objective integer programming. The choice of a programming model was made due to the fact that the reform was too recent to allow for detection of actual reactions ex post and because of the difficulty of representing the complexity of technical and economic constraints interacting with decoupling through an econometric approach. The choice of a dynamic model and integer programming was connected to the nature of investment choice, which affects several periods of time and concerns non-divisible assets. The adoption of a household multi-objective model allowed for the consideration of the investment choice as embedded in the overall objectives of the relevant decision-making unit.

The results were generated by running the models under two scenarios. The first represented the situation under the pre-2003 reform situation, whilst the second assumed the decoupling of direct payments, all other things being equal. No other policy variable was modified between the two scenarios.

The type of model adopted enabled the simulation of the farm household's (and the farm's) full adaptation to the changes in external variables (price and policy). Such adaptation could include changes to the crop mix, to labour and capital allocation on- and off-farm, as well as to investment and disinvestment decisions (including land, building, machinery). The output is given in terms of these decision variables plus the connected overall economic results, such as income from farming and total household income. See Gallerani et al.[8] for the full model description and the original results.

Using the results from Gallerani et al., in this paper we classify households on the basis of their changes in total farming income and farming investment through the calculation of the following index:

$$\beta_a = \frac{\Delta I_a}{\Delta Y^f_a}$$

where: β_a = income elasticity of investment due to decoupling; ΔY^f_a = percent change in farming income due to decoupling; ΔI_a = percent change in farm investment due to decoupling. Note that in the model the changes in investment and income occur simultaneously as part of the same decision-making process. The use of an elasticity measure to interpret such a relationship may suggest causality between income and investment changes that is not necessarily real. Consequently, we focus our discussion on a weaker concept of elasticity as a measure of the different directions of change of investment and income as a reaction to decoupling.

Based on this information, we can classify farm income and investment behaviour reactions into the following six cases:

a) $\Delta Y^f_a \geq 0$ and $\beta_a \geq 0$;

b) $\Delta Y^f_a \geq 0$ and $\beta_a \leq 0$;

c) $\Delta Y^f_a \geq 0$ and $\beta_a = 0$;

d) $\Delta Y^f_a \leq 0$ and $\beta_a \geq 0$;

e) $\Delta Y^f_a \leq 0$ and $\beta_a \leq 0$;

f) $\Delta Y^f_a \leq 0$ and $\beta_a = 0$.

Cases a) to c) reflect situations in which decoupling contributes to an increase in farm investment, as opposed to cases d) to f), which represent cases where decoupling

5 T. Serra, D. Zilberman, B. K. Goodwin, A. Featherstone: Effects of decoupling on the mean and variability of output, in: European Review of Agricultural Economics, Vol. 33, No.3, pp. 269–288; V. Gallerani, S. Gomez y Paloma, M. Raggi, D. Viaggi: Investment behaviour in conventional and emerging farming systems under different policy scenarios. (JRC Scientific and Technical Reports, EUR 23245 EN – 2008), 2008.

6 V. Gallerani et al., op. cit.

7 Ibid.

8 Ibid.

Table 1
Number of Models per System

Area	Specialisation	Technology	DE	ES	FR	GR	HU	IT	NE	PO	Total
Mountain	Arable	Conventional	3					3			6
		Emerging	3					3			6
	Livestock	Conventional	4					3		2	9
		Emerging	2					2		3	7
Plain	Arable	Conventional	1		4	5	2	4		4	20
		Emerging	1			1		2		1	5
	Livestock	Conventional	3				3	3	3	5	17
		Emerging	1					1	3	1	6
	Trees	Conventional		4							4
Total			18	4	4	6	5	21	6	16	80

causes a decrease in farm investment. Cases a) and d) represent situations with a positive elasticity of investment to farm income, i.e. a propensity to invest attached to an increase in income due to decoupling. However, in a) both income and investment increase, while in d) both income and investment decrease. Accordingly, cases a) and d) can be thought of as opposite directions of change on the same line of conduct: in both cases income and investment move in the same direction, but decoupling yields an opposite effect. Case a) reflects the theoretically expected effect of decoupling: greater flexibility yields higher income and in turn results in a greater propensity to invest. Case b) reflects a less expected result in terms of income, as it provides for a decrease due to decoupling. However, the reaction in terms of investment is consistent, i.e. investment decreases due to lower profitability. Cases b) and e) show the opposite relationship: changes in income are associated with opposite changes in investment. These two cases are again distinguished by the opposite reaction to decoupling: while in case b) income increases and investment decreases, in case e) income decreases and investment increases. Case b) in particular reflects the potentially expected option of farms that derive higher income from increased flexibility but prefer to disinvest on-farm and devote time and capital elsewhere. Case e) reflects the opposite situation in that a negative effect on farm income is rather associated with a reaction carried out through increased investment. No change in investment occurs in the remaining two cases, c) and f), which are associated however with increases and decreases of income respectively. The no-change option is a non-trivial result, associated either with positive or negative income. In fact, decoupling may reasonably yield no relevant changes in many farms, and it is very important that models take into account this potential behaviour.

Case Studies

The original models were built on 80 case study households in 8 countries (Table 1).

The samples have been selected through a "not completely random" methodology based on a proportional stratified sample rationale complemented by the analysis of expert judgment. The farm-household sample was selected in order to fit in the intersection of the following categories: different altitudes (plain/mountain); different specialisations (arable crops, livestock, trees), different farming systems (conventional, organic).

Results are provided as an average of two periods: 2006-2013 and 2014-2021. The first period (2006-2013) corresponds roughly to the present programming period of the CAP (2007-2013), while the second represents an additional period of the same length.

Results

Table 2 illustrates the relationship between the effects of decoupling on farm income and investment. The first important point is that decoupling can bring about both positive and negative impacts on farm income, with a slight prevalence of negative effects. This is contrary to the expected results from static models. However, it is justified in a dynamic context where coupled payments are a driver for farm enlargement and the resulting increase in the absolute value of farm income. This effect is most evident in Poland and France, and generally in livestock systems.

Whatever the change in farm income may be, the investment behaviour of many farms remains unchanged (about 55%). However, this is more discernible in farms having experienced a positive income effect as a result of decoupling (26 out of 35), rather than in those with a negative income effect (17 out of 45). In other words, when decoupling has a negative income effect, investment-related reactions tend to be more significant, which hints at a greater need for adaptation.

Among those with increases in farm income, only 7 out of 26 have, as theoretically expected, positive elasticity of investment. A very small group (2 out of 26) has negative investment elasticity to farm income. This corresponds with the hypothesis that decoupling encourages consumption and the cessation of farming activity. That only a small number of farms follow this strategy is consistent with the fact that the sample mostly includes farm households which are strongly committed to farming activities and which would not easily adopt a rent-seeking strategy due to decoupling.

Table 2
Investment/Farm Income Elasticity (2006-2013)[1]

	$\Delta Y_a^f \geq 0$			$\Delta Y_a^f \leq 0$			
System	$\beta_a < 0$	$\beta_a > 0$	$\beta_a = 0$	$\beta_a < 0$	$\beta_a > 0$	$\beta_a = 0$	Total
DEMCA			1 (0)		1 (10.44)	1 (0)	3
DEMCL		1 (7.47)			2 (0.18; 2.93)	1 (0)	4
DEMEA			2 (0)		1 (16.78)		3
DEMEL		2 (5.88;6.39)					2
DEPCA			1 (0)				1
DEPCL	1 (-3.77)				1 (4.01E-07)	1 (0)	3
DEPEA				1 (-1.37)			1
DEPEL			1 (0)				1
ESPCT			2 (0)		1 (12.37)	1 (0)	4
FRPCA	1 (-11.45)					3 (0)	4
GRPCA		1 (0.001)	2 (0)	1 (-0.004)			4
HUPCA			1 (0)		1 (6.22)		2
HUPCL			1 (0)		2 (3.93; 4.72)		3
ITMCA			2 (0)			1 (0)	3
ITMCL					2 (4.99; 15.11)	1 (0)	3
ITMEA			2 (0)			1 (0)	3
ITMEL			2 (0)				2
ITPCA			2 (0)		1 (10.69)	1 (0)	4
ITPCL			2 (0)	1 (-0.10)			3
ITPEA						2 (0)	2
ITPEL		1 (0.27)					1
NEPCL			1 (0)	1 (-2.96)	1 (5.65)		3
NEPEL			1 (0)	1 (-13.35)	1 (0.038)		3
POMCL		1 (21.81)				1 (0)	2
POMEL				1 (-0.38)	1 (1.60)	1 (0)	3
POPCA				3 (-2.9E-07; -5.09)		1 (0)	4
POPCL		1 (1.75)	1 (0)	1 (-0.39)	2 (0.34; 2.75)		5
POPEA					1 (10.47)		1
POPEL						1 (0)	1
Total	2	7	26	10	18	17	80

[1] In the table: DE= Germany, ES=Spain, FR= France, GR=Greece, HU=Hungary, IT=Italy, NE= Netherlands, PO=Poland; P=Plain, M=Hilly/mountain; C=Conventional, E=Emerging; A=Arable crops, L=Livestock, T=Trees. Numbers represent the number of farms in each category; minimum and maximum values of elasticity in each group are given in parentheses.

Among those farm households with a decrease in farm income, the results are more diversified: the largest group shows positive elasticity, as expected (decreased investment, 18 out of 45). However, 10 out of 45 show negative elasticity, which is produced by investment made in order to adapt to a negative change in farm income.

In the longer run (2014-2021), the primary implications do not change, though the results tend to converge with expected economic behaviour. In particular, there is a slight increase (+2) in farms with positive income from decoupling (Table 3).

Among these farms, the most relevant effect is the increase in farms with negative investment income elasticity (11 out of 37). Hence, the effect of decoupling in encouraging passive rent seeking rather than production-oriented investment on the farm seems more evident in the longer term after adaptation has occurred in the short term. Within the group with negative income change, the most evident effect is an increase in farms with positive elasticity (implying in this case negative investment) or zero elasticity.

Discussion and Conclusions

This paper analyses the effects of decoupling on farm income and investment behaviour in a selected sample of individually modelled farm households. The results emphasise the different and contrasting reactions of different farm household types to the decoupling of payments. Three main conclusions arise from the results.

First, taking into account a dynamic household perspective, the decoupling of farm payments may result in both positive and negative changes in income. This result is

Table 3
Investment/Farm Income Elasticity (2014-2021)[1]

	$\Delta Y_a^f \geq 0$			$\Delta Y_a^f \leq 0$			
System	$\beta_a < 0$	$\beta_a > 0$	$\beta_a = 0$	$\beta_a < 0$	$\beta_a > 0$	$\beta_a = 0$	Total
DEMCA			1 (0)			2 (0)	3
DEMCL	2 (-4.05; -6.83)		1 (0)		1 (8.73)		4
DEMEA			2 (0)		1 (10.45)		3
DEMEL					2 (5.07; 5.07)		2
DEPCA			1 (0)				1
DEPCL				2 (-0.02; -1.64)		1 (0)	3
DEPEA						1 (0)	1
DEPEL			1 (0)				1
ESPCT			2 (0)		1 (12.37)	1 (0)	4
FRPCA	2 (-6.45; -206.49)					2 (0)	4
GRPCA	2 (-1.35; -35.95)		1 (0)		1 (11.31)		4
HUPCA					1 (2.06)	1 (0)	2
HUPCL					2 (1.61; 1.67)	1 (0)	3
ITMCA			3 (0)				3
ITMCL					2 (0.75; 4.82)	1 (0)	3
ITMEA	1 (-0.04)					2 (0)	3
ITMEL			2 (0)				2
ITPCA		1 (7.38)	1 (0)		2 (2.02; 6.49)		4
ITPCL			2 (0)			1 (0)	3
ITPEA			1 (0)			1 (0)	2
ITPEL	1 (-0.04)						1
NEPCL	1 (-0.26)	1 (7.15)			1 (0.37)		3
NEPEL			1 (0)		1 (0.52)	1 (0)	3
POMCL		1 (2.65)				1 (0)	2
POMEL	2 (-3.17; 27.30)				1 (0.41)		3
POPCA			1 (0)		2 (0.27; 1.44)	1 (0)	4
POPCL		1 (0.27)		1 (-81.61)	2 (0.87; 0.92)	1 (0)	5
POPEA						1 (0)	1
POPEL				1 (-0.39)			1
Total	11	4	22	4	20	19	80

[1] In the table: DE= Germany, ES=Spain, FR= France, GR=Greece, HU=Hungary, IT=Italy, NE= Netherlands, PO=Poland; P=Plain, M=Hilly/mountain; C=Conventional, E=Emerging; A=Arable crops, L=Livestock, T=Trees. Numbers represent the number of farms in each category; minimum and maximum values of elasticity in each group are given in parentheses.

consistent with survey results on reactions to decoupling,[9] while at the same time being less evident from sector and farm-level static simulation models, which tend rather to emphasise the positive effects due to the higher flexibility of farm choices under the decoupled policy.

Second, there is no effect on investment in the majority of cases (about half of the farms).

This result is made possible by the underlying integer programming model, which allows us to reproduce the practical situation of threshold-based asset fixity and is supported by recent studies on various types of investment behaviour (increase, decrease, inaction).[10]

Third, in the medium term, investment tends to be justified in the same proportion by exploiting opportunities from decoupling and by counteracting negative trends in income.

These results draw attention to the fact that the diversity of farm typologies and the dynamics of long-term adaptation should be considered more explicitly in the evaluation of policy impacts on EU farming systems and also in future policy strategies concerning agriculture.

However, neither the underlying model nor the simplified framework discussed in this paper is sufficient to respond exhaustively to such needs. More in-depth studies, in particular connecting policy, entrepreneurship and attitudes toward investment and innovation, would be welcome to address this field of practical information needs.

9 E.g. R. B. Tranter et al., op. cit.

10 E.g. B. L. Boutel, R. Hoffmann, D.J. Liu: Estimating investment rigidity within a threshold regression framework: The case of U.S. hog production sector, in: American Journal of Agricultural Economics, Vol. 89, No.1, 2007, pp. 36–51.