Working Papers SMART - LERECO

Farm expansion in Lithuania after accession to the EU: The role of CAP payments in alleviating potential credit constraints

Laure LATRUFFE, Sophia DAVIDOVA, Elodie DOUARIN, Matthew GORTON

Working Paper SMART – LERECO N°08-06

November 2008

UMR INRA-Agrocampus Ouest **SMART** (Structures et Marchés Agricoles, Ressources et Territoires)
UR INRA **LERECO** (Laboratoires d'Etudes et de Recherches Economiques)

Farm expansion in Lithuania after accession to the EU: The role of CAP payments in alleviating potential credit constraints

Laure LATRUFFE

INRA, UMR1302 SMART, F-35000 Rennes, France
Agrocampus Ouest, UMR1302 SMART, F-35000 Rennes, France

Sophia DAVIDOVA

Kent Business School, UK

Elodie DOUARIN

Imperial College, Wye Campus, UK

Matthew GORTON

Newcastle University, UK

Acknowledgements

This paper benefited from research funding as part of the EU FP6 project IDEMA (Impact of Decoupling and Modulation in the Enlarged Union: A Sectoral and Farm Level Assessment) SSPE-CT-2003-502171. The authors acknowledge Romualdas Zemeckis, Egle Stonkute and Rima Daunyte.

Auteur pour la correspondance / Corresponding author

Laure LATRUFFE
INRA, UMR SMART
4 allée Adolphe Bobierre, CS 61103
35011 Rennes cedex, France
Email: Laure.Latruffe@rennes.inra.fr
Téléphone / Phone: +33 (0)2 23 48 53 93
Fax: +33 (0)2 23 48 53 80

Farm expansion in Lithuania after accession to the EU: The role of CAP payments in alleviating potential credit constraints

Abstract

The impact of the introduction of EU Single Area Payments (SAP) on farm expansion strategy in Lithuania is investigated, utilizing farm accounting and survey data. The introduction of the SAP has a positive influence on farmers' intentions to expand their area compared to a baseline scenario of the hypothetical continuation of pre-accession policy. The switch in policy has a more pronounced effect on farms that were previously credit constrained. While the SAP has been presented as a support that is decoupled from production, its introduction may have *ex post* coupled effects, through an income multiplier effect on credit constrained farmers.

Keywords: Single Area Payments (SAP), Common Agricultural Policy (CAP), credit, investment, Lithuania

JEL Classification : Q18, Q14

Agrandissement des exploitations agricoles en Lituanie après accession à l'Union Européenne : Le rôle des paiements uniques de la PAC dans la réduction des contraintes de crédit potentielles

Résumé

Nous analysons ici l'impact de l'introduction du paiement unique à l'hectare dans les Nouveaux Etats-Membres de l'Union Européenne (« Single Area Payment », SAP) sur les stratégies d'agrandissement des exploitants agricoles en Lituanie, en utilisant des données comptables et d'enquête. L'introduction du paiement unique à l'hectare a une influence positive sur les intentions des agriculteurs de s'agrandir, en comparaison avec l'hypothèse d'une continuation de la politique nationale qui existait avant accession (scénario de référence). L'effet du changement de politique est plus prononcé sur les exploitations qui faisaient face à des contraintes de crédit avant l'accession du pays à l'Union Européenne. Ainsi, le paiement unique à l'hectare, qui a été présenté comme une politique de soutien découplée de la production, pourrait avoir l'impact d'un instrument couplé, par un effet de multiplicateur de revenu sur les exploitants contraints dans leur crédit.

Mots-clefs : paiement unique à l'hectare, Politique Agricole Commune, crédit, investissement, Lituanie

Classification JEL : Q18, Q14

Farm expansion in Lithuania after accession to the EU: The role of CAP payments in alleviating potential credit constraints

1. Introduction

An important task for researchers is to understand the implications of eastern enlargement of the European Union (EU) for both new and established Member States. Given that the Common Agricultural Policy (CAP) still accounts for approximately 43% of the EU's budget and that the New Member States (NMS) are relatively more rural and dependent on farming, any comprehensive assessment of enlargement should consider agriculture. Adoption of the CAP has led to a substantial increase in real support to farmers in most of the NMS of Central and Eastern Europe, through the implementation of the Single Area Payment (SAP). These direct payments to farmers are decoupled from production and distributed on a simple flat-rate, per hectare basis. They are much higher than pre-accession national support. In addition, NMS can top-up SAP, up to agreed limits, with national funds. Given that direct payments have become, post-accession, the main mechanism of agricultural support, any understanding of the effect of adoption of the CAP in the NMS requires an assessment of the impact of the SAP on farmers' behaviour.

Remarkably little attention has, however, been given to understanding the relationships between the SAP and farm strategies, in particular farm expansion and, as yet, no consensus, has emerged on likely impacts. For instance, while some have argued that adoption of the CAP will lock farmers into agriculture and therefore impede structural change (Ciaian and Swinnen 2006), others see accession as an important catalyst for rapid adjustment (Raiser *et al.* 2003).

This paper contributes to this debate by focusing on one of the key issues affecting farm strategy, namely farmers' financial constraints. The objective of the paper is to assess the impact of the SAP on farmers' strategies in the NMS. Given that the pre-accession period was typically characterized by the presence of binding credit constraints (e.g. Davis and Gaburici 1999; Swinnen and Gow 1999; Bezemer 2002), the main proposition of this paper is that the CAP flat-rate area payments will relieve liquidity constraints and positively affect the expansion of farms in the NMS. In other words, the SAP will have an 'income' effect, as the flat monetary transfers increase farmers' income and may allow them to purchase more

production factors than would have been the case otherwise. The focus of this paper is the effect on the long-term use of production factors, land and other assets.

The paper draws on farm level data and investigates specifically the case of one state that joined the EU in 2004 – Lithuania. The relationship between agricultural policy and investment is particularly pertinent for Lithuania. During the 1990s the agricultural sector, as in much of Central and Eastern Europe, experienced significant de-capitalization. This, intertwined with a land reform programme favouring restitution to previous owners, has left Lithuania with a relatively low-value added agricultural sector and fragmented farm structure (Meyers *et al.* 1999). Yields are low not only compared to established Member States but also to other Central and Eastern European Countries that acceded in 2004. From the mid-1990s onwards the country has had a substantial trade deficit in agri-food produce. Jalinskiene and Stanikünas (2003) noted prior to accession that any shift to a more internationally competitive agriculture would require substantial investment.

To capture the specific effect of the implementation of the CAP, we segment farmers on the basis of their financial constraints and assess the linkage with past decisions in farmland investment, and with growth intentions under two policy scenarios, namely continuing pre-accession policy and implementation of SAP.

The paper is structured as follows. The next section explores the potential relationships between direct payments, investment and credit constraints. Section three describes the Lithuanian context and the following section presents an overview of the methodology and data. Section five presents the analytical results and section six concludes.

2. Decoupled payments and credit constraints

The shift to decoupled payments in the EU is, partly, a response to recent WTO negotiations and a desire to switch to less trade and production distorting measures of support. However, it has been recognized that even payments with no direct link to production could have an indirect impact on farmers' choices. In particular, so-called "dynamic effects" could be observed *ex-post* (OECD 2001). This means that decoupled payments may change investment and saving decisions of farm operators, creating long-term changes in farmers' behaviour. One objective of this paper is, thus, to focus on these "dynamic effects" by studying

specifically farmers' decision to invest in land and the impact of the introduction of SAP on this decision.

In the NMS the transition to the SAP differs significantly from the introduction of the Single Farm Payment (SFP) in the established EU Member States. This is, first, because the agricultural policy in place prior to accession in most NMS was relatively less protectionist, and farmers were receiving limited support compared to the payment they receive now under the SAP scheme. Second, the overall economic situation in the NMS differs significantly, for instance in terms of the presence of credit constraints. These two conditions are likely to generate changes in farmers' investment behaviour, as the receipt of decoupled payments will increase farmers' cash flow and could help alleviate credit constraints.

Investment generally occurs when the expected rate of return from an additional hectare of land exceeds a threshold level reflecting the cost associated with acquiring this additional hectare (Lagerkvist 2006). However, if the farm operator does not have the required internal funds to proceed and invest in more land, then he or she may rely on external funds. If access to credit is rationed, credit constrained operators will be forced to fund most of their investment through their own funds, making their investment very responsive to the availability of cash flow. In contrast, unconstrained farmers would be expected to invest whatever their cash flow, thanks to their access to external funds. This argument is well known in the investment literature, and, despite some recent challenges (see Cummins *et al*. 2006, for example), there is still a strong intuitive and empirical support in favour (Carpenter and Guariglia 2007).

In the case of perfect credit markets, transfers through decoupled payments should not affect farm investment and production. However, if credit markets are imperfect, transfers through decoupled payments may improve liquidity and reduce farmers' borrowing costs. It is recognized that, in general, credit markets are imperfect, largely due to asymmetric information, screening, monitoring and enforcement problems (Hoff *et al*. 1993). Due to this, lenders may ration borrowers by refusing to fund part or all of their loan applications. Such credit market issues are exacerbated in agriculture, particularly during the period of transition to a market economy (e.g. Latruffe 2005; Petrick 2004; Davis *et al*. 2003; Bezemer 2002; Swinnen and Gow 1999).

With the introduction of SAP in Lithuania, farm operators' support becomes both larger and more reliable than it was before. It is also decoupled from current production decisions, making it akin to a lump-sum transfer. In this situation, Lithuanian farmers' cash flow will therefore be increased by the value of the support they receive, simultaneously alleviating some of the potential credit constraints they were initially facing: as the CAP payments represent a more secure and increasing stream of income, borrowers can pledge an increase in their repayment capacity (Collender and Morehart 2004). Therefore, in the context of accession to the EU, the implementation of generous decoupled payments may help mitigate past credit constraints and lead to increased investment. Some researchers have also argued that the increased capitalization of support into land resulting from the introduction of SAP would consolidate farmers' collateral and facilitate their access to external funds (see Latruffe and Le Mouël 2006b). However, in the case of farmland investment, it would also make the asset in which they wish to invest more expensive, leading to an ambiguous overall impact of this indirect effect of SAP.

3. Lithuanian farms before and after accession

Before the reforms of the 1990s, agriculture accounted for 28% of Lithuanian Gross Domestic Product (GDP) (OECD 1996). However, during the 1990s the agricultural sector contracted sharply and its contribution to total GDP and employment dwindled. Table 1 details the evolution of key indicators for the sector prior to, and post, accession. By the mid-1990s, Lithuania possessed approximately 250,000 farms operating 2.5 million hectares (ha). With an average farm area of 10 ha, the Lithuanian mean was about one-half of that of established EU Member States (EU-15). Yields were also about 50% of EU-15 levels. During this period, agriculture was a low value added activity with around 900,000 ha of land previously used for agriculture left uncultivated (sometimes referred to as 'abandoned') (Lithuanian Institute of Agrarian Economics 2005). Land prices were exceedingly low by both EU-15 and NMS rates (see Latruffe and Le Mouël 2006a): in 2000 the average sale price for agricultural land was just under 300 Euro/ha.

Table 1: Evolution of Lithuanian agriculture (1995-2007)

	1995	2000	2003	2004	2005	2006	2007
Utilized agricultural area (ha)			2,490,960		2,792,040		2,648,950
Number of farm holdings			272,060		252,880		230,200
Employment in agriculture (000 people)	286.3	261.0	254.1	224.8	204.0	183.6	157.8
Milk production (000 tonnes)	1,818.9	1,724.7	1,796.1	1,848.7	1,861.6	1,891.3	1,936.6
Cereal production (000 tonnes)	1,906.5	2,657.7	2,631.8	2,859.4	2,811.1	1,857.8	3,017.0
Meat production (000 tonnes, carcass weight)	208.2	186.4	196.3	221.1	238.6	246.6	252.3
Average wheat yield (tonnes/ha)	2.45	3.34	3.58	4.03	3.73	2.36	3.92
As a percentage of EU-15 (%)	46.2	57.0	67.8	64.4	64.4	39.8	69.3
Average barley yield (tonnes/ha)	1.64	2.43	2.92	2.94	2.71	1.94	2.66
As a percentage of EU-15 (%)	41.5	54.2	66.1	58.6	63.6	42.9	57.2
Average sale price of agricultural land (Euros/ha)		294.4	389.8	406	536	733.9	
Average rental price of agricultural land (Euros/ha)		8.93	13.6	16.8	22.3	33	

Source: Eurostat (various years)

Since the mid-1990s, agricultural output has recovered: meat and milk production has grown steadily since the year 2000 and cereal production has also risen (apart from the drought year of 2006). Yields have also risen but remain significantly below those achieved in the EU-15. During the period 2000 to 2007, employment in agriculture fell by approximately 40%. Some previously uncultivated land has been brought back into production, as witnessed by the rise

in Utilized Agricultural Area (UAA) from 2.49 million ha in 2003 to 2.65 million ha in 2007. Land prices have also risen dramatically, albeit from a very low base.

Turning specifically to credit issues, a cost-price squeeze during the early to mid-1990s, late payments by processors to farmers and delayed payments of government subsidies, augmented the financial problems and tightened the liquidity constraints of many farmers (OECD 1996). The lack of loan finance, in particular, impeded the development of the land market. During the mid-1990s, Davies and Cook (1995) conducted a farm survey and found that under the then prevailing system farmers were credit constrained. Credit constraints have been also recognized by policy makers. The pre-accession policy included interest rate subsidies, which accounted for 30-70% of the loan interest rate. Nearer to accession, Lithuania provided a 50% interest rate subsidy on loans for the purchase of agricultural land (Meyers *et al.* 2004). A Rural Credit Guarantee Fund was established with the aim of facilitating access to credit for farm businesses which did not possess sufficient collateral. Although there were improvements in the 2000s, smaller farmers that would have liked to expand their farm were still financially constrained.

Accession to the EU has increased the funds available to farmers. Prior to accession, Lithuania implemented direct payments linked to production of selected crops and livestock, but their amount was low. For instance, cereals were supported at 11 Euro/ha in 2002 and the suckler cow slaughtered premium was 57 Euro/head. This constitutes the baseline scenario against which farmers' intentions under SAP have been analyzed in this study. Post-accession, the SAP for crops and grassland was 32.5 Euro/ha in 2004 increasing to 45.6 Euro/ha in 2005. In addition the coupled top-ups were almost flat across all crops and grass land – 56.8 Euro/ha in 2004 and 56.4 Euro/ha in 2005. The only exceptions were flax for fibre with top-ups in 2004 equal to 134.2 Euro/ha and in 2005 to 124.4 Euro/ha, and protein crops, the top-ups for which were increased from 56.8 Euro/ha in 2004 to 89.7 Euro/ha in 2005. An additional 18.8 Euro/ha on all land located in Less Favoured Areas (LFA) has been funded by the Lithuanian government as a top-up. Overall there has been a substantial increase in payments for most crop and livestock products since the introduction of the SAP and national top-ups.

4. Methodology and data

The investigation of the link between farm financial constraints and farm expansion is based on a Farm Accountancy Data Network (FADN) sub-sample of individual farmers and a survey of intentions of the same farmers. Only commercial farms are included in the analysis as they are more likely to be eligible for, and respond to, the changes in support. Firstly, FADN data for 2000-2002 were used to investigate whether investment decisions of some farmers in the sample were constrained prior to accession due to a shortage of finance. For this, an augmented accelerator investment model is employed, followed by a second stage which characterizes those farmers who were the most constrained. Secondly, intentions of constrained and non-constrained farms are compared, using answers from the intention survey.

4.1. First stage: investment model

To identify whether financial constraints exist and to characterize the most constrained firms, a two-step method is usually applied. In the first step, an investment model is commonly used to assess the presence of financial constraints in a sample. In the second step, the sample is sub-divided and the investment model is re-run to identify the most constrained sub-groups.

Standard investment models explain firms' investment decisions by relating the firms' investment demand to explanatory variables that proxy investment opportunities. Then, as proposed by Fazzari *et al*. (1988), a variable representing the firms' internal resources is included in the standard model. If the estimated coefficient for this variable is significant, this implies that some of the sample's firms face financial constraints. The justification for this approach rests typically on Modigliani and Miller's (1958) claim that in a perfectly functioning capital market, internal (retained profits) and external (loans) financings are perfect substitutes, and therefore neither plays a role in investment decisions. Thus, if proxies for any source of financing have a significant influence in investment demand models, this provides evidence of capital market imperfections that constrain some firms financially. A stronger explanation is provided by Hubbard (1998), who shows that, in the case of a perfect capital market, the firm's opportunity cost of internal funds is equal to the market interest rate. By contrast, in the presence of market imperfections such as information asymmetries, the firm's shadow cost of external financing is greater than the one for internal financing. The gap between both costs forces some firms to resort to the cheaper internal source of funds. However, such funds might be limited, and therefore, firms' investment decisions are

constrained by the availability of internal resources. This justifies the addition of an internal funds' proxy to standard investment models, to test for the presence of financially constrained farms in the sample. Investment models which include a variable for internal resources are referred to as augmented models.

A second stage of analysis is required to identify the most financially constrained firms. This second step, adopted by Fazzari *et al*. (1988), consists in separating the sample's firms into groups of *a priori* constrained and unconstrained firms. As explained by Hubbard (1998) this intuitive approach must use sorting criteria that allows for the identification of firms that face a wedge between the cost of external and internal financings, compared against those for which both financings are similarly costly (unconstrained firms). The augmented investment model is then re-estimated for each group of firms separately, the most constrained group being the one displaying the highest sensitivity to the internal resource variable. This splitting approach has been widely used in the literature. Studies conducted for the manufacturing and health sectors, have distinguished between firms based on four principal characteristics: maturity (well established businesses are known to lenders, thus reducing information costs), size (lager firms can provide greater collateral), membership of larger groups (improving firms' access to loans), and the nature of the financial and ownership structure (e.g. Hoshi *et al*. 1991; Calem and Rizo 1995; Aggarwal and Zong 2006). Regarding studies dealing with agriculture, farm size has also been commonly employed, as well as, amongst other variables, collateralisable assets, level of indebtedness, financial performance and human capital (Bierlen and Featherstone 1998; Benjamin and Phimister 2002; Chaddad *et al.* 2005; Latruffe 2005; Fertő *et al*. 2006). All these variables capture researchers' *a priori* expectations concerning which farms face high external financing costs.

Models used for investigating firms' investment behaviour can be classified into three main approaches: accelerator models (Clark 1917; Koyck 1954), neo-classical models including the most common adjustment costs model (Jorgenson 1963; Lucas 1967), and *q*-models (Tobin 1969; Hayashi 1982). In this paper, the investment model used is the accelerator model: the neo-classical adjustment costs model has been tested but results indicate that it is not an appropriate specification for the sample, while the Tobin's *q* approach relies on using the market value of firms, which is not relevant for Lithuanian farmers. Based on Clark's (1917) early observations that an industry's demand for new capital increased when demand for the final good accelerated, the accelerator model, in its original specification, relates the change

in the stock of capital to sales' growth. As Hubbard (1998) demonstrated, the former variable is the investment and the latter variable proxies the farm's opportunities. The standard accelerator model is given by equation (1), while the augmented model, to test for the presence of financially constrained farms, is given by equation (2). In this model, a cash flow variable is added to equation (1), representing the farms' availability of financial resources:

$$\frac{I_t}{K_{t-1}} = \alpha_0 + \alpha_1 \frac{(S_t - S_{t-1})}{K_{t-1}} + \varepsilon_t \quad (1)$$

$$\frac{I_t}{K_{t-1}} = \alpha_0 + \alpha_1 \frac{(S_t - S_{t-1})}{K_{t-1}} + \alpha_2 \frac{CF_{t-1}}{K_{t-1}} + \varepsilon_t \quad (2)$$

where subscript t represents the time period; K is the farm's total capital stock; I is its gross investment; S is the level of its sales; CF is its cash flow (calculated as total farm revenue minus wages, rentals and interest); α_0, α_1, and α_2 are parameters; and ε is an error term. The normalization by the capital stock allows for the control of size effects. Panel data techniques are not used to estimate the models in (1) and (2), as the time series is too short (two periods, 2000-2001 and 2001-2002). Simple ordinary least squares, including a year dummy, are thus employed.

It is expected that, if the sample contains farms that were financially constrained during the period studied (2000 to 2002), the cash flow coefficient, α_2, has a positive and significant sign. Then, in order to identify which farms were the most constrained, farms are split into two sub-groups using the sample average of specific, discriminating variables (in year 2000) as separating thresholds. Several discriminating variables are used in turn to create several sets of sub-groups, based on previous studies as mentioned above: human capital characteristics (e.g. age, education, successor, participation in a farmer union); farm characteristics (e.g. initial size, reliance on farming); location (e.g. regions, LFA); indebtedness, profitability and past reliance upon subsidies, to capture the possible income effect. Model (2) is then re-estimated for both sub-groups created with one of the above discriminating variables. The sub-group presenting the highest coefficient for the cash flow variable is the most financially constrained.

4.2. Second stage: intention survey

The post-accession growth intentions of farmers are then compared between the sub-groups (more and less financially constrained) identified in the first stage, using responses from a face-to-face survey conducted in early 2005. While not receiving widespread attention, surveys of farmers' intentions offer two main research strengths. First, because farmers base their answers on their expectations about the evolution of their environment, survey results give a good insight into farmers' business confidence, which is otherwise difficult to capture (Thomson and Tansey 1982). This provides a good approximation of how farmers will behave in the short-run as their expectations bias their intentions and decisions (Harvey 2000). Second, the reliability of intention-based surveys appears robust as follow-up studies have indicated that the majority of surveyed farmers actually implemented their intended behaviour (Harvey 2000; Thomson and Tansey 1982; Tranter *et al*. 2004).

The survey sought to compare farmers' intentions holding everything else but the policy reform constant, in order to understand the potential impact of the implementation of the SAP. Respondents were asked to state whether they intended to exit or stay in farming within the next five years, and for those who intended to stay whether they planned to increase or decrease their farm area or maintain the *status quo* under two scenarios: a (hypothetical) baseline scenario of continuation of the pre-accession national policies, and the (real) scenario that entails the introduction of the SAP and national coupled top-ups.

4.3. Sample's statistics

The sample of surveyed farmers represented a stratified FADN sub-sample. The farms sampled are fairly representative in terms of Economic Size unit (ESU), but from the point of view of specialization, farms specialized in Cereals, Oilseeds and Proteins (COP) and general cropping are over-represented whilst mixed crop, mixed livestock and other farms are under-represented. Altogether 220 farmers were interviewed. Among them, only 152 in each scenario intended to stay in the farming sector beyond five years. Among those, more respondents would like to expand their farm under the SAP regime than they would have done if the national pre-accession policy had remained in place (51 compared to 24%) (Table 2). This provides the first indication that the introduction of SAP has lifted some obstacles to farm expansion.

Table 2: Share of respondents who intend to grow in size, decrease or remain with the same farmed area under both scenarios (%)

	Intend to grow in size	Intend to keep the same area or to decrease in size	Total number of respondents (% in brackets)
Baseline scenario (continuation of pre-accession policy)	24	76	152 (100)
SAP and coupled top-ups	51	49	152 (100)

5. Modelling results

The standard accelerator investment model is first applied on the full sample (220 farms each year) to identify whether some of the farmers interviewed were financially constrained prior to accession. This model is appropriate for the sample studied, as the coefficient for the growth in sales is positive and significant, indicating that investment demand is based on market opportunities (Table 3). Regarding the augmented model, as the cash flow coefficient is significant and positive, it shows that, at least for some farms, investment demand was sensitive to internal liquidity between 2000 and 2002, and thus internal and external funds did not act as perfect substitutes. This reveals the presence of financial constraints for some farms in the sample.

Table 3: Results of the accelerator investment model on the full sample

	Standard model		Augmented model	
	Coefficient	Signif.	Coefficient	Signif.
Intercept	0.236	***	-0.011	
Sales' growth to total assets	0.534	***	0.711	***
Cash flow to total assets			0.473	***
Dummy = 1 if period 2001-2002	-0.305	***	-0.228	***
Number of observations	440		440	
R-square	0.140		0.217	

Signif.: significance. At 1% when ***.

As explained in the methodology section, the sample of farms was then split into several sets of sub-groups according to some specific characteristics. The characteristics used to split the sample were chosen to reflect possible determinants of financial constraints. These characteristics are presented in Table 4, together with the reasons for which they are expected to discriminate between constrained and less constrained respondents. For each set of sub-groups A to D, the average of the sample in 2000 has been used as a threshold for defining the groups (share of subsidies in revenue: 5.7%; UAA: 79.9 ha; share of output sold: 61.5%; debt to asset ratio: 0.097).

Table 4: Potential determinants of financial constraints

	Characteristics	Motivation
A	Subsidies as a share of revenue plus subsidies	It is assumed that farms with a higher share of subsidies are less constrained as subsidies may help farms overcome their financial shortage for investment.
B	Farm size measured by their utilized agricultural area (UAA)	Size refers to the intrinsic characteristics of the farm which may make external finance more costly for some farms than the others, namely for small farms the screening, monitoring and enforcement costs could be too high, or they may not be able to provide sufficient collateral.
C	Share of output sold in total output produced	More market-integrated farms (with a higher share of output sold) may be less financially constrained as they would have more internal resources.
D	Debt to total asset ratio	Highly indebted farms may find it difficult to obtain further loans. On the contrary, farmers who did not receive loans in the past may be less likely to be awarded one.

Model (2) is estimated for each sub-group separately and for each discriminating characteristic A to D. For a specific discriminating characteristic, a larger and significant coefficient for the cash flow variable of one of the two sub-groups indicates that this sub-group is more constrained. Table 5 presents the value of the cash flow coefficients for each sub-group. Chow tests confirm that for each discriminatory variable A, B, C and D, the cash-flow coefficients of both sub-groups are significantly different at 1%. A significantly lower cash-flow coefficient is found for farmers receiving more subsidies prior to accession than the sample average. This indicates that those farmers were less constrained in their investment decisions and therefore suggests that subsidies, in the past, have increased farm liquidity. Additionally, smaller farms, those with a low share of sold output and those with little

indebtedness, were more credit constrained. This is consistent with the idea that potentially higher screening, monitoring and investment costs for small farms limit access to credit. Similarly, farms that were less integrated into the market and that had less experience of receiving external loans were also more credit constrained. This is consistent with previous studies concerning credit constraints in the NMS (e.g. Latruffe 2005; Petrick 2004).

Table 5: Cash flow coefficient in the augmented accelerator model for sub-groups

A	Low share of subsidies in the revenue	0.721
	High share of subsidies in the revenue	0.550
B	Small UAA	0.713
	Large UAA	0.529
C	Low share of sold output	0.683
	High share of sold output	0.352
D	Low debt to asset ratio	0.641
	High debt to asset ratio	0.461

In a second stage, farmers' intentions to increase, decrease or maintain their farmed area under the SAP are compared across sub-groups of less and more constrained farms (Table 6). The share of credit constrained farmers (identified in the first stage) intending to grow under the SAP scenario is larger than under the pre-accession policy. This is also the case for unconstrained farmers, but the effect is less pronounced. In other words, the rate of change, between the share of farmers intending to grow under pre-accession policy and the share of farmers intending to grow under SAP, is consistently greater for the sub-groups that had been identified as constrained in the first stage (shaded boxes in Table 6). The examination of farmers' intentions therefore suggests that accession to the EU and the introduction of the SAP will relax the financial obstacles of the more constrained farmers. Therefore, it seems that subsidies constitute an important facilitator of on-farm investment. Indeed, we have been

able to identify farmers receiving less subsidies prior to accession as more credit constrained. Additionally, our results show that the introduction of the SAP have a more pronounced effect on the growth plans of farmers that were more credit constrained pre-accession, irrespective of the fact that the SAP are considered by the European Commission (2003) as decoupled.

Table 6: Share of farms that intend to grow under pre-accession policy (Scenario 1) and under SAP plus top-ups (Scenario 2) (%), and rate of change between both shares

		Share under Scenario 1	Share under Scenario 2	Increase rate * (%)
A	Low share of subsidies in the revenue	25.2	54.1	114.7
	High share of subsidies in the revenue	22.4	46.3	106.7
B	Small UAA	24.2	53.8	122.3
	Large UAA	24.6	47.5	93.1
C	Low share of sold output	23.2	50	115.5
	High share of sold output	25.3	52.4	107.1
D	Low debt to asset ratio	25.5	54.5	113.7
	High debt to asset ratio	24	45.1	87.9

* The increase rate is calculated as (Share under Scenario 2 – Share under Scenario 1)*100 / Share under Scenario 1.

6. Conclusions

Accession to the EU has profoundly changed the financial conditions faced by Lithuanian farmers. Specifically, the implementation of the SAP in the NMS has led to higher and more predictable payments to agriculture. Farmers have responded to this altered environment:

previously uncultivated land has been brought back into production and, as evidenced by survey work, the willingness to operate larger farms has risen.

Regarding the growth of land area, the accession to the EU and the introduction of the CAP in Lithuania has provided incentives to pursue expansionist farm strategies for both financially constrained and less financially constrained farmers. Moreover, model results indicate that farmers that were constrained pre-accession are even more likely to be willing to grow than less constrained farmers. Thus, this suggests the existence of an income effect of the *ex ante* decoupled SAP. This is due to the fact that a secure direct payment can be directly reinvested or used as collateral to access credit. Payments are thus likely to facilitate expansion, especially among farmers whose expansion plans were previously constrained. This is in agreement with the argument put forward by Sadoulet *et al.* (2001), that transfer programs are likely to have an income multiplier effect on credit constrained farmers. Overall, these findings also confirm that, due to market imperfections, the introduction of CAP payments in the NMS will have *ex post* coupled effects. As farmers want to grow, implementation of the SAP will lead to the fuller utilization of agricultural land and to an increase in the demand for, and consequently price of, land. Claims that direct payments in the NMS are 'production-neutral' should be rejected.

References

Aggarwal, R., Zong, S. (2006). The cash flow-investment relationship: international evidence of limited access to external finance. *Journal of Multinational Financial Management*, 16: 89-104.

Benjamin, C., Phimister, E. (2002). Does capital market structure affect farm investment? a comparison using French and British farm-level panel data. *American Journal of Agricultural Economics*, 84(4): 1115-1129.

Bezemer, D.J. (2002). Credit markets for agriculture in the Czech Republic. *Europe-Asia Studies,* 54(8): 1301-1317.

Bierlen, R., Featherstone, A.M. (1998). Fundamental q, cash flow, and investment: evidence from farm panel data. *The Review of Economics and Statistics,* 80: 427–435.

Calem, P., Rizzo, J. (1995). Financing constraints and investment: new evidence from hospital industry data. *Journal of Money, Credit and Banking*, 27(4): 1002-1014.

Carpenter, R., Guariglia, A. (2007). Investment behavior, observable expectations, and internal funds: a comment on Cummins et al. (AER, 2006). *Economics Bulletin*, 5(12): 1-12.

Chaddad, F., Cook, M., Heckelei, T. (2005). Testing for the presence of financial constraints in US agricultural cooperatives: an investment behaviour approach. *Journal of Agricultural Economic,*. 56(3): 385-397.

Ciaian, P., Swinnen, J. (2006). Land market imperfections and agricultural policy impacts in the new EU member states: a partial equilibrium analysis. *American Journal of Agricultural Economic*s, 88(4): 799-815.

Clark, J. (1917). Business acceleration and the law of demand: a technical factor in economic cycles. *Journal of Political Economy,* 25(1): 217-235.

Collender, R., Morehart, M. (2004). Decoupled Payments to Farmers, Capital Markets, and Supply Effects, in Burfisher M., Hopkins J. (eds) (2004). *Decoupled Payments in a Changing Policy Setting.* ERS/USDA Agricultural Economic Report No. 838 . Washington D.C., 40-48

Cummins, J. G., Hassett, K. A., Oliner, S. D. (2006). Investment behavior, observable expectations, and internal funds. *The American Economic Review,* 96(3): 796-810.

Davies, S., Cook, P. (1995). *Lithuanian Farms Research*. World Bank Survey Report. University of Aberdeen, Aberdeen, UK.

Davis, J., Buchenrieder. G., Thomson, K. (2003). Rural Credit for Individual Farmers: A Survey Analysis of Rural Financial Markets, in Davidova S., Thomson K. (eds) (2003) *Romanian Agriculture and Transition toward the EU*. Lanham, Boulder, New York, Oxford, Lexington Books.

Davis, J.R., Gaburici, A. (1999). Rural finance and private farming in Romania. *Europe-Asia studies,* 51(5): 843-869.

European Commission (2003). *Mid Term Review of Agricultural Policy*. Com(2003) 23 final Brussels, Belgium.

Eurostat (various years) Online database, http://epp.eurostat.ec.europa.eu/ Luxemburg.

Fazzari, S., Hubbard, R., Petersen, B. (1988). Financing constraints and corporate investment. *Brookings Papers on Economic Activity*, 1: 141-195.

Fertő, I., Bakucs, L., Fogarasi, J. (2006). Investment and Financial Constraints in Hungarian Agriculture. Paper presented at the conference *Transition in Agriculture – Agricultural Economics in Transition III*, 10-11 November. Academy of Sciences, Budapest, Hungary.

Harvey, D. R. (2000). *Farmers' Intentions Survey, 1994-1997: Final Report*, Special Studies in Agricultural Economics. Newcastle University, Newcastle upon Tyne, UK.

Hayashi, F. (1982). Tobin's marginal q and average q: A neoclassical interpretation. *Econometrica*, 50(1): 213-224.

Hoff, K., Braverman, A., Stiglitz, J. (1993). Introduction. in Hoff K., Braverman A., Stiglitz J. (eds) (1993). *The Economics of Rural Organization: Theory, Practice, and Policy*. New York, Oxford University Press.

Hoshi, T., Kashyap, A., Scharfstein, D. (1991). Corporate structure, liquidity, and investment: evidence from Japanese industrial groups. *The Quarterly Journal of Economics*, 106(1): 33-60.

Hubbard, R. (1998). Capital-market imperfections and investment. *Journal of Economic Literature*, 36(1): 193-225.

Jalinskiene, G., Stanikünas, D. (2003). Income and Income Dynamics of the Lithuanian Rural Population and Farmers Between 1996-2001, in OECD (eds) (2003). *Agricultural and Rural Development Policies in the Baltic Countries.* Paris, OECD.

Jorgenson, D. (1963). Capital theory and investment behavior. *American Economic Review*, 53 (2): 247-259.

Koyck, L. (1954). *Distributed Lags and Investment Analysis.* NL, North-Holland.

Lagerkvist, C. J. (2006). Agricultural policy uncertainty and farm level adjustments – The case of direct payments and incentives for farmland investment. *European Review of Agricultural Economics*, 32(1): 1-23.

Latruffe, L. (2005). The impact of credit market imperfections on farm investment in Poland. *Post-Communist Economies*, 17(3): 349-362.

Latruffe, L., Le Mouël, C. (2006a). *Description of Agricultural Land Market Functioning in Partner Countries.* Deliverable 9 of the FP6 project IDEMA. Impact of decoupling and modulation in the enlarged Union: a sectoral and farm level assessment, January.

Latruffe, L., Le Mouël, C. (2006b). *How and to What Extent Support to Agriculture Affect Farmland Markets and Prices: A Literature Review*. Report for the OECD, Directorate for Food, Agriculture and Fisheries, Paris, 27 March.

Lithuanian Institute of Agrarian Economics (2005). *Monitoring of Agricultural Policy, Market and Trade Developments in Lithuania.* Vilnius, Lithuania.

Lucas, R. (1967). Optimal investment policy and the flexible accelerator. *International Economic Review*, 8(1): 78-85

Meyers, W., Kazlauskiene, N., Giugale, M. (1999). *Lithuania's Accession to the European Union: Successes and Challenges for a Rural Economy in Transition.* Ames, IA, Iowa State University Press.

Meyers, W., Kazalauskiene. N., Naujokiene, R., Krisciukaitiene, I. (2004). *Rural Financial Constraints in the Framework of EU Accession in Lithuania*. Study supported by the World Bank under Lithuania Technical Assistance TA-P083790-TAS-BB.

Modigliani, F., Miller, M. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review*, 18(3): 261-297.

OECD (1996). *Review of Agricultural Policies Lithuania.* OECD, Centre for Co-operation with the Economies in Transition, Paris.

OECD (2001). *Decoupling: A Conceptual Overview*. OECD, Paris.

Petrick, M. (2004). A microeconometric analysis of credit rationing in the polish farm sector. *European Review of Agricultural Economics*, 31(1): 77-101.

Raiser, M., Schaffer, M., Schuchhardt, J. (2003). *Benchmarking Structural Change in Transition*, Discussion Paper No. 727. Forschungsinstitut zur Zukunft der Arbeit, Bonn, Germany.

Sadoulet, E., de Janvry, A., Davis, B. (2001). Cash transfer programs with income multipliers: PROCAMPO in Mexico. *World Development*, 29(6): 1046-1056.

Swinnen, J. , Gow, H. (1999). Agricultural credit problems and policies during the transition to a market economy in Central and Eastern Europe. *Food Policy*, 24(1): 21-47.

Thomson, K. J., Tansey, A. W. (1982). Intentions surveys in farming. *Journal of Agricultural Economics*, 33: 83-88.

Tobin, J. (1969). A general equilibrium approach to monetary theory. *Journal of Money, Credit and Banking*, 1: 15-29.

Tranter, R., Costa, L., Knapp, T., Little, J., Sottomayor, M. (2004). Asking Farmers about their Response to the Proposed Bond Scheme. in Swinbank A. , Tranter R. (eds.) (2004) *A Bond Scheme for Common Agricultural Policy Reform.* CABI Publishing.

Les **Working Papers SMART – LERECO** sont produits par l'UMR SMART et l'UR LERECO

- **UMR SMART**

L'Unité Mixte de Recherche (UMR 1302) *Structures et Marchés Agricoles, Ressources et Territoires* comprend l'unité de recherche d'Economie et Sociologie Rurales de l'INRA de Rennes et le département d'Economie Rurale et Gestion d'Agrocampus Ouest.

Adresse :
UMR SMART - INRA, 4 allée Bobierre, CS 61103, 35011 Rennes cedex
UMR SMART - Agrocampus, 65 rue de Saint Brieuc, CS 84215, 35042 Rennes cedex
http://www.rennes.inra.fr/smart

- **LERECO**

Unité de Recherche *Laboratoire d'Etudes et de Recherches en Economie*
Adresse :
LERECO, INRA, Rue de la Géraudière, BP 71627 44316 Nantes Cedex 03
http://www.nantes.inra.fr/le_centre_inra_angers_nantes/inra_angers_nantes_le_site_de_nantes/les_unites/etudes_et_recherches_economiques_lereco

Liste complète des Working Papers SMART – LERECO :
http://www.rennes.inra.fr/smart/publications/working_papers

The **Working Papers SMART – LERECO** are produced by UMR SMART and UR LERECO

- **UMR SMART**

The « Mixed Unit of Research » (UMR1302) *Structures and Markets in Agriculture, Resources and Territories*, is composed of the research unit of Rural Economics and Sociology of INRA Rennes and of the Department of Rural Economics and Management of Agrocampus Ouest.

Address:
UMR SMART - INRA, 4 allée Bobierre, CS 61103, 35011 Rennes cedex, France
UMR SMART - Agrocampus, 65 rue de Saint Brieuc, CS 84215, 35042 Rennes cedex, France
http://www.rennes.inra.fr/smart_eng/

- **LERECO**

Research Unit *Economic Studies and Research Lab*
Address:
LERECO, INRA, Rue de la Géraudière, BP 71627 44316 Nantes Cedex 03, France
http://www.nantes.inra.fr/nantes_eng/le_centre_inra_angers_nantes/inra_angers_nantes_le_site_de_nantes/les_unites/etudes_et_recherches_economiques_lereco

Full list of the Working Papers SMART – LERECO:
http://www.rennes.inra.fr/smart_eng/publications/working_papers

Contact

Working Papers SMART – LERECO
INRA, UMR SMART
4 allée Adolphe Bobierre, CS 61103
35011 Rennes cedex, France
Email : smart_lereco_wp@rennes.inra.fr

2008

Working Papers SMART – LERECO

UMR INRA-Agrocampus Ouest **SMART** (Structures et Marchés Agricoles, Ressources et Territoires)

UR INRA **LERECO** (Laboratoires d'Etudes et de Recherches Economiques)

Rennes, France