Scenario analysis on farm income of Dutch dairy farmers through 2020; the effect of regionalisation and liberalisation on the future of Dutch dairying.

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Abstract

Dairy farmers in the Netherlands and in the rest of Europe have to cope with fast and vast developments in agricultural policy. The outcome of the CAP reforms, WTO negotiations, and changes in agricultural markets are uncertain. Each farmer should be well aware of the possible consequences. However, it is difficult to translate these developments into concrete expectations on future income levels. In this study we try to give sense to the possible outcomes under various scenarios.

A reference scenario ('baseline'), as well as two alternative scenarios ('liberalisation' and 'regionalisation') are considered. For each of these scenarios the trends in price level and price variance are estimated for the input factors: milk prices, animal returns, feeding costs and manure disposal costs. Using the estimated prices of the input factors, a dairy farm model is used to calculate future farm income. The effect of regionalisation and liberalisation on the future level and fluctuations in farm income is apparent.

Introduction

Dutch dairy farmers, like all of their colleagues in Europe, face declining milk prices and increasing costs of production. As a result, gross margin and farm income levels are under pressure. The last decades, dairy farming in the Netherlands was dominated by stable milk and feeding prices and hence income security (Jongeneel et al, 2006). After World War II the EU established a Common agricultural Policy (CAP) that kept stable prices above world market levels. This system of high internal prices led to overproduction, and the associated level of public spending became a problem. Therefore, the EU had to respond. The recent CAP reform of 2003 brought about a significant reduction of export refunds and reduced the

intervention prices of dairy products. Instead, European dairy farmers receive income support while price setting is left to the market. This means learning to cope with fluctuating prices.

Little insight is available on the effect of these reforms on individual farm results. Instead, general statistics are available on percentages of farms to run into bankruptcy and reallocation of production in Europe. For an individual farmer and their consultant it is relevant to know if he or she runs the risk of losing the farm. Therefore, the objective of this study was to analyze the effects of fluctuating prices on future income of Dutch dairy farms in different EU policy scenarios.

Model

A static, risk incorporating, farm income model was used to forecast farm results until 2020. To estimate future prices and volatility of the main farm inputs and outputs, historical data on milk prices, animal returns, feeding costs, manure costs and interest costs was analysed. Then the price levels and variances were projected forward to 2020 for three different scenarios using the results of Scenar 2020, a scenario analysis on European agriculture (Nowicky, et al., 2007). Using @Risk®, the average and standard deviation of future input and output prices was incorporated in the excel model and run for every year starting 2008 and ending 2020.

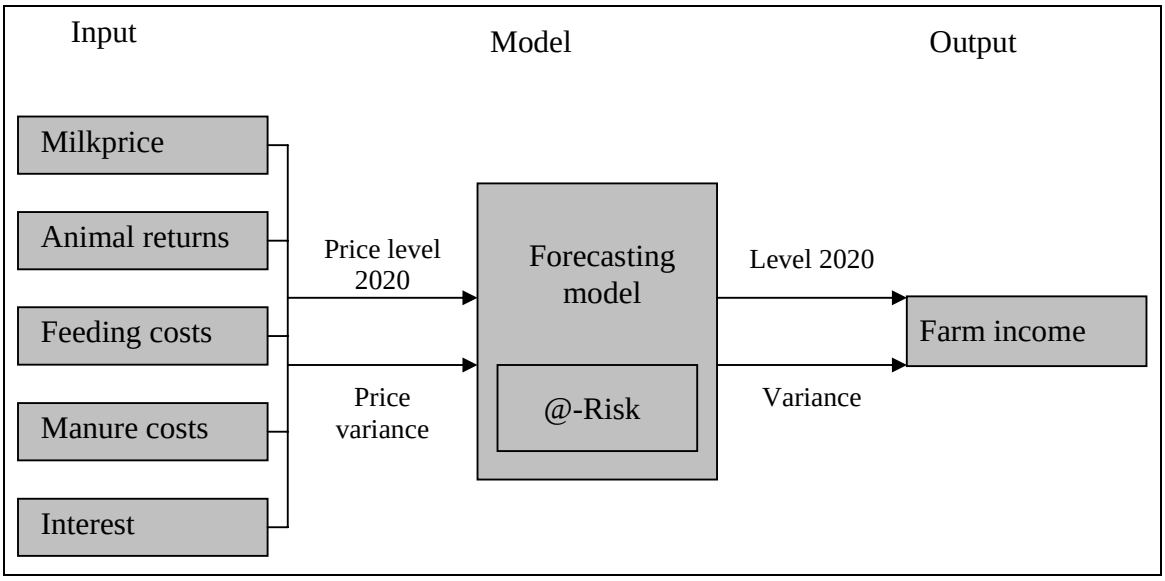


Figure 1: Modelling scheme

Scenarios

It is assumed that agricultural policy measures affect the trends in the main input and output prices, and thus in farm income. Therefore, three scenarios were examined similar to the ones used in the Scenar 2020 study. A reference scenario ('baseline'), as well as two alternative scenarios ('liberalisation' and 'regionalisation') are considered. The latter two are considered opposite scenarios, providing a contrast in order to get insight in the range of possible consequences associated with different policy options.

The baseline situation is based on the continuation of the trends in so-called exogenous drivers (demographics, macro-economic growth, consumer preferences an agri-technology). It assumes the development of agricultural and rural policy according to current European policy objectives, including a successful outcome of the Doha Round negotiations.
Regionalisation is a policy framework which refers to an unsuccessful conclusion of the Doha Round, further bilateral and multilateral negotiations will continue, and more encouragement will be given to promoting the internal market.
Liberalisation implies that the current context of moving toward more open markets at the international level will be strengthened. In this scenario, all forms of market and trade policies and income support will be abolished in the European Union and the rest of the world.

Estimated prices of input factors

For each of the scenarios – baseline, regionalisation and liberalisation – the trends in price level and price variance are estimated for the input factors milk, cattle, feeding and manure. Interest rates are assumed to be equal in each scenario. In the period 2008-2013 the direct farm payments in the baseline scenario are reduced by 25 percent because of modulation. This money is shifted towards rural development. In the regionalisation scenario the direct payments will remain at the same level as today. The liberalisation scenario ends up with no financial EU-support at all in 2013.

The forecast of the *future price levels* in the baseline scenario are based on the Agricultural Outlook (OECD-FAO, 2007) and KWIN (ASG, 2007). As the scenarios 'liberalisation' and 'regionalisation' focus on more or less liberalisation, price changes at EU market level will differ from the 'baseline'. The price changes under the different scenarios throughout 2020 are determined, similar to the Scenar 2020 study. The impact of policy change in the baseline

scenario leads to a decrease of prices to a different degree. The further liberalisation leads to a decrease of prices. This is represented in the first three rows of table 1.

Estimation of the *future fluctuation in prices* is based on the variance in historical data. For the baseline scenario the variance is calculated for prices paid by Dutch farmers in the last decade. It is assumed that the price variance will be different in the regionalisation-, and liberalisation scenario. The market situations in New-Zealand and Australia, for example, are assumed to resemble the future variance in milk and feeding prices in the liberalisation-scenario. The variance in animal returns and interest rates is supposed to be the same in all three scenarios.

Table 1: Relative price levels and -variances of the input factors under different scenarios

	Baseline	Regionalisation	Liberalisation
Price level			
- Milk and feeding	••	•••	•
- Animal returns	••	•••	•
- Manure disposal cost	••	•••	•
- Interest	••	••	••
Price variance			
- Milk and feeding	••	•	•••
- Animal returns	••	••	••
- Manure disposal cost	••	•••	•
- Interest	••	••	••

Figure 2 depicts the estimated future milk price in the various scenarios. It is obvious that the trend in milk price differs. The baseline scenario shows a slightly ascending line, in accordance with the OECD and FAO outlook. In the regionalisation scenario the milk price is assumed to climb even more, due to the protection of regional markets. The same effect can be seen for the other input factors. 'Liberalisation' is associated with a downfall in milk price, as a result of the lack of any market regulation. In this scenario farmers act on the world market and have to cope with its unpredictable prices.

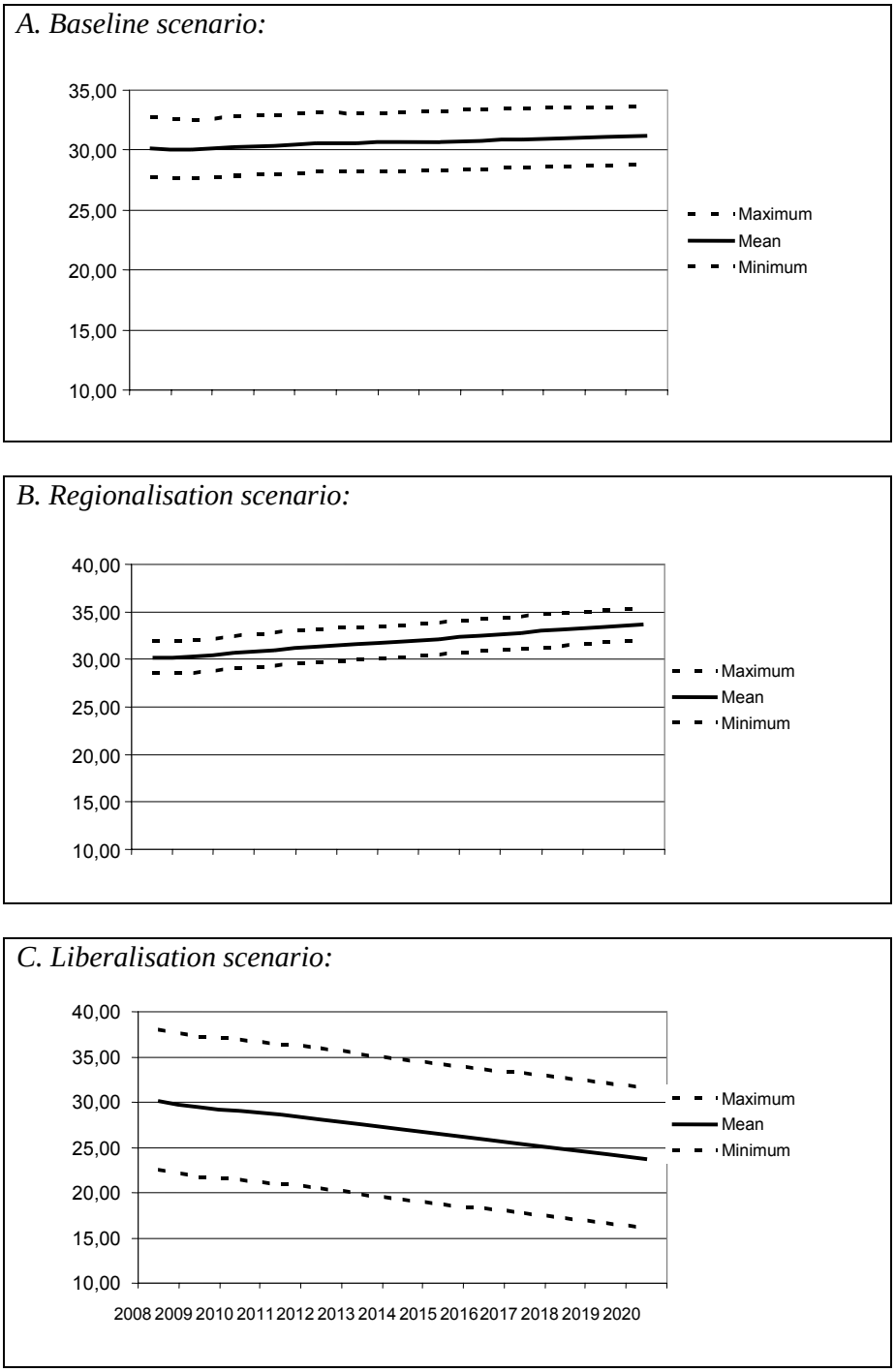


Figure 2: Forecasted price levels and variances for milk under different scenarios

The fluctuation in milk prices is also different in each of the scenarios. The variance is represented by the distance between the lower and upper dotted lines. The bandwidth, i.e. the area between the minimum and maximum milk prices, corresponds with the confidence intervals of the normal distribution as shown in figure 3.

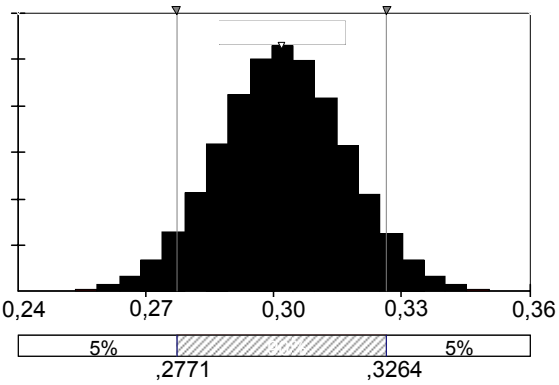


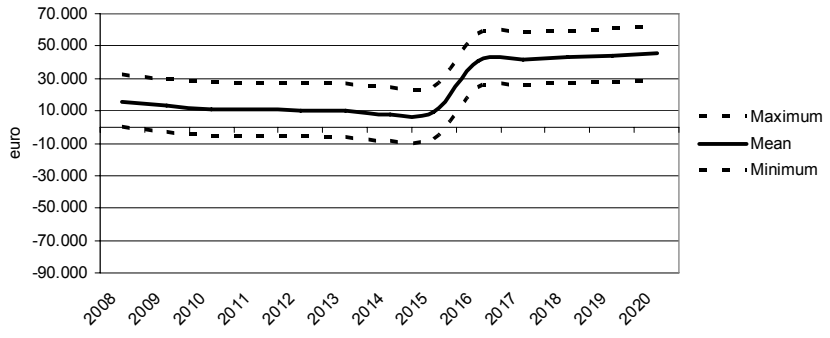
Figure 3: Distribution diagram for the milk price in 2008 in the baseline scenario

The largest variance in milk prices is found in the liberalisation scenario. The possibility of very high or low prices is more substantial in a situation with open markets, compared with the baseline- and regionalisation scenario.

Forecasts on farm income

Using the estimated prices of the input factors, the dairy farm model is used to calculate future farm income. The modelling is performed for an average Dutch dairy farm; the specifications can be found in table 2. The model assumes that farm structure does not change up until 2020, nor will any investments other than replacement investments occur. Figure 4 shows the results of the model.

A. Baseline scenario:



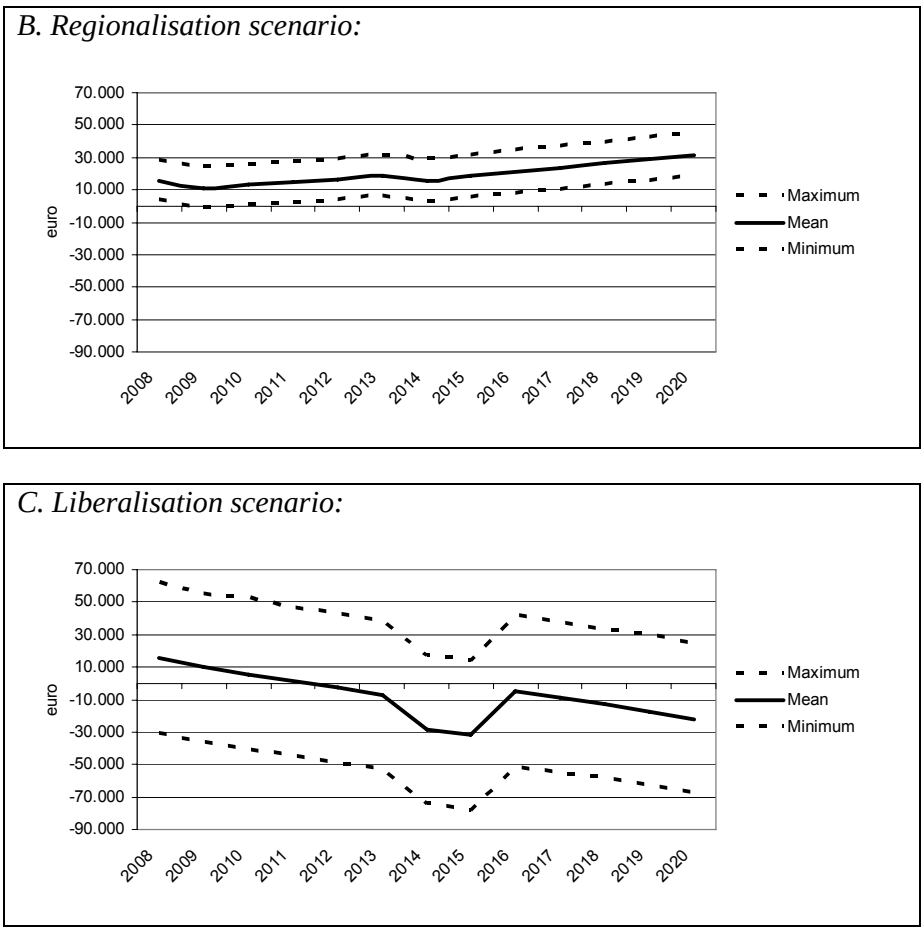


Figure 4: Forecasted farm income under different scenarios

Farm income in the baseline scenario decreases to a level under 10,000 euros in 2014. This decline is caused by increasing cost for feeding, removal of manure and interest. The expiration of the EU-milk quota in 2015, and thus its depreciation, results in an upward boost of the income level of around 30,000 euros. In the regionalisation scenario the milk quota, or similar measures for controlling milk production, are still supposed to exist after 2015. The sum of milk returns minus feeding costs gradually increases, and so does farm income. The expected fall in milk prices has a large effect on farm income under 'liberalisation'. After 2012, income drops below zero. The ending of the direct payments after 2013 is one of the main reasons. In the liberalisation scenario, like the baseline situation, depreciation costs for milk quota disappear in 2015. As a result, farm income rises, but remains negative.

The area between the dotted lines depicts the estimated fluctuation in farm income. Under the regionalisation scenario, this bandwidth is smallest. Therefore, future farm income will be

quite steady without large peaks expected. The 'Baseline' shows some more variance. The lower boundary implies the possibility of negative farm incomes until 2015. Afterwards, a farm income below zero is unlikely. Large fluctuations in farm income can be expected in the liberalisation scenario. Open markets are obviously less predictable, compared with internal markets. Due to large variability, farmers can still make a decent living in favourable years. However, even then, farm income is just around the same level, or even below the average income in the baseline- or regionalisation scenarios. It is not difficult to predict the consequences in poor years: most farms will not be viable. When this scenario occurs, factor prices will have to go down.

Farm structure and future income

So far, the average farm has been examined in this scenario study. It seems obvious that the outcome will be different for other farm structures. Therefore, the same analysis was performed for a large scale farm and an intensive production system, i.e. high level of milk production compared to available land. Table 2 shows the characteristics of these farm types.

Table 2: Farm structure of typical Dutch dairy farm systems

	Average farm	Large scale	Intensive
Acreage grassland (ha)	35.8	53.5	30.8
Acreage maize (ha)	6.9	11.3	6.1
Milk production (kg)	610,000	970,000	690,000
Milk production per cow	8,400	8,700	9,000
Milk production per ha	14,300	15,000	18,700

The farm income on the large scale farm appears to be highest under all scenarios, except for the liberalisation scenario. The production scale, and its corresponding milk revenues, result in positive incomes under the baseline- en regionalisation scenario. Fully open markets, however, make these big farms more vulnerable for decreasing milk prices. This effect was apparent for farms in Australia and New-Zealand during the last few years. The outcome for the high productivity farm is similar to the average farm in the three scenarios.

The effect of price variances on income fluctuation

The future fluctuation in income is a sum of each variance in prices for milk, cattle, feeding, manure and interest. Fluctuations in milk price determine for 90 percent whether a dairy farmer will earn or lose money. The effect of interest rates on farm income is also apparent. Variances in feeding costs, cow revenues and manure costs are of less interest. The latter, manure disposal costs, will become increasingly important within the next years, as environmental policy will be more severe.

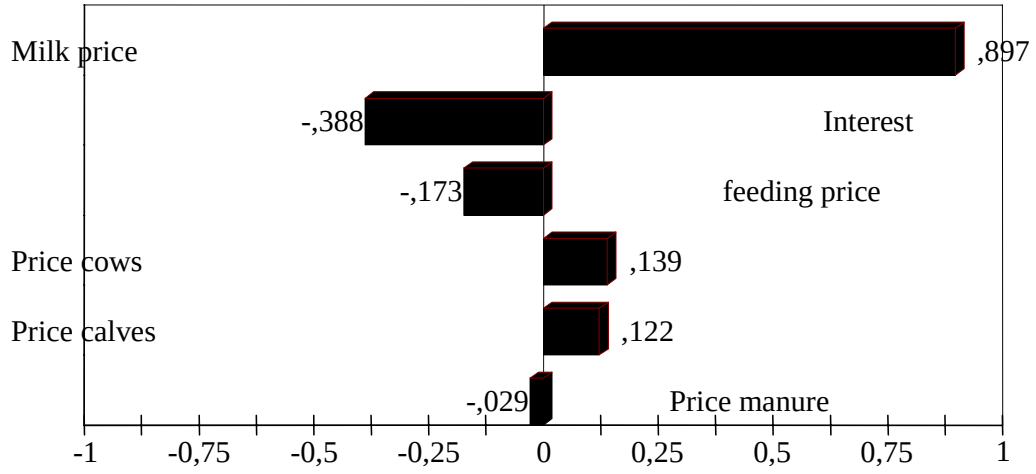


Figure 5: Regression sensitivity for Farm income

Conclusions

Continuation of the present EU policy, as represented in the baseline scenario, seems to be quite reasonable for dairy farmers today. Farm income levels will be positive, and fluctuations are less severe, compared to an open markets situation. Under 'regionalisation' no WTO agreement is reached. Trading blocks will lead to higher costs for production factors, which results into increasing consumer prices. In the Netherlands, with its emphasis on exports, this is an unfavourable scenario.

Individual farmers should be well aware of the possible consequences of the various developments under different scenarios. Entrepreneurs, active in uncertain markets, must try to achieve a higher level of flexibility in their farm management. So they can act and react properly, in order to earn a decent future income.

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Accompanying document Article Van den Hengel, IFMA17 Congress

Title

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Biography of Jeroen van den Hengel

Jeroen van den Hengel - age 30 - was born in Terschuur, a small place in the middle of the Netherlands. He grew up at his parents' dairy farm. After finishing his study Agricultural Business Economics at Wageningen University, he started to work as a business consultant at the head office of Alfa Accountants en Adviseurs in Wageningen. This is one of the largest agricultural book-keeping and advisory agencies in the Netherlands.