Dairy supply chain restructuring and its impact on farmers' revenues in Poland

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Abstract— **Supply chain restructuring and its impact on farmers' situation have become the subject of vast interest among agricultural economists. However, there have been relatively few studies trying to quantitatively asses this issue. This paper analyses the impact of supply chain modernisation on dairy farmers in Poland. It is shown that joining the modern marketing channel positively affects farmers' revenues. The decision to enter the modern channel is crucially dependent on access to funds and facilitated by having larger cow herds.**

Keywords— **Supply chain restructuring, dairy sector, Poland.**

I. INTRODUCTION

Profound restructuring has taken place in the Polish dairy sector during transformation, with the most significant changes occurring in milk production and processing. This can be illustrated by a sharp decrease in total output, total number of dairy cows and number of farmers producing milk (Fig. 1). Further examples are an increase in average milk yield, an outstanding improvement in milk quality and a gradual increase in the share of milk being marketed (Milczarek et al. 2007). The above processes have been first caused, and then accompanied, by thorough changes happening in farms' institutional environment.
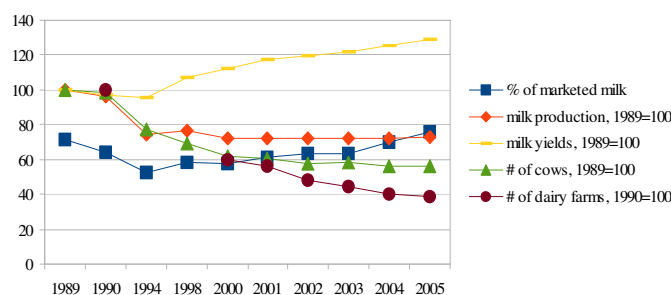

Fig. 1 Dairy sector restructuring in 1989 – 2005

Two main channels through which milk producers can deliver milk to dairy processors have emerged: (1) direct collection from the cooling tank at the farm (hereafter referred to as the modern marketing channel, MMC); and (2) milk delivery to a collection station operated by the dairy company (hereafter referred to as the traditional marketing channel, TMC). Direct collection at the farm has been primarily an option for larger milk producers with a minimum herd size (which justifies the investment in a cooling tank). Selling milk via collection point has been 'chosen' mainly by smaller farmers. According to estimates, the share of milk collected from the farm increased from 5% in 1993 to 20% in 2001 (Nowakowski 2002). However, this trend has significantly sped up in recent years and now milk collected directly from the farm ranges from 75% to 100% of the dairies' supplies (Seremak-Bulge 2005, Wilkin et al. 2007).

Recent research on dairy sector restructuring in Poland has been concentrated mainly on analysis conducted from the macro-level perspective (e.g. Seremak-Bulge 2005). Contributions adopting micro-level approach have focused predominantly on the issue of dairy farms' efficiency and the relationship between profitability and cow herd size (Parzonko 2006, Kołoszycz et al. 2006). Relatively little attention, however, has been devoted to investigate dairy farms' restructuring from the angle of supply chain reorganisation. Available studies (e.g. Dries and Swinnen 2004, Swinnen *et al.* 2006, Milczarek et al. 2007), although providing valuable insights, have come up with at most partial answer to the problem of supply chain restructuring's impact on the adjustments and situation at the farm level. More specifically, none of them has quantitatively analysed determinants of market channel choices of dairy farmers in Poland. They have not explicitly explored either the impact of market channel choice on farms' financial situation. The main objective of the present research is to fill these gaps, and thus to contribute to the more general

literature investigating the impact of food supply chain restructuring on farmers.

The paper is organised into six parts. Section 2 presents theoretical considerations highlighting key issues that are likely to determine farmers' capabilities of benefiting from supply chain restructuring and the impact that the latter may have on farm's financial situation. Section 3 describes the data, Sections 4 and 5 present econometric analysis whereas Section 6 concludes.

II. THEORETICAL FRAMEWORK

In response to recent developments in agri-food sector, food supply chain restructuring has become a subject of numerous studies (e.g. Swinnen 2007, Reardon and Timmer 2007). Special interest has been paid to the impact that reorganisation of the food marketing system may have on farmers' situation. Concerns have been expressed that changes taking place at the downstream stages of the chain, such as consolidation and implementation of food quality standards, are likely to adversely affect farmers' bargaining power. This detrimental effect might be especially visible with regard to smallholders. Taking into account the remarkable extent and speed of the restructuring taking place in the Polish dairy sector as well as the fact that local milk production remains highly fragmented, the question of the supply chain's reorganisation impact on farmers acquires special importance. Discussion below highlights the main factors that are likely to determine farmers' inclusion in MMC.

Decision to enter MMC involves considerable investments at the farm level. Therefore, shifting the channel depends on farm's access to physical and financial capital. The former would determine the scale of necessary adjustments whereas the latter would set the level of investments being within farm's capabilities. Taking into account that farm households in Poland earn less than the national average (GUS 2007), access to external funding might be of special importance. Since farmers' market channel choice could be perceived as one of the available income strategies, one may assume that it would depend also on farm access to unearned income and off-farm job opportunities.

The level of production as well as distances to dairy and collection point, on the other hand, determine the level of transaction costs involved in delivering milk to the market. Therefore, having larger cow herds or higher milk yields per cow should facilitate entering MMC. Similar (opposite) effect should have proximity to dairy plant (collection point). Assuming that processing companies would look for opportunities to optimise their system of supplies, one may suspect that farmers' chances to enter MMC might also depend on number and development of other farms in the neighbourhood.

As regards the impact of changing the channel on farm's financial situation, one may expect it to be positive on several counts. First, considerable investments on the farm should result in quality improvement and thus in higher prices. Second, it is reasonable to suspect that to make these investments profitable joining MMC would require increasing the scale of production which should also affect the level of income. Finally, due to improvements in farming practices and investments in new technologies, farmers' productivity is expected to increase.

III. DATA

Data used in the present study comes from two regions located in the north-eastern part of Poland, namely Podlaskie and Warmińsko-Mazurskie regions. Podlaskie region is a successful case of dairy sector development. It grew from a poorly structured (dominated by small farms) and rather underdeveloped region to the most significant dairy region in Poland. Warmińsko-Mazurskie is another important dairy region with rich natural environment particularly favourable for milk production. Compared to other regions in the country it has a relatively good farm structure based on privatised and restructured former state-owned farms[1]. In both regions a strong concentration process of dairy production and processing has been observed. The choice of these

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[1] It should be noted here, however, that in contrast to majority of other post-communist countries agriculture in Poland has always remained mostly in private hands (despite state's efforts to pursue the soviet model of farming the share of collectivised or state-owned land has never exceeded 20%). Therefore, although better than in the rest of the country, farm structure in Warmińsko-Mazurskie remains still highly fragmented in comparison to European standards.

regions was premised on assumption that developments observed there could serve as the path to be followed by other regions that lagged behind. Thanks to weighting techniques the obtained results can be regarded as representative for the selected regions.

The paper uses information from 329 individual dairy farms surveyed in accordance with a stratified random sampling methodology in 2007. 218 of them delivered milk to MMC and 111 were in TMC. The questionnaire aimed to collect information about family and farm characteristics; marketing channel used by given farmer; milk production and sales as well as farm revenues.

Except for collecting information referring to 2006, the survey contained a number of retrospective questions referring to situation in 2001. This was done in order to avoid potential problems with determining the direction of causality between variables of interest. Although the sector restructuring started already at the beginning of 1990s, the year 2001 was chosen as a reference point for two main reasons. First, in June 2000 EU accession negotiations on the agriculture chapter began. Second, in September 2001 the regulation specifying 2002/2003 as a reference year for the milk quota system was introduced. Accordingly, in this year strong impulses for dynamic changes at the farm level were created.

IV. ECONOMETRIC MODELS

In order to assess: (a) what facilitates farmers' inclusion into MMC and (b) what is the impact of joining MMC on farms' revenue, following estimation strategy is adopted. First, probit model is run to determine factors affecting farmers' marketing channel choice. Second, farm revenues are regressed on a vector of explanatory variables including market channel choice variable estimated from the first model. Choice of the variables to be included was based mainly on considerations outlined in Section 2. In addition, suggestions from other studies dealing with similar topics were taken into account (Huang et al. 2007, Neven et al. 2006, Gorton and White 2007).

As noted in the literature, choice or impact evaluation models give rise to difficulties stemming from the interdependence of dependent and explanatory variables. In order to avoid them both models are fitted basing on retrospective data referring to 2001. Moreover, the former model uses instrumental variables. It can be expressed as follows:

(1) $M_{ki} = c + \Sigma\alpha I_i + \Sigma\beta A_i + \Sigma\gamma F_i + \Sigma\delta L_i + \Sigma\varphi IV_i + \varepsilon_i$

where M_k is a dummy variable equal to one for households belonging in 2006 to MMC; and equal to zero for households supplying TMC. I is a vector of variables describing incentives faced by farmers, i.e. variables measuring farms' access to off-farm job, unearned income and credit as well as dummy variables distinguishing households that experienced their milk being refused due to low quality and households that experienced problems with untimely payments from the processors. A is a vector of variables measuring farm size and assets. It aims to capture the effect of land endowments (both owned and rented), physical assets (both specific to dairy production and those with more universal application), herd size and milk yields (representing the efficiency of production). F is a vector of variables describing managers' and household characteristics. Therefore, it contains variables capturing the effect of household labour endowments as well as managers' age, education, experience in managing the farm, attitude to risk and propensity to leave farming[2]. Further, it contains variables indicating whether given household cooperates with others and whether the processor it supplies is a cooperative or not (thus measuring the potential effect of ownership structure of the processing industry). Finally, L stands for a vector of variables representing local shifters whereas IV is a vector of instrumental variables. The former contains variables distinguishing households located in Podlaskie region as well as households located in the neighbourhood where few/majority of households withdrew from dairy production. IV contains three

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[2] Variable measuring attitude to risk bases on the following question: "Provided that there are no costs of changing the dairy you are currently supplying, would you change it having opportunity to supply other dairy offering 20% higher price, having no guarantee, however, that this higher price will hold in the future?". It takes values of two for answers "yes", of one for answers "I do not know", and of zero for answers "no". Variable measuring farmers' propensity to leave farming is a dummy equal to one for those willing to leave agriculture having an opportunity to find an off-farm employment with the same remuneration as in farming and zero otherwise.

variables measuring: (a) the distance to the closest dairy, (b) the distance to the closest collection point, and (c) the share of surveyed households from the same district having a cooling tank. It is believed that all of these variables affect farmers' channel choice having however no direct effect on the level of farm revenues. The ε_i is the error term and $c, \alpha, \beta, \chi, \delta$ and φ are (vectors of) coefficients to be estimated.

With regard to the model measuring the resulting effect of farmers' marketing channel choice, it could be given by:

$$(2)\ Y_i = g + \omega M_i + \Sigma\mu I_i + \Sigma v A_i + \Sigma\pi F_i + \Sigma\theta L_i + \lambda_i$$

where Y stands for an outcome variable defined as a natural logarithm of household revenues (in PLN) obtained in 2006 and I, A, F and L are defined as above. M is a variable defined as a probability of belonging to MMC estimated from the equation (1). This variable aims at directly capturing the impact of inclusion into MMC on farms' financial situation. g, ω, μ, v, π, θ are (vectors of) coefficients to be estimated and λ_i is the error term. Compared to the model (1), the model investigating determinants of farms' revenues additionally contains variable defined as the natural logarithm of farm revenues (in PLN) in 2001. With this variable one attempts to measure how the level of farm revenues depends on initial conditions.

V. RESULTS OF THE ECONOMETRIC ESTIMATION

The obtained results are reported in Table 1.[3] Several interesting observations could be made. The negative coefficients by *UNEARNED* and *AGE* tend to indicate that access to unearned income and old age demotivate farmers to undergo necessary modernisation. Second, positive and highly significant effect of *CREDIT* clearly shows that access to external funds appears to be indispensable to keep up with

market and dairy companies' demands. This observation is further strengthened by no impact of *OFF-FARM JOB*, which suggests that off-farm employment does not provide sufficient contribution to finance investments at the farm.[4] Lack of significant impact of *OFF-FARM JOB* seems also to indicate that rural labour market fails to attract farm workers, marginalising at the same time potential benefits that households could reap from having abundant labour endowments. This hypothesis is indirectly confirmed by insignificant impact of *LABOUR* which may be indicative of inefficient usage of production factors employed in agriculture. Finally, lack of significance of *REFUSAL* and *DELAYS* suggest two explanations. First, initial problems with meeting the required milk quality do not necessarily have to shatter farmers' chances to catch up with them in the future. Second, given that problems with timely payments are encountered more often in *TMC*, no impact of *DELAYS* suggests that either farmers do not perceive them as being crucial for their operation or dairies can effectively prevent their suppliers from turning elsewhere. Insights obtained from the qualitative study investigating this problem tend to incline towards this latter hypothesis (Wilkin et al. 2007).

As far as the farm size and farm assets are concerned the obtained results are following. Neither initial physical capital endowments nor initial land resources appeared to matter for farmer's market channel choice. This shows that being relatively backward in terms of physical assets was not blocking the way to join MMC. What seemed to be crucial in determining this decision were the size and, to a lesser extent, herd's quality. Farms larger in terms of herd size were more successful in adjusting to new conditions than smallholders. Given that belonging to MMC is strongly facilitated by access to external funds and having larger herd size, the obtained results could be indicative of smallest farmers' marginalisation. Some minimum herd size conditions might have been needed for obtaining financial support either from a dairy or from a bank.

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[3] Except for the models being presented other specifications were estimated as well in order to investigate nonlinear behaviour of *AGE* and *EXPERIENCE* (no such effect has been found), the potential impact of correlation between *AGE*, *EXPERIENCE* and *UNEARNED INCOME* or to test the validity of instruments being used. For brevity reasons results of these estimations are not reported here but are available from the authors upon request.

[4] The role of level of revenues in 2001 was also explored. Similarly to the effect of off-farm employment, the impact of own financial resources appeared to be insignificant. This supports again the hypothesis that internal funds were far too small to bear the burden of investments conditioning the shift to MMC.

Table 1. Factors increasing probability of belonging to MMC and affecting farm revenues.

Dependent variable: (1) Market channel choice in 2006 (1=modern, 0=traditional) (2) Natural logarithm of farm revenues in 2006	(1) Probit with weights	(2) OLS with weights
Market channel choice		
Modern		0.236***
		[0.004]
Incentives		
Unearned income 2001	-0.613**	-0.067
	[0.010]	[0.209]
Off-farm job 2001	0.084	-0.089**
	[0.836]	[0.016]
Refusal 2001	-0.143	-0.069*
	[0.425]	[0.099]
Delays 2001	0.364	0.018
	[0.170]	[0.708]
Credit 2001	1.925***	0.007
	[0.000]	[0.907]
Farm size and assets		
Assets specific 2001	-0.082	-0.017
	[0.293]	[0.395]
Assets machinery 2001	-0.011	0.021
	[0.866]	[0.101]
Herd 2001	0.328***	0.012***
	[0.001]	[0.001]
Yields 2001	0.001***	0.000**
	[0.001]	[0.031]
Farm revenue 2001		0.498***
		[0.001]
Land owned 2001	-0.008	0.004
	[0.602]	[0.278]
Land leased 2001	0.039	-0.001
	[0.144]	[0.872]
Household characteristics		
Age 2006	-0.029	-0.002
	[0.143]	[0.365]
Experience 2006	0.032**	-0.002
	[0.036]	[0.402]
Education	-0.273	0.021
	[0.255]	[0.654]
Labour 2006	-0.046	-0.005
	[0.740]	[0.617]
Cooperation 2001	-1.121**	-0.096*
	[0.013]	[0.081]
Ownership cooperative 2001	0.170	-0.017
	[0.869]	[0.899]
Risk	0.497	0.035
	[0.211]	[0.336]
Leave	-0.085	0.047
	[0.758]	[0.261]
Local shifters		
Neighbours majority	-1.120**	0.223
	[0.011]	[0.179]
Neighbours few	-1.095**	0.350*
	[0.045]	[0.079]
Podlaskie	0.227	0.133
	[0.713]	[0.264]
IV's		
Distance_dairy_2006	-0.012	
	[0.274]	
Distance_point_2006	0.339**	
	[0.011]	
Cooling_tank_2001	3.414*	
	[0.079]	
Constant	-5.033*	4.873***
	[0.053]	[0.001]
Observations	323	322

p values in brackets, ***, **, * denote 1%, 5% and 10% significance level respectively. Source: authors' farm households survey 2007

The analysis suggests that this minimum herd size was 5 cows. This suggests that initial herd size (and quality of cows' breeds) might have been used by loan granters to select potential borrowers. This hypothesis finds support in positive and statistically significant correlation between herd size in 2001 and obtaining bank or dairy credit afterwards ($\rho=0.18$). In this context, the obtained results stay in opposition with what has been found in other studies dealing with Polish dairy sector (Dries and Swinnen 2004).

Significant impact of *HERD* and *YIELDS* may also help to explain lack of statistically significant relationship between joining MMC and distance between the farm and the dairy company (*DISTANCE DAIRY*). The obtained results indicate that higher transport costs, although having a potential to discourage dairy company to come to collect milk at the farm, seem to be outweighed by benefits of enlisting large and high quality suppliers. However, unfavourable location might have had a strong impact on the market channel decision of the smallest farmers, i.e. those having less than 5 cows. This conjecture stems from the fact that, on average, both in 2001 and 2006 distance between the dairy and farms from this group has been much larger than in case of farmers with larger cow herds. As regards the impact of *DISTANCE COLLECTION POINT*, proximity to milk collection point seems to facilitate preservation of traditional way of selling milk. Since transport costs in this case are incurred by farmers, obviously, remaining in TMC is the less profitable the further the distance the milk needs to be transported.

Interesting insights are also provided from the analysis of the 'neighbourhood effect'. *COOLING TANK*, as expected, increases the odds on belonging to MMC, supporting hypothesis that farmers imitate each other in terms of production and marketing practices. Similar conclusions could be drawn when analysing the negative impact of *NEIGHBOURS MAJORITY*. The latter observation could indicate that high proportion of farmers quitting dairy production in a given region may discourage farmers to undertake modernisation investments in fear of the dairy company not being eager to engage in direct milk collection due to high transaction costs. The fact that regions where majority of farmers have withdrawn from dairy production were dominated in 2001 by

smaller farmers confirms this supposition. The negative impact of *NEIGHBOURS FEW* poses more interpretational difficulties. Potential explanation could be linked to the issue of the level of competition. The fact that most of farmers in given region remained in dairy production obviously results in high level of competition. This in turn, could discourage less advanced farmers from undergoing the process of modernisation. The reason for that is fear of low future profitability and potential problems with covering the costs of necessary investments.

Finally, quite surprisingly no effect of variables measuring household human capital has been found. What seems to matter here then is practical rather than theoretical knowledge. Worth noting is also negative and statistically significant impact of *COOPERATION*. This observation shows that potential costs of remaining in TMC (e.g. lower price, higher risk of milk refusals, lower quality premiums etc.) may be outweighed by benefits created by cooperation. This result suggests that farmers' collaboration, often commonly advised as a tool having great potential for stimulating further restructuring, does not need to have the desired effects.

A. Determinants of farm revenues & impact of market channel choice

As far as the second type of the estimated models is concerned, the presented figures provide strong evidence that inclusion into MMC contributes to considerable improvements in farms' financial situation. This is clearly indicated by positive and statistically significant coefficient of the variable *MODERN*. This result is fully in line with theoretical predictions as well as other studies examining agri-food supply chain restructuring (e.g. Swinnen et al. 2006, White and Gorton 2005). It might be worth noting here that the effect of belonging to MMC holds regardless of the farm herd size, though benefits for smallest farms were of lesser magnitude.[5] This means

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[5] Interaction term between *MODERN* and *HERD* as well as interaction between *MODERN* and dummy distinguishing households with more than 20 cows or 10-20 cows appeared to be statistically insignificant. Interaction between *MODERN* and dummy distinguishing farms with less than 5 cows was negative and on the edge of being statistically significant. Specifications including these variables are not reported here but could be obtained from the authors upon request.

that inclusion into MMC appeared to be beneficial not only for the largest farms, what could be suggested by the positive and statistically significant impact of *HERD*, but also for farms of medium and smaller size.

Further, important to mention is positive and statistically significant impact of *YIELDS*, though it is of much smaller magnitude than that of *HERD*. This result can be seen as capturing rents from applying more sophisticated production techniques and having cows of higher quality. Similarly, no effect of size has been found here which suggests that these were not only large farms that adopted better technologies. The above observations suggest that farmers with herds larger than the required minimum of five cows could succeed in shifting to MMC, which allows one to suspect that dairy/bank assistance was not limited to the largest households.

According to expectations, farm revenues were found to be positively correlated with households' physical endowments and financial assets. Further, interesting insights are provided from the analysis *REUFSAL* and *OFF-FARM JOB*, both of which entered the estimated equation with negative signs. The former finding is as expected and reflects the fact that farms having problems with satisfying quality standards have only limited opportunities to grow. The latter observation deserves more attention since it might look counterintuitive. In all normal cases, access to off-farm job opportunities is expected to positively affect farms revenues. However, as discussed earlier, it is reasonable to assume that rural labour market in Poland is heavily biased towards agricultural employment. Under these circumstances undertaking off-farm occupation might be an expression of seeking whatever employment in order to make the ends meet rather than a form of having stable and decent job. This hypothesis finds support in negative and statistically significant correlation between the level of 2001 farm revenues and access to off-farm activities.

With regard to human capital endowments, interestingly none of the variables aimed at capturing this effect is statistically significant. This result might give rise to concerns about farmers' returns from education. Although this finding needs further confirmation, once this phenomenon is permanent farmers may lack incentives to educate and train. This

obviously is of interest for policy designers aiming at facilitation rural development.

Finally, few words of comment need to be devoted to the negative impact of *COOPERATION* as well as positive effect of *NEIGHBOURS FEW*. The former result, at the first glance, looks surprisingly. That is because cooperation is generally recognised as allowing farmers to benefit from pooled resources and higher bargaining power. Accordingly, it is advised to farmers as having great potential to increase their revenues. However, as noted earlier, cooperation may also contribute to preservation of traditional production and marketing practices. In this regard, it may slow down the modernisation process. As regards the positive impact of *NEIGHBOURS FEW*, this result tends to show that farmers benefit from "production cluster". In case of farmers in MMC these benefits may stem from the fact that dairies can economise on transport costs and thus are able to provide them with better terms. In case of traditional farmers it is reasonable to assume that they are likely to benefit from the existing infrastructure in form of collection points and various assistance programmes, which costs per farm are relatively small.

B. Impacts of market choice

In order to gain more insights on the impact of market channel choice on farm situation some more detailed analysis was additionally employed. Comparing households always remaining in MMC with those supplying TMC and those who switched from TMC to MMC at some point after 2001 (CHANGED) revealed several interesting issues. First, the average growth of agricultural revenue per capita (2001-2006) in case of MMC and CHANGED farmers was by ca. 40% higher then that observed for TMC farmers. Similar differences were noticed with respect to growth rates of milk sales revenues. Remarkable is also the fact that increase in herd size in case of CHANGED was almost three times larger than that observed in case of TMC (ca. 52% in CHANGED and ca. 18% in TMC). It is worth mentioning that, although milk yields per cow were growing almost at the same rate in all groups, the output per cow in MMC and CHANGED was higher by roughly 1000 litres than in TMC. These differences were reflected in

differences in prices obtained by different groups of farmers. The average milk price growth in case of farmers who entered MMC was roughly 36% whereas in case of TMC farmers it accounted for 26%.

The other striking difference between the analysed groups relates to the level of specialization in milk production. While the share of specialized farms decreased in TMC, it increased by over 50% in CHANGED and by 17% in MMC. It could be then stated that one of the most important outcomes of joining MMC is farms' specialisation in milk production. However, this is mainly true for large farms (only roughly 5% of all farms delivering to MMC and specializing in milk production had less than 10 cows in 2006).

VI. CONCLUSIONS

In response to dynamic and thorough transformations taking place in the Polish dairy sector the present paper aimed at analysing determinants of market channel choices of local dairy farms. Moreover, it attempted to investigate what impacts this choice may bring about as regards farmers financial situation and their behaviour.

Entering the modern marketing channel (MMC) seems to be conditioned by the exogenous rather than endogenous factors. Neither human capital nor households' initial physical assets are the decisive factors. It is rather access to funds that would allow for undertaking necessary adjustments. Given that farms' financial capital endowments are limited, the marketing channel choice is crucially dependent on having access to external funds. Therefore, the role of dairy processors assisting farmers and stimulating the restructuring has been of great importance. Further, joining MMC is facilitated by having herds of larger size and improved cow breeds. No systematic evidence for small farmers' being excluded from MMC was found, though it seems that the smallest ones (< 5 cows) are marginalised having no access to external funds.

Entering MMC positively affects farms' financial situation. This effect has been found for all farms regardless of their size. For the smallest ones, however, the impact is of lesser magnitude. Households supplying MMC experienced also much

faster development than their counterparts from TMC. Finally, changing the channel also influences the level of farms' specialization. Farms delivering to MMC tend to concentrate on milk production. However, these are mostly larger farms (having more than 10 cows). Small farmers and those who remained in TMC tend to search for off-farm sources of income. Apparently, this strategy does not allow them to reach the level of revenues enjoyed by larger farms. Therefore, there is a strong need for development of non-agricultural income sources in rural areas in order to improve welfare of the smallest farms and consequently to encourage and enable less efficient farmers to quit milk production.

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