The cost of the Icelandic transferable dairy quota system

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ABSTRACT

This paper studies the consequences of the liberalization of the dairy quota trade in 1992 for Icelandic dairy farmers. It shows that the liberalization has facilitated large structural changes in the dairy farming sector, with a substantial reduction of farms and an increase in average production. Large quantities of dairy quotas have changed hands and the prices of quotas have been high. Consequently, current farmers have made large investments in production quotas, which have mainly been transfers of subsidies from current farmer to former farmers. According to the results of the study the costs associated with the quota trade have been between ISK1500 and 2200 million a year of the total of roughly ISK 4000 million in annual subsidies. The trade has therefore first and foremost served to as a source of gain for former farmers while putting a heavy financial burden on current farmers.

Keywords: cost of quota trade dairy quota, subsidies, quota trade liberalization

YFIRLIT

Kostnaður við mjólkurkvótakerfið á Íslandi og áhrif þess á kostnað við mjólkurframleiðslu

Greinin fjallar um afleiðingar frjáls framsals á greiðslumarki, sem tekið var upp 1992, fyrir kúabændur á Íslandi. Síðan 1992 hefur bændum fækkað mikið og bú stækkað. Mikið magn greiðslumarks hefur skipt um hendur og verð á greiðslumarki hefur verið hátt. Afleiðing þessa hefur verið miklar fjárfestingar kúabænda í greiðslumarki, sem hafa endurspeglað mikinn flutning fjármagns frá núverandi bændum til fyrrverandi bænda. Niðurstöðurnar benda til að samanlagður kostnaður kúabænda nemi á bilinu 1500 til 2200 milljónum króna á ári af um 4000 milljóna árlegum heildar niðurgreiðslum. Viðskipti með greiðslumark hafa fyrst og fremst verið fyrrverandi bændum mikil auðsuppspretta en leitt til skuldsetningar núverandi bænda.

INTRODUCTION

Iceland, like most European countries, had a problem with agricultural overproduction in the late 1970´s. Accordingly, production control schemes were introduced in the Icelandic dairy sector in 1980. The first system was based on an individual production quota called the “Búmark” and was in force until 1987. The total quota under Búmark was the upper limit of the quantity that could be sold at full price in the domestic market. However, the actual quantity to be sold at full price was routinely reduced to account for reduced sales in the domestic market. From 1 September 1985 to 1 September 1992 the second generation of production quotas, called “Fullvirðisréttur”,

was in place. This system was fundamentally different from Búmark as it secured the full price for production within the total allocated quota. Under both of these systems there were several limits on the transfer of quotas from one producer to another as well as between farms within regions and between regions. A discussion of production controls in the Icelandic dairy sector during this period is found in Bjarnadóttir (1990). Since 1st September 1992 the third generation of production quotas, "Greiðslumark", has been in place. This current system differs from Fullvirðisréttur in that the subsidies are associated directly with the specific quota and are paid directly from the government to the farmer. Such direct payments are thought to increase market efficiency since market distortions are reduced. Another difference between the current system and the earlier systems is that under the current system quota trade is not limited in any way. This has had substantial consequences for the structure of Icelandic dairy production and the financial situation of current and former dairy farmers. The purpose of this paper is to study the consequences of the liberalization of the quota trade for Icelandic dairy farmers.

The paper focuses on the current period, from 1992 to 2007. The paper gives an overview of the regulatory framework for production controls in dairy production and quota trading. The development of the dairy sector during the period is discussed. The theoretical background of quota price determination is established. Finally the price development and extent of the quota trade was studied, as well as the financial and structural effects of this trade on dairy farms.

Agreements between the state and the dairy farmers

The regulations regarding production control, subsidies and other aspects of the Icelandic dairy sector are determined in periodic agreements between the government and dairy farmers. There have been three such agreements since 1992. The objective of government intervention in the dairy sector appears in the agreements as well as the ways to reach the specified goals. The main objectives have been to increase dairy farm productivity, to ensure an acceptable standard of living for farmers, and to lower the price of milk to consumers.

The first article of the 2004 agreement states that: *The general production conditions in the production and processing of dairy products and government support to the industry should aim to further increase profitability, increase competitiveness with foreign production and lower product prices.* The article further states in section 1.3 that: *The stability between production and domestic consumption should be maintained.*

These two objectives are the fundamental justifications for the current tradable quota system. The quota maintains equilibrium between production and domestic demand while the tradability allows farms to increase in size through buying quotas from less efficient producers, thus increasing the profitability of the sector. The effects of this change in regulation on the structure of the Icelandic dairy sector have been quite substantial, as shown in Figure 1.

Figure 1 shows a clear trend of fewer and

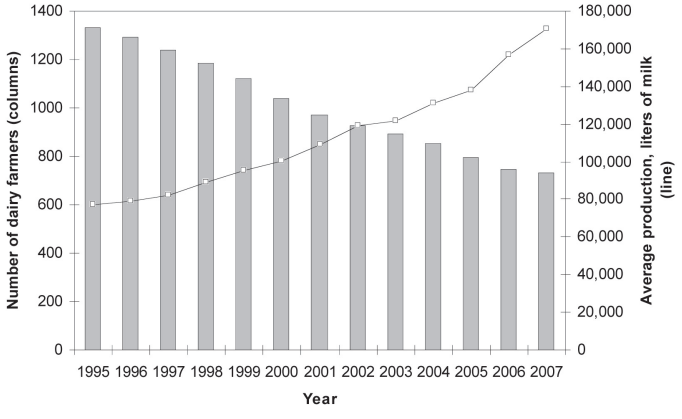

Figure 1. The number of dairy farmers in Iceland and their average yearly milk production from 1995 to 2007.

bigger farms from 1995 to 2007. The number of farmers has been halved and the average production more than doubled since 1995. This is a dramatic change over just one decade.

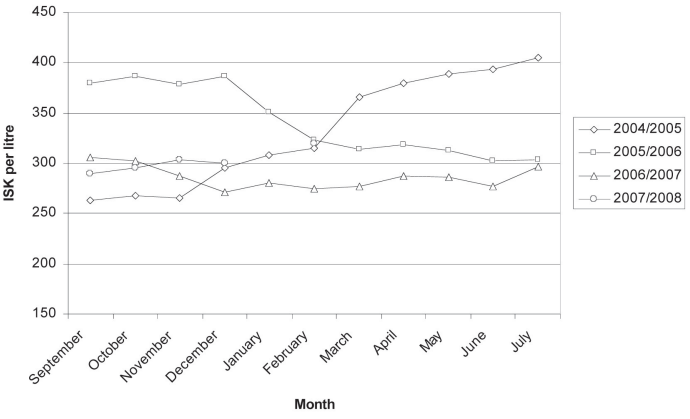

Figure 2. Monthly milk quota prices since 1 September 2004 until December 2007.

Current rules regarding quota trading

Since 1992 there have been few special limits on quota trading between farms and quotas are treated like any other asset. The only exceptions are that leasing quotas has been prohibited and if the farmer is not the owner of a farm, then both owner and farmer have to agree on the sale of a quota from the farm. All farmers who lease land can buy and own quotas. The quota is then registered in the farmes name and can be traded without permission of the owner. However, all direct payments related to the quota go to the farmer, who may not necessarily be the owner of the quota.

The quota is defined in litres and in practice every farm holds a share of the total quota. It gives the quota owner the right to deliver milk to a processing plant and receive the minimum price, which is set by an official committee made up of farmers, processors, consumers and representatives of the government. The total quota is determined once a year based on the development of the domestic market. The farmer further receives a share of total subsidies in accordance with his share of the total production quota. The farm quota therefore guarantees the farmer the opportunity to sell milk at a given price and to receive subsidies directly from the government. The milk price has historically been slightly higher than the direct subsidy. Milk delivered in excess of the quota receives a price determined by the processors alone and varies with market conditions from the full official minimum price in some years to virtually nothing in other years.

All quota transfers have to be registered in the official quota register. Furthermore, from 1 September 2004 all registrations of quota transfers have to be accompanied by a signed contract stating the quantity and price of the traded quota. Official monthly statistics on quota prices have been available since that time, as seen in Figure 2.

THE VALUE OF A QUOTA

The price that a farmer pays for a quota depends on the profitability of increasing production permanently. The value of increasing a quota share is determined by the farm's marginal profit, the profits from increasing production by one litre of milk, for the duration of the quota investment. Given marginal profits, it is fairly straightforward to calculate the value of an additional quota. However, estimating marginal profit and the duration of the investment is not as easy. It involves the estimation of marginal revenue and marginal cost, not only for the current period but also for all foreseeable future periods. Furthermore, since the quota system is a government construct there is always considerable uncertainty about the political will to maintain the system in its present form. No predictions are therefore accurate and are estimated with considerable uncertainty (Stonehouse et al. 1992).

To better understand what determines a quota price let us look at an example where the

quota is rented rather than bought. This allows us to focus on the current period. Assume that marginal revenue is equal to the price of milk. Assume further that marginal cost is initially lower than marginal revenue but increases as production increases, due to fixed factors such as the size of the farm (Burrell 1989). Figure 3 presents one example of what these curves might look like.

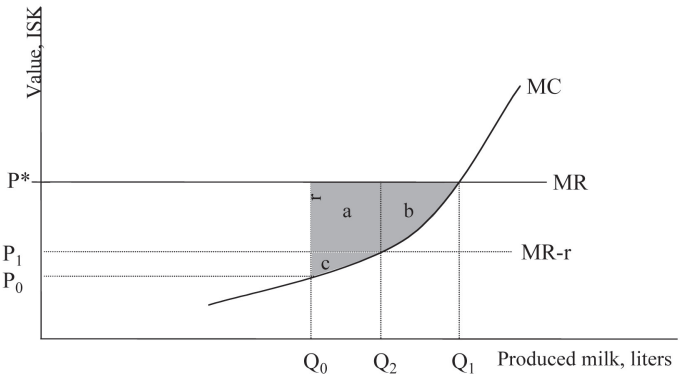

Figure 3. Marginal cost (MC) and revenue (MR) as functions of the produced amount. The areas *a*, *b* and *c* represent profits from production, *r* represents quota rent and P_0, P_1 and P_2 are the prices that would result in production quantities Q_0, Q_1 and Q_2, respectively.

Now assume that the farm has an initial allocation of a quota equal to Q_0. The marginal cost (MC) is well below marginal revenue (MR) at production level Q_0 and the farmer would wish to increase his production since this would increase his profits. In fact his profits would be maximized at the point where marginal cost equals marginal revenue at production level Q_1. If the farmer were allowed to increase his production from Q_0 to Q_1 he would increase his profits by the highlighted regions *a*, *b* and *c* in Figure 2. Assume that it is possible to rent a quota for one period at unit price *r*. The farmer would now receive only the milk price minus the quota rent; his marginal revenue would become MR-r. He would still be willing to rent a share of his quota and increase his production since marginal revenue minus the rent would still be above marginal cost and his marginal profits would be positive. However he would not increase his productivity to Q_1 but only to Q_2, where marginal revenue minus the rent equals marginal costs.

The figure suggests that a quota market would exist as long as there is a difference in marginal costs between producers. The farms with low marginal costs would be willing to buy/rent quotas from farms with high marginal costs since total profits would increase and both the buyer and the seller could be made better off. The theoretical result is a more profitable production, with lower overall costs. This claim is, at least partly, supported by empirical results (Oskam & Speijers 1992, Alvarez 2006).

Assume that there is an auction market for a permanent quota. How much would the farmer in Figure 3 be willing to pay for a quota that would increase his production form Q_0 to Q_2? He would be willing to pay anything up to the present value of his increased profits at production level Q_2, or the full quota rent, *r*, per unit for as long as he intends to run the farm or as long as the system exists. According to the classic approach to profitability analysis the net present value of an investment can be calculated using

$$NPV = \sum_{t=0}^{T} \frac{[profits\ from\ investment_t]}{(1+\rho)^t} + \frac{[S_T]}{(1+\rho)^T} - Investment \quad (1)$$

where profits from investment are defined as above, ρ is the discount rate, *T* is the duration of the investment period and S_T is the value of the asset at the end of the investment period (Stonehouse et al. 1992, Flaten et al. 1996). Assuming that the farmer plans to keep on farming for the foreseeable future (S_T =0) and that he only demands non-negative net present value from his investment, then the maximum amount he would pay for a quota can be found by setting S_T =0 and *NPV*=0 and solving equation (1) for the investment. This is his highest possible bid for the asset:

$$Highest\ possible\ bid = \sum_{t=0}^{T} \frac{\left[profits\ from\ investment_t\right]}{(1+\rho)^t} \qquad (2)$$

Let us assume that the full price paid for milk by the processing industry covers marginal cost. This assumption is supported by the fact that there has been a substantial supply of milk in excess of the quotas issued in years where processors pay full price for all milk. Then marginal profits can be assumed to be equal to the per litre subsidy guaranteed by the quota and we can simply calculate how many years of subsidies a farmer has to pay for the quota. It would simply be a matter of finding the appropriate T to solve a formula analogous to equation (2), where the only income is the direct subsidy, given as:

$$price = \sum_{t=0}^{T} \frac{\left[direct\ subsidy_t\right]}{(1+\rho)^t} \qquad (3)$$

It is evident from the simple analysis above that farmers are willing to pay a considerable amount for a quota if the difference between marginal revenue and marginal costs is large. According to economic theory a farmer is willing to pay almost the full amount of increased profits for the remaining period of the quota system for a permanent quota. He only demands that profits justify the risk of his investment in the production. A quota system with free trade will therefore create a stream of payments from more efficient farmers to less efficient ones, with high marginal costs. The less efficient farmers sell their quota for a price that reflects the profitability of the more efficient farmers. The more efficient farmers however do not profit more than they would by investing in any other form of production, with similar risk.

Obviously the size of these payments relies on marginal profits. If production is heavily subsidized, as is the case with Icelandic milk production, and therefore very profitable the price of a quota may become very high and lead to large payments from current farmers to past farmers. A farmer that sells his quota is not willing to do so without adequate compensation for giving up the subsidy he would have received in the future. He will therefore not consider selling for anything less than the present value of his future profits. The farmer that buys a quota will therefore have to pay the present value of future subsidies to someone who, after the sale, is no longer a dairy farmer (Fuchs 2002). This will obviously reduce the efficiency of the subsidy scheme in terms of improving the income of farmers, so-called transfer efficiency. As more and more of the subsidy is used to invest in quotas, less and less of the subsidy really goes to improving the income of current farmers (OECD 1996, OECD 2001). This leads to the conclusion that the larger the extent of the quota trade, the smaller the transfer efficiency of the subsidy scheme. This effect has been documented for dairy quota schemes where trade is not limited. As an example Coleman (2000) estimated that the cost associated with quota acquisition added as much as 12.5% to the production cost of UK dairy farms. Needless to say, former farmers can use the revenue from quota sales as they wish, without any restrictions.

But the problem does not end there. In addition, the farmers who buy quotas have permanently increased their production costs, and would have considerable difficulty in handling price competition with farmers who have not bought quotas. Their marginal profits are now zero and any reduction in prices will force them to cut back on production (OECD 1996, OECD 2001). Furthermore, these farmers will oppose any changes in the system that reduces revenues from owning a quota since the quota has become a substantial part of their capital assets. The transferability of the quota therefore only profits the first generation of farmers, the ones who were farmers when the system was introduced. Later generations of farmers receive limited or no benefits from the quota system or any associated subsidy scheme. Tullock (1975) pointed this flaw out and named it “the transition gains trap” due to the considerable difficulty associated with abolishing such systems. The government finds itself in a trap where abolishment would mean the confiscation of assets from people who did

not receive the assets for free but paid good money for them.

MATERIALS AND METHODS

Data on quota trading were collected from the official quota registry, "Greiðslumarksskrá", maintained by the Farmers Association of Iceland. Table 1 shows the yearly quota trading from the start of the current system until the most recent quota year. A quota year extends from 1 September to 31 August.

Table 1. Annual quota trading from September 1993 to August 2007.

Quota year	Quantity, million litres	Total allowed production	Proportion, %
1993-1994	2,461	100,000	2.5
1994-1995	1,972	101,000	2.0
1995-1996	3,448	101,000	3.4
1996-1997	2,907	102,000	2.9
1997-1998	3,625	102,000	3.6
1998-1999	3,416	103,000	3.3
1999-2000	5,864	102,000	5.7
2000-2001	5,576	103,000	5.4
2001-2002	5,320	104,000	5.1
2002-2003	4,595	106,000	4.3
2003-2004	3,586	105,000	3.4
2004-2005	5,320	106,000	5.0
2005-2006	5,117	111,000	4.6
2006-2007	4,715	116,000	4.1

In the first five years under the current scheme only about 2.0-3.5 million litres changed hands each year. This changed however during the quota year of 1999/2000 when quota transfers increased to about 5.9 million litres per year and have since been between 3.4 and 5.6 million litres per year. There have been substantial variations from year to year, due to different factors such as payments for excess milk and the outlook with respect to changes in agreements with the government.

When considering transfer payments associated with quota trading between current and former farmers it is important to identify the net sales. The same quota can be sold many times over but the rents from the system are only transferred once. After the initial transfer, subsequent transfers only add to net transfers, if the price of the quota has increased between sales. As an example, three farmers A, B and C have quotas of 100 thousand litres each, which they got in the initial allocation from the government. Farmer A decides to quit dairy farming. He sells his 100 thousand litre quota to farmer B for ISK 300 per litre. Farmer B produces milk for several years but then he also decides to stop farming and sells his 200 thousand litres to farmer C for ISK 350 per litre. The amount of rent from farming paid to former farmers is now the net transfer, the transfer minus former payments for the same quota. The answer is therefore not ISK 100 million (100,000x300)+(200,000x350) but rather 100 million - 30 million = 70 million. The first trade has to be subtracted from the total trade to avoid double counting. Further, it has been very common that Icelandic farms are set up as companies for convenience. Therefore we have only considered the cases where milk quota has been moved between farms. This omits the cases where the farm is sold complete, including the milk quota. However, it was decided that this underestimation was closer to the actual figure than counting all the cases when quotas changed hands, including the cases where the same owner changes the business type of the farm from a private business to a company. The data were further corrected for changes in total quota allocations, as the quota of individual farms is really a share of the total quota, as stated above.

As indicated above, a central record of quota prices exists for transactions after 1 September 2004. Price data for the period 1992-2004 had to be collected from other sources. Two actors in the market gathered price data for the period, the largest dairy co-operative, Mjólkursamsalan, and the Association of Icelandic Dairy and Beef Cattle Farmers, Landssamband Kúabænda. Both were willing to provide data and the data series for the period 1992-2004 was created from these two sources. Figure 4 shows the price data for quotas in ISK per litre adjusted for inflation to 2007 values.

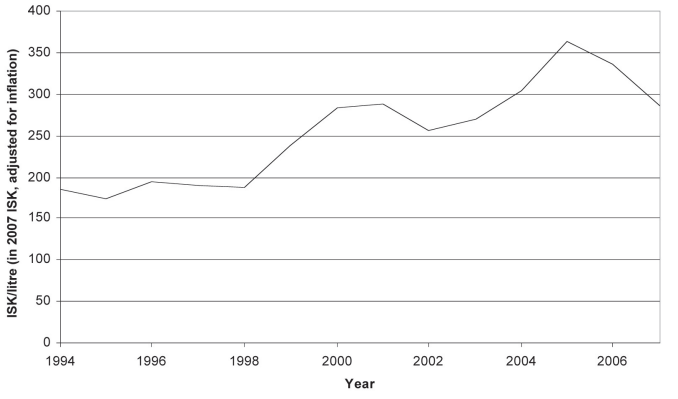

Figure 4. The price of quotas in ISK per litre from 1994 to 2007 adjusted for inflation to 2007 values. Sources: Landsamband kúabænda (to 2000), Mjólkursamsalan (2000-2004), Bændasamtök Íslands, (from 2004).

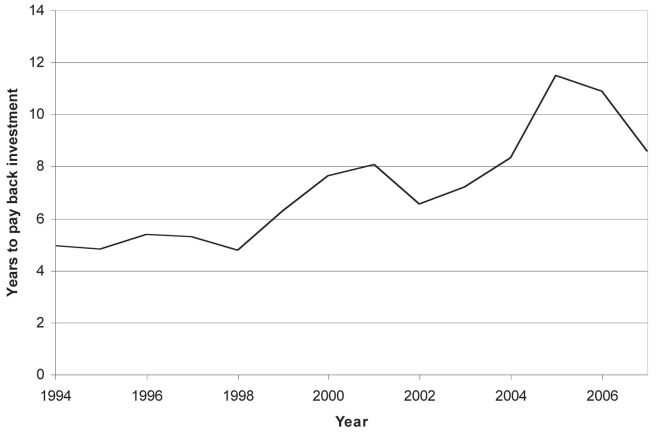

Figure 5. The time, in years, it takes to pay for quota investments using direct subsidies, assuming a 5% discount rate.

The price of a quota has been very high and increased during the period. The price can be compared to the total payment, the price plus the subsidy, for milk of about ISK 100 per litre. Although the quota price has fallen during certain periods, from 2001 to 2002 and from 2005 to 2007, the real value increase in the price has averaged about 3% per year. During this same period the cost and revenue per litre of Icelandic dairy farms has roughly remained unchanged (Niðurstöður Búreikninga 1994-2006). That does not have to mean that quota prices cannot increase. The net present value of quota investments is also substantially affected by expectations regarding the duration of the production control system and subsidy scheme. Since we have no direct estimates of marginal profits it is difficult to assess the validity of the prices in Figure 4.

A second source of costs to current farmers due to quota trading is capital costs paid to banks on quota loans. No direct data exist on this cost but it can be estimated either by assuming some common type of loan or by using survey data from Hagþjónusta Landbúnaðarins (Niðurstöður Búreikninga 1994-2006). On one hand, let us assume that the quota trade is financed using a 7-year annuity loan with 5% interest rates. On the other hand, assume that all the assets of the farm are financed in a similar manner so that the share of capital costs on quota loans compared to total capital costs is proportional to the share of quota assets of total assets. The first method takes the opportunity cost of equity into account but does not reflect well changes in capital costs over time. The second method measures real capital costs but does not take the opportunity cost of equity into account.

RESULTS

Figure 5 shows the results from estimation of the time it takes to pay off quota investments by direct subsidies alone, as described in equation (3), assuming a 5% discount rate.

According to the results, farmers were quite skeptical about the system at first but grew increasingly confident from 1998 to 2005,

where the price represented more than the present value of 11 years of subsidies. This may also reflect the lower profitability of dairy farming between 1992 and 1998. During that period farmers were expected to lower costs, which were reflected in a declining minimum milk price. However, according to this the farmers that bought quotas in 2005 are not going to enjoy any subsidies until 2016. Both Figures 4 and 5 indicate that dairy farming in Iceland has been very profitable and that farmers received substantial economic rents under the fixed price and direct subsidy schemes.

The analysis of net transfer to former farmers through quota sales is presented in Figure 6.

Figure 6 shows that the net transfer to former farmers through quota sales was initially small, about ISK 600 million a year. However, since 2000 this has increased substantially and reached ISK 1,740 million in 2006. This can be compared to the roughly ISK 4,000 million that Icelandic dairy farmers receive in subsidies each year from the government. The average yearly transfer has been about ISK 1,100 million during the last decade, or roughly 25% of the total subsidy.

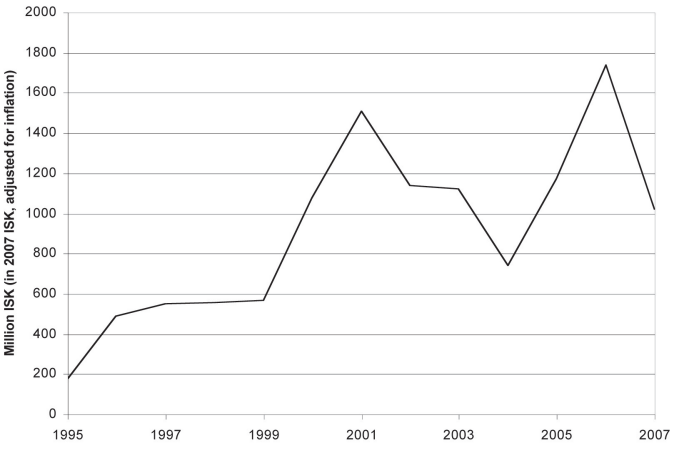

Figure 6. Net transfer of funds to former farmers through quota sales from 1994/1995 to 2006/2007, adjusted for inflation in 2007 ISK.

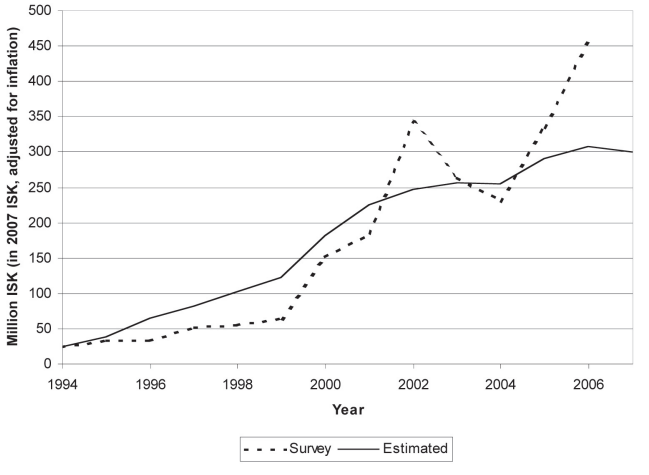

Figure 7. Capital costs due to quota trading, using survey data and estimated assuming a common method of financing.

Figure 7 presents the estimated capital costs associated with quota trading using the two methods described earlier.

The two methods render a very similar result, as seen in Figure 7. Using a common method of financing rather than the survey data results in slightly higher estimates in the first half of the period, but the reverse for the second half. This may reflect a falling share of equity financing of quota trading and/or generally increasing capital costs during the period. In any case capital costs seem to have increased along with the quota trading and now lie between ISK 300 and 450 million per year.

CONCLUSIONS

Icelandic dairy farms have been through a period of large structural changes in recent years with fewer and larger farms. This has called for large investments in production quotas.

These investments are solely due to the structure of the control of production and the subsidy scheme chosen by the government. The objective of the system is to improve profitability and lower the prices of dairy products. However, the results of quota trading have not supported the objectives. The price of quotas has been very high and as a result large amounts of money have been paid to former dairy farmers compared to the annual subsidy budget. According to our estimates the costs associated with quota trading have been between ISK 1,500 and 2,200 million, of the total of roughly ISK 4,000 million in subsidies. Farmers seem to be no better off. Only former farmers have gained from the system. On the other hand, the trade has put a heavy financial burden on current farmers. The policy implication is clear. The Icelandic government should consider changing the system in a manner that reduces costs to current farmers in order to better meet the objectives of the Icelandic dairy policy.

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