A prospect of moving towards free milk quota market in Ireland – will milk quota movement follow efficiency?

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Abstract - **Quota trade in Ireland is 'ring fenced' to milk processors where farmers are not allowed to trade milk quota outside their designated milk processor. This ensures milk production staying within a region but has implications for the efficiency of milk production. In this paper, we simulated a free milk quota market in Ireland and compared the results with a milk quota exchange which was ring fenced to determine if the quota move from an inefficient region to a more efficient region. The results show that quota indeed follow efficiency of production when there is restriction over trade area.**

Keywords- ***Milk quota trade, Irish quota market, Farm level model***

I. INTRODUCTION

Dairy production in Ireland, as in all other EU Member States, is constrained by production quotas. Milk quota transfers between farmers have been allowed in the EU since the early 1980s, although to varying degrees in different Member States. Quota trade in Ireland, like Germany, parts of Scotland and France, is regionalised or "ring-fenced"; this means intra-regional trade is permitted but inter-regional trade is not. The motivations behind the ring-fencing of milk quota in Ireland mostly relate to social, rural development and local political objectives. While ring-fencing may be successful in meeting these goals, it has implications for the efficiency of the milk producing sector as a whole. The efficiency of the sector is particularly relevant given the imminent abolition of quotas. It is critical for policymakers to implement a trading mechanism that places the sector in the best possible competitive position to prosper following quota abolition. Previous research has shown that quota markets with the minimum government intervention and restriction possible yield the most efficient outcome.

The objective of this paper is to explore the implications of shifting to a national free market for milk quota. The paper draws on research conducted in a number of other Member States on milk quota trade. Following methodologies employed by others, a farm-level linear programming model is developed to estimate the effect of a national milk quota market. The results of this scenario are compared to a baseline situation, which only permits regional trade, to examine the movement of quota. The model is simulated for the full sample of dairy farms in the Irish FADN dataset, and with national aggregation factors the impact of quota trade on farm structures is estimated.

II. BACKGROUND

In the early 2000s the trade of milk quota in Ireland was through an administered system. Under this system the trade price and reallocation of quota were determined by the Minister for Agriculture in consultation with industry stakeholders. In January 2007 this scheme was replaced with an exchange system. In the exchange system farmers can bid to purchase or sell quota at their desired price. Quota is then traded at the market equilibrium price, albeit with some intervention and market cooling mechanisms.[1] Purchasers are allowed a maximum allocation of 80,000 litres per exchange which occurs twice a year. Each dairy processor operates an exchange and quotas are ring-fenced so that they can not be moved from

[1] Full information on the milk quota exchange scheme is available from www.agriculture.gov.ie

one exchange to another. This ring-fencing mechanism, therefore, ensures security of supply for dairy processors. This exchange system has given rise to over thirty separate markets for quota in Ireland, with prices in the second 2007 exchange varying from 11 cent per litre in some exchanges to 28 cent in others. In this paper the economic implications of this quota trade system are explored.

There has been much written on the effect of the EU milk quota system on efficiency for example the impact on assets values [1, 2, 3]. These papers, and many others, tend to support the general theory put forward by Alston [4] and Oskam [5]; that the imposition of a quota generates an economic inefficiency in the sector but that the more freely traded quotas are, the smaller that inefficiency. Oskam states that if quotas are freely tradable, more efficient farmers will purchase quota from less efficient farmers and as a result the national quota will be produced at a lower cost.

A number of empirical studies have attempted to quantify the relationship between quota trade and sector efficiency. Boots [6] analysed the welfare costs of trade distortions in the exchange of milk quota in the Netherlands. They used a simulation model to quantify the short-term effects of quota trade distortion for a panel of specialist Dutch dairy farms. They concluded that the free tradability of quotas would increase farm profit and lead to a geographical concentration of milk production. As their model was only estimated for a sample of specialist producers they could not aggregate their results to make conclusions about sectoral efficiency. Similarly, Colman [7, 8] developed a model to estimate the optimal allocation of milk quota in the UK. These studies compared the optimal allocation of quota to the one that existed in the UK at the time. The results showed that substantially more redistribution of quota was required for the UK dairy farm structure to reach its optimal position. These studies used various techniques to estimate quota values and simulate quota trade with the objective of explaining variability in quota values, projecting structural change or exploring different quota arrangements. None of these studies however, focussed on the efficiency loss to the sector as a whole of the regionalisation of milk quota. In this paper we use National Farm Survey (NFS) data for Ireland [9] and price and cost projections from the FAPRI-Ireland model[2] to identify the regional variation in the efficiency in the dairy sector and simulate quota movement in a freer quota market.

III. First quota exchange

The first exchange took place in January, 2007. Farmers bid to buy or sell quota in 31 co-operatives. A total of 172 million litres of quota was demanded and 120 million litres of quota was offered for sale. However, only 44 million litres of quota was traded at different market clearing prices across the different exchanges. The market clearing prices in these co-operatives ranged from as low as 0.11 cent per litre (cpl) in Lakeland to 0.23 cpl in Dairygold and Wexford. Figure 1 clearly suggests three different levels of quota prices in the county. The south eastern part of the country had the maximum market clearing price while the northern parts had the lowest market clearing prices, with the south west falling in between. We can distinguish these three regions as; the South East, the South West and the BMW regions. An analysis of the NFS data provides characteristics of these three regions (Table 1). The South East region has the highest number of sampled farms and quota followed by the BMW and South West regions. The data shows that farms in the BMW region receive the highest average milk price; however, the costs of production per litre of milk are also the higher in that region. The data shows that farms in the BMW region are the least efficient with average net margin from milk production of 0.9 cpl compared to farms in the South East with 1.5 cpl and the South West at 1.3 cpl.

[2] FAPRI-Ireland model is a part of FAPRI model which was established in the Universities of Iowa and Missouri in 1984 and uses partial equilibrium models of agricultural markets to show the effects of policy change on commodity prices, volumes of production and trade and many other economic indicators. For a description of the Irish model see [10]

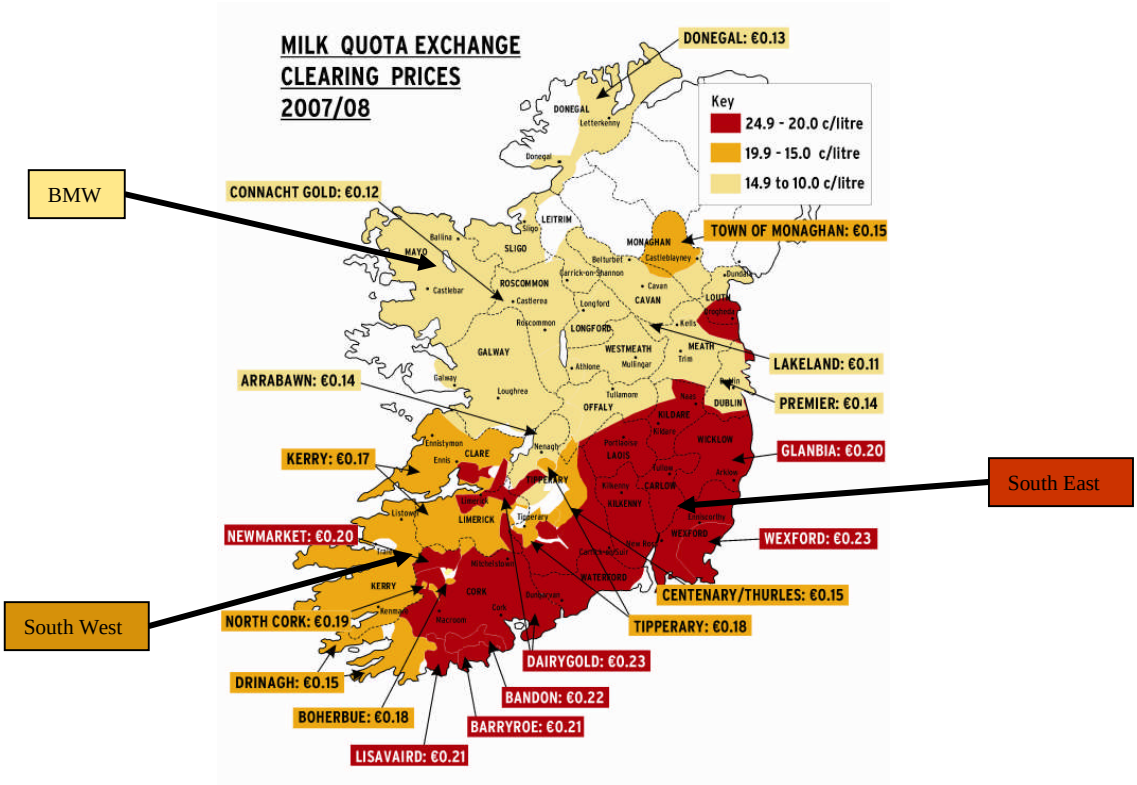

Figure 1: The first quota exchange 2007-08 [11]

Table 1: Number of sampled farms and total milk quota in three regions

	BMW	South East	South West
Sampled Farms	119 (1.6%)	254 (2.2%)	85 (1.1%)
Total quota	29 mil l	73 mil l	17 mil l
Milk yield (l/cow)	5085	5120	4544
Milk price (cpl)	25.4	25.3	25.0
Costs of prod. (cpl)	24.5	23.8	23.7

Data on bids for sale and purchase received in each exchange were secured from the Irish Department of Agriculture and this data was analysed to examine the outcome of the first milk quota exchange. Figure 2 presents the regional pooled bids for purchase and sale of quota. The bids are pooled in three regional markets. The South East region is usually considered to have the best comparative advantage for dairy production in the country. The data shows that farms in the South East region demanded 103 million litres of quota whereas total quantity of bids to supply was just 48 million litres. When the bids recorded in each of the co-operatives in this region were pooled the equilibrium trade price is estimated to be approximately 21.5 cent per litre and trade is estimated at approximately 39 million litres. The South West region would be considered the next most suitable region for milk production in the country. Approximately 45 million litres of quota were demanded in this region and 29 million litres supplied. When the bids are pooled for this region the equilibrium exchange price is estimated at 17 cent per litre and at this price approximately 20 million litres would be exchanged. The final region, the BMW region, covers the midlands, border and west regions, this area would traditionally be considered the most disadvantaged for milk production. In this region, supply (38 million litres) exceeded demand (24 million litres). The estimated equilibrium trade price for this region is the lowest at 13 cent per litre and the estimated volume of quota traded is about 14 million litres.

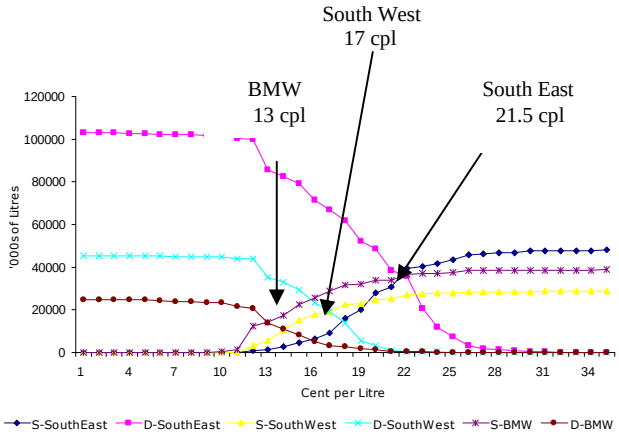

Figure 2: Regional pooled bids for quota trade in first exchange, 2007

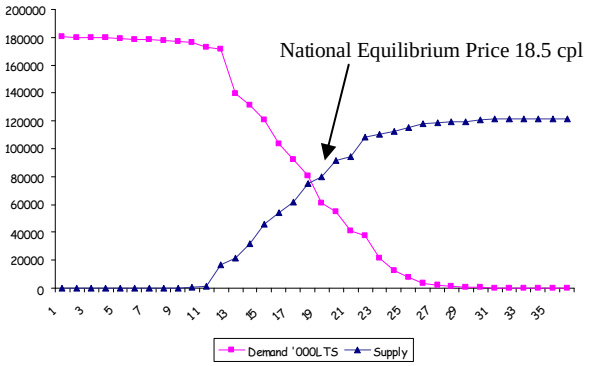

Figure 3: National pooled bids for quota trade in first exchange, 2007

In order to gain some insight into what price might prevail if quota is traded nationally; all bids for sale and purchase were pooled to derive national supply and demand curves for quota. Figure 3 presents the national demand and supply of quota based on bids submitted in the first exchange. The Figure shows that 18.5 cent per litre would be the national equilibrium and a total of 75 million litres of quota would be traded in a national exchange. It should be noted however, that the equilibrium price in Figure 3 is based on bids made by farmers participating in a regional exchange. It is probable that if farmers were operating in a national exchange they would revise their bids, up or down to reflect their expectations on the outcome of a national exchange. However, in the absence of any data on how farmers would have behaved under a different set of circumstances it is assumed that 18.5 cpl is the national equilibrium price.

IV. FARM LEVEL MODEL

In the EU, many studies have been carried out to analyse different aspects of milk quota trade [6, 12, 13]. These studies used a number of models such as micro-econometric and CGE models to simulate a quota market within a region. In this paper, a farm level linear programming (LP) model is developed, which uses farm level data taken from the Irish National Farm Survey (NFS), to simulate milk quota trade. The model is a static LP model which maximises farm profit within a range of limiting farm resources. The general form of the model is;

$$\text{Max } z = \Sigma (p_f * x_f) - (c_f * x_f)$$
$$\text{s.t. } A_f * x_f \leq R_f$$
$$x_f \geq 0$$

where, z is the farm profit, x_f is the farm activities for farm type f, p_f is a measure of the returns and c_f are the costs procured for x_f activity, A_f is an input – output coefficient for activity x_f, while R_f is a limiting resource such as milk quota, land and labour.

As the LP model runs at the farm level, it is able to simulate quota trade taking account of the heterogeneity of farms. As the model maximises farm profit, the model is structured such that quota moves to the most profitable/efficient farm. If a farmer's individual quota value is higher than the equilibrium price then the farmer would buy quota, conversely if the individual quota value is lower than the equilibrium price then quota would be sold. The model is constrained such that if a sale occurs, all quota rights are sold, this is to avoid marginal quota sales which do not occur in reality. Purchase of quota is constrained by the supply of quota for sale. This is expressed as follows;

$$\sum_{f=1}^{n} bquota(f,y) \leq \sum_{ff=1}^{n} squota(ff,y); \ \forall\, y$$

where, bquota is bought quota; squota is sold quota; f is the n number of farm types; y is the number of years, and ff is an alias of f such that ff $\subset$ f but ff $\neq$ f. For equilibrium, total bought quota is made equal to total sold quota within the whole sample;

$$\sum bquota(f,y) = \sum squota(f,y) \ \forall\ f, y$$

Dairy farms that wish to expand have a maximum of 160,000 litres of milk quota to bid each year, i.e. 80,000 litres per exchange. Based on Shalloo [14], it is assumed that an expanding farm can increase milk production either by implementing better management on the farm and increasing milk yield per cow by 10% without incurring additional costs (except for costs of extra feed required) or increase the farm's specialisation in milk production by disposing of beef animal and increasing dairy cow numbers. Due to land fragmentation issues, land transfer between farms was not allowed and dairy farms could replace a maximum of 50% of their dry stocks on existing farmland. For this second assumption of expansion, building costs, bulk tank costs, feed costs and labour costs were included for additional dairy animals. However, a loss in farm margin due to replaced beef animals was also incorporated in the model (for detail, please refer to [14]).

V. QUOTA MOVEMENT

The LP model was simulated for all dairy farms in the 2004 NFS under national quota trade scenarios. The prices and costs were projected to 2007 by using the price indices from FAPRI-Ireland model. The average national equilibrium price, 18.5 cpl, determined from pooled bids from the first milk quota exchange was used in the model. Two trade scenarios were examined; in the first scenario there is a maximum quota purchase limit of 160,000 litres, as exists currently in the exchange rules, and in the second scenario there is no such limit on amount of quota purchases. The results of the model indicate that the South East region would gain milk quota if a national milk quota exchange was implemented. It is estimated that the total quota level of this region would increase by 1.5% under the first scenario (Figure 4, a). The other two regions, the BMW and the South West, are both projected to lose milk quota. The BMW region is projected to lose almost 3% of milk quota whereas the South West region would lose approximately 1% of milk quota. As expected the amount of quota traded increased when the limit on purchases was removed under the second scenario (Figure 4, b). There is also a change in the amount of quota exiting in the South West and BMW regions under this scenario when compared to the first scenario. The South West region is projected to recover one third of quota loss suggesting that the profitable farms in the region are capable to purchase more quota once the limit on purchase of quota is removed. In contrast to that, the BMW region is projected to lose 31% more quota which shows that at the given equilibrium price, there are not enough efficient farms in the region to benefit from removal of limit on purchase of milk quota. These results can also be analysed by examining structural change in the farm sector in each region. The simulation shows that the highest ratio of expanding to exiting farms in the South East region compared to other two regions (Figure 5, a). There are, however, a large proportion of farms in all regions that remain unchanged under the first scenario. The number of these unchanged farms decreased substantially when the limit on quota traded was removed (Figure 5, b). The BMW has the highest proportion of exiting farms and the lowest proportion of expanding farms compared to other two regions.

Farms selling quota have lower than average efficiency levels and thus find it more profitable to exit production. When the restriction on quota purchases is removed, more farms exit the sector and more milk quota is transferred to efficient producers, thus increasing the overall efficiency in the sector. It can be concluded that placing individual farm limits on quota purchase introduces an additional inefficiency into the sector. The results therefore confirm expectations that the abolition of milk quota ring fencing would increase the efficiency of the sector but would also lead to a geographical concentration of milk production.

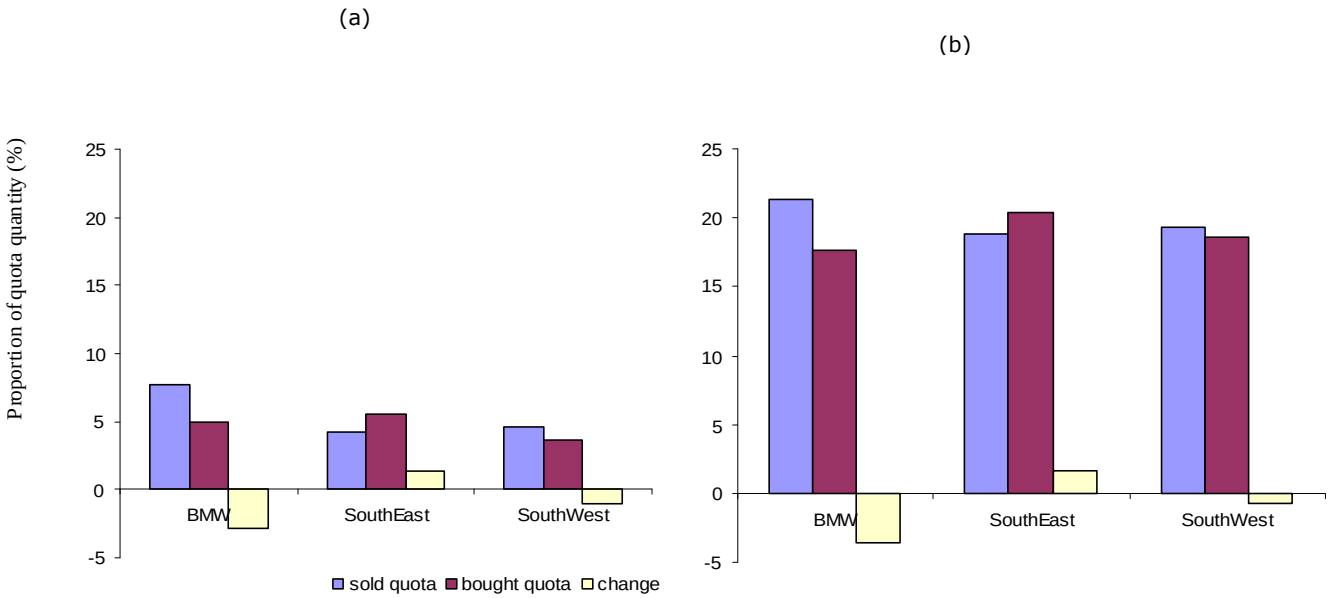

Figure 4: Proportion of milk quota transaction in three regions under (a) restricted and (b) unrestricted quantity of quota traded

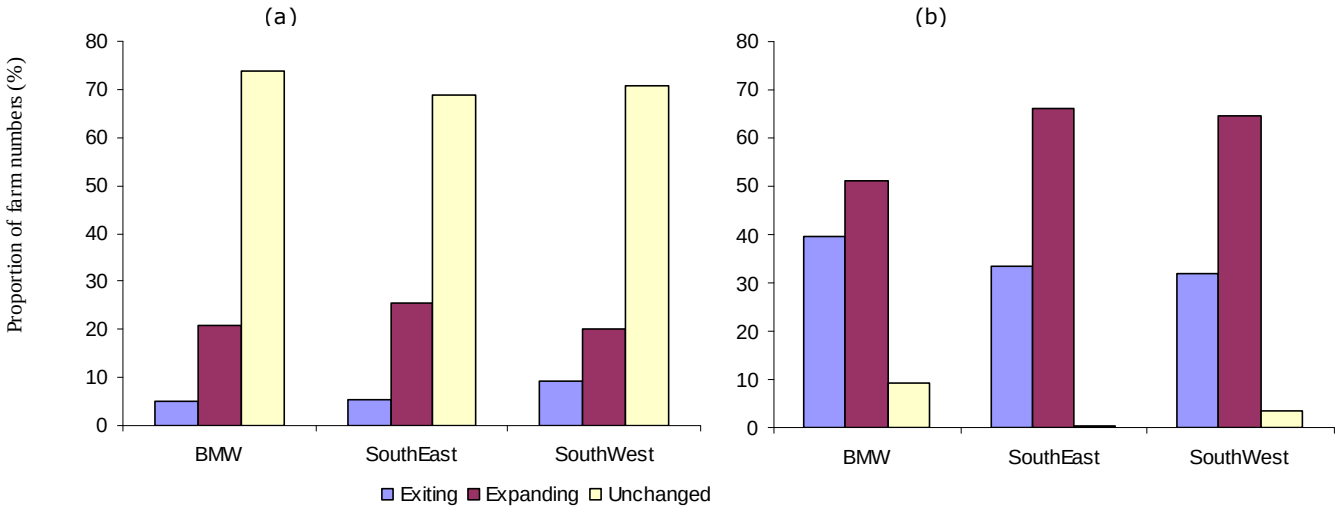

Figure 5: Proportion of farm numbers exiting and expanding in three regions under (a) restricted and (b) unrestricted quantity of quota traded

VI. CONCLUSION

Data from the first milk quota exchange operated in Ireland showed that amount of quota traded was significantly less, by almost a third, than the totals offered for sale or purchase. This suggests that a large number of farms wishing to exit or expand were not able to do so under ring-fenced quota trade and thus ring-fencing introduced a distortion in the market and an impediment to structural change.

The analysis of milk quota exchange data suggests that there is substantial regional variation in quota values. This indirectly represents the regional variability in farm level efficiency. The analysis conducted in this paper shows that if Ireland shifted to a national market for milk quota, rather than a regional one, that substantially more milk quota would be traded and that there would be more structural change. Quota would move to the most efficient farms nationally rather than just the most efficient regionally. This would have positive benefits for the efficiency levels of the sector as a whole. The efficiency gains would increase if there were no individual restrictions on quota trade. The results of this analysis support the findings of other empirical studies on this topic; that milk quotas introduce an inefficiency to the sector but that this inefficiency can be minimised if quotas can be traded freely between farmers. The results therefore indicate that a national market for milk quota may be a more efficient policy to prepare the sector for the eventual removal of milk quota.

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