ARGOS – Modelling the Economic, Environmental, and Social Implications for New Zealand from Different Scenarios Relating to the Demand and Supply of Organic Products

Caroline Saunders
Martin Emanuelsson
Lincoln University, PO Box 84, Canterbury, New Zealand,
Phone: +64-3-325 3627, emanuelp@lincoln.ac.nz

Paper prepared for presentation at the 11th congress of the EAAE
(European Association of Agricultural Economists),
'The Future of Rural Europe in the Global Agri-Food System',
Copenhagen, Denmark, August 24-27, 2005

ARGOS - MODELLING THE ECONOMIC, ENVIRONMENTAL, AND SOCIAL IMPLICATIONS FOR NEW ZEALAND FROM DIFFERENT SCENARIOS RELATING TO THE DEMAND AND SUPPLY OF ORGANIC PRODUCTS

Abstract

This paper reports on some of the initial findings of the ARGOS (Agricultural Research Group on Sustainability) programme, a 6 year quasi-experimental research project with the aim to model the economic, environmental, and social differences between organic, environmentally friendly and conventional systems of production.

In the first section the paper reviews the development of organic markets, details the production costs and reports some preliminary results from ARGOS. The information is then used to develop potential future scenarios relating to the organic sector, which are assessed using the Lincoln Trade and Environment Model (LTEM), a partial equilibrium trade model that differentiates between organic and conventional production methods. This paper concentrates upon the difference between organic and conventional production, consumption and trade.

Keywords: Sustainability, New Zealand, Organic Markets, ARGOS
JEL: F18, Q17

Introduction

NZ is unique in the developed world in its reliance on agricultural exports for external income, with around 50 per cent of its export earnings from agriculture. NZ is also unusual in the developed world in that it has an unsubsidised agricultural sector which has to compete with subsided sectors around the world. This has lead to a number of issues for NZ not least competing with countries which not only subsidies their agriculture but also provide export subsidies and compete in potential markets for NZ. The other issues facing NZ is of course the low or even negative income elasticity of demand for primary commodities and thus as incomes around the world have risen NZ has failed to keep pace and has fallen down the OECD rankings.

The NZ agricultural sector has responded in various ways to falling real incomes. These include reducing the cost of production through economies of scale and increasing efficiency through different management and production techniques. In addition the agricultural sector has diversified into alternative crops and animal products, such as kiwifruit and deer.

Another strategy pursued has been to distinguish the agricultural products and attracting price premiums based on the way the product is produced. Increasingly, consumers in developed markets are willing-to-pay for attributes that are perceived to improve because of the product's method of production. These include the adoption of Integrated Pest Management (IPM) in apples and kiwifruit production, adoption of schemes such as EUREPGAP, and organic certification schemes. In that context the developments in the European Union (EU) agriculture and environmental policy have both direct and indirect implications for New Zealand (NZ). While the importance of the EU as a market for NZ produce has diminished it is still significant, accounting for 17 per cent of exports, especially as a high value market and in commodities such as sheepmeat and dairy products (Ministry of Foreign Affairs and Trade, 2004). Thus direct impacts of changes in EU policy can affect NZ access into the EU especially under its preferential arrangements. Indirect impacts include the influence the EU has on the outcome of WTO negotiations, particularly in relation to agriculture. Also policy and market changes in the EU affect NZ indirectly by impacting on other potential export markets.

However, concern does exist regarding the applicability of some of these schemes to the NZ environment as they tend to reflect the conditions in the export market country, not NZ. Moreover relatively little is known in detail about the different cost structures of different types of farming and how these impact on the environmental or connect to social variables. To assess both this and the potential benefits and costs to NZ of adopting market driven environmental and product schemes the ARGOS (Agricultural Research Group on Sustainability) has been established and this paper reports some of the preliminary findings of this group.

ARGOS is a 6 year research project quasi-experimental with the aim to model the economic, environmental, and social differences between organic, environemtally friendly and conventional systems of production. The aim is to detail the impact of these systems and devlop indicators which reflect the interactions across the social, economic and enviromental [0]factors. The project is initially focussed on the beef and sheep sectors and the kiwifruit sector and consists of cohorts of matching farms.

The ARGOS study also is assessing market developments overseas and how these are likely to affect and be implemented in NZ. The costs of implementation and potential benefits of these are further assessed using the LTEM (the Lincoln Trade and Environment Model). This enables the impact of various scenarios relating to the level of production and consumption, premiums and production costs to be assessed both or NZ and other countries.

This paper therefore reports on some of the initial findings of the ARGOS programme and then assess, using LTEM, some scenarios relating to this on the producer returns for NZ, the EU US and

Australia. This paper concentrates upon the difference between organic and conventional production, consumption and trade.

The first section of the paper reviews the development of organic markets, in particular outside NZ. The next section focuses on production costs concentrating upon NZ. The organic sector in NZ is then briefly reviewed followed by some preliminary results from ARGOS. This is followed by a description of the trade model and scenarios developed from previous sections. The information is then used to develop potential future scenarios relating to the organic sector. Finally the impact of these scenarios on producer returns is reported.

Market for Organic Goods

The demand for organic food and beverages is primarily attributed to food safety and health considerations (Elliott et al., 2003). An increase in personal health awareness has occurred, perhaps more urgently in nations that have experienced food scares (such as BSE in the UK), and this has brought attention to the methods used in intensive conventional agriculture, and a lack of confidence in mainstream food production. Others may prefer organic food as it has not been treated with pesticide, hormone or antibiotic treatments. Further to personal health, concern for the health of the environment is increasing around the world, especially in developed nations. Organic production methods are favoured over current conventional practices, as being more environmentally benign. Also ethical reasons have an influence on consumers demand for organic produce.

Many countries are experiencing growth in demand for organics. Market maturity has occurred in few countries on a limited range of commodities – so overall continued growth is expected, varying by degree across nations. Price premiums may decrease over time as the organic industry sector increases in size, yet potentially remaining at a significant level in a mature market. Production costs for organics may decrease over time given increasing economies of scale as the industry grows, but also due to improvement in production technology as research and service industry support develops alongside the expanding production.

All these factors contribute to the uncertainty and risks of the organic industry, and it is important for the sector to review potential risks and benefits of developments in the organic markets.

Organic Production and Consumption Worldwide

Consistent time series data for the organic sector, for prices, production and consumption, is difficult to obtain and therefore in assessing the extent and likely growth in the sector a number of different sources have to be used. However, most sources of data do show that organic food markets have experienced substantial growth over the last ten years (20-30 percent per year). For example, as illustrated in Figure 1, the retail value has doubled in the UK from 1999-2004. Figure 1 also illustrates the growth in production with the organic land area in the EU-25 tripling from 1996-2002 (EISFOM, 2004; Soil Association, 2004; USDA Foreign Agricultural Service, 2004).

Table one shows estimates of the organic retail sales by key countries and their projected growth rates. This shows that in 2003 the retail value of the European market was estimated at US$10-11 billion and the US market at US$11-13 billion. In 2002 these two markets accounted for 97% of the world organic market. (Willer & Yussefi, 2004; Yussefi & Willer, 2003).

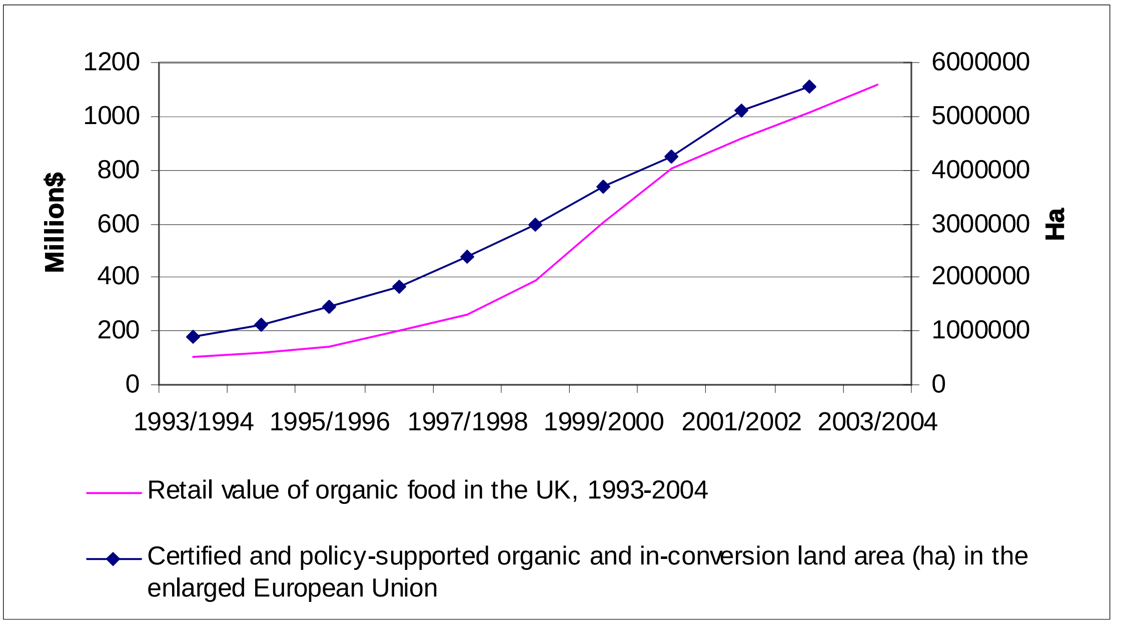


Figure 1. Time trend of organic sales in the UK and EU production area (EISFOM, 2004; Soil Association, 2004).

Despite the growth in the market for organics it still has a relatively small share of total retail sales, as illustrated in table 1, and these shares were according to Smith & Marsden (2003) almost stable between 1997 and 2000. Thus in the EU the relative shares are as follows; Germany (US$2800 million in sales, 1.7 per cent retail market share); United Kingdom (US$1550 million, 1.5 per cent retail market share); Italy (US$1250 million, 1.0 per cent retail market share); and France (US$1200 million, 1.0 per cent retail market share). The highest organic retail market shares within Europe are found in Switzerland, closely followed by Denmark and Austria. Germany, UK and Sweden follow thereafter. Japan and the US, dominates the markets in the Pacific and Northern America, with organics accounting for 2.0 respectively 0.5 per cent of the retail market share.

Table 1. Estimates of organic retail value, retail share and projected annual market growths 2003.

Market	Retail value (million €)	Retail share (% organic of total sales)	Annual market growth 2003-2005 (%)
Austria	325-375	2.0-2.5	5-10
Belgium	200-250	1.0-1.5	5-10
Denmark	325-375	2.2-2.7	0-5
France	1200-1300	1.0-1.5	5-10
Germany	2800-3100	1.7-2.2	5-10
Italy	1250-1400	1.0-1.5	5-15
Netherlands	425-475	1.0-1.5	5-10
Ireland	40-50	<0.5	10-20
Sweden	350-400	1.5-2.0	10-15
Switzerland	725-775	3.2-3.7	5-15
United Kingdom	1550-1750	1.5-2.0	10-15
Other Europe	750-850	-	-
Japan	350-450	<0.5	n.a.
China*	6	n.a.	n.a.
Taiwan*	9.7	n.a.	200
Australia*	123-130	0.2	400
United States	11000-13000	2.0-2.5	15-20
Canada	850-1000	1.5-2.0	10-20
Mexico*	12	n.a.	n.a.

Source: Willer & Yussefi (2004)
**1998 estimates from Lohr (2001).*

Price premiums on organic products vary a lot between products and between different countries; Lohr (2001) found that price premiums for key markets were between 10 and 100 per cent above conventional products. In 2003, price premium were estimated to range between 10-400 per cent in China and between 50-75 per cent in Australia (Willer & Yussefi, 2004). Premiums in Europe vary considerably between countries as well as products, from 31 to 133 per cent (Hamm, Gronefeld, & Halpin, 2002) (15 to 77 per cent (La Via & Nucifora, 2002)). The La Via & Nucifora (2002) study of retail chains in Europe found the average premium across all types of outlets for organics was 51 per cent whereas the difference in premium across product categories within individual stores were only 14 per cent. The study does suggest that in the longer run a premium of between 20-30 percent in the large retail stores is most likely. In more mature markets such as Denmark, Sweden and Switzerland, a more stable price premium between 10 and 30 per cent for dairy and meat products seems to be most common (Millock & Hansen, 2002; Teagasc, 2004).

The structure of organic food retailing seems to go through three stages over time from niche to maturing market with availability of organic products mainly sold in supermarkets (retail-chain-stores). Initially organic sectors are small with produce typically sold directly from producer to consumer. The market then develops, with an increase in amount sold through specialist stores. Final stages tend to have high processing and marketing costs. As the market goes through these three stages the organic market share grows (Christensen & Saunders, 2003).

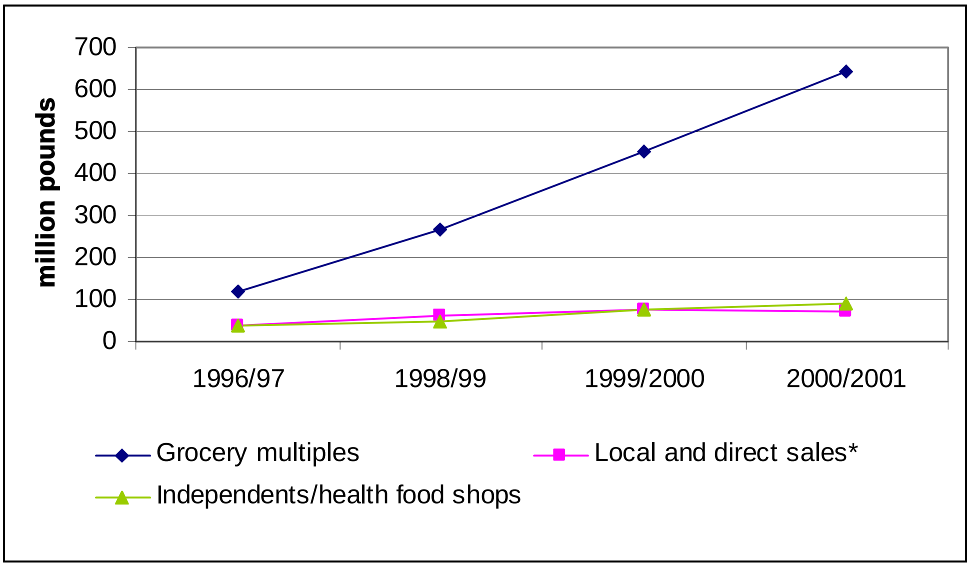


Figure 2. U.K. Retail Sales of Organic Food by Distribution Channel (Organic Trade Services, 2005).

Thus organic products are mainly distributed through supermarkets (retail-chain stores), specialty stores and/or producer direct sales, as illustrated in table 2. Retail-chain distribution is a strong factor for the continuing growth of organic market share beyond what is possible through direct sales our through speciality stores. Due to a large customer base, supermarkets can generate turnover more quickly, thus reduce costs and maintain product appearance and quality. Furthermore, supermarket availability makes organic produce more accessible for the consumers.

Table 2. Percentage shares of organic retail market by distribution channel.

Market	Supermarkets[1]	Specialty stores[2]	Producer direct[3]
Austria	77	13	10
Denmark	70	15	15
France	45	45	10
Italy	25-33	33	33-42
Germany	25	45	20
Netherlands	20	75	5
Sweden	90	5	5
Switzerland	60	30	10
United Kingdom	65	17.5	17.5
Japan[4]	High-end-stores	Widely available	Widely available
United States	31	62	7

[1]Includes supermarkets and hypermarkets that offer conventionally grown foods
[2]Includes organic supermarkets, natural products and health food stores, cooperatives and other
[3]Includes on-farm sales, farmer markets, box schemes, CSAs, teikei and other
[4]Share data not available for Japan, but qualitative information suggests the relative availability of product in each country
[5]Source: Lohr, 2001

Thus, as illustrated in table 2, in Europe the majority of organic produce is distributed through supermarkets (retail-chain stores) which may help to explain the relatively large share of organic produce in these markets. Moreover it is argued that as the US has moved away from a specialty store dominated distribution system this has contributed to the highest growth rates in organic sales of any country of 12 per cent in 2002 (Willer & Yussefi, 2004). This growth has also been fuelled by the establishment of a common organic standard. The continuing strong growth of organics market share in Switzerland has been contributed to the high involvement of the large retail chains (Willer &

Yussefi, 2004). Similarly, the slow down of growth in organic sales in Denmark is sometimes attributed to the weak interest of the leading retail chains (Agra Europe, 2004; Willer & Yussefi, 2004). An exception to this dominance of retail outlets is the Japanese market where organic produce is mainly distributed directly from the producer or through specialty stores (Lohr, 2001).

Organic Sector in New Zealand

Organic farming in NZ started as an idealistic movement in 1950-60s, consisting of a loose coalition of people with many different interests. However, in 1983 the coalition institutionalised itself by setting up New Zealand Biological Producers Council (BIOGRO), which from then on administrated production standards under the BIOGRO certification system (Saunders, Manhire, Campbell, & Fairweather, 1997).

Successful aggressive targeting of organic products to niche exports markets in the 1990s attracted attention to NZ organic food products. Exports of organic products has grown rapidly in the past, but slowed down considerably from 2000 to 2002. This is mostly because a strong growth in the domestic market and the slow adoption rate among sheep & beef and dairy (BioGro, 2004). More than 80 per cent of New Zealand's organic export is for the US, European and Japanese markets (OPENZ, 2002).

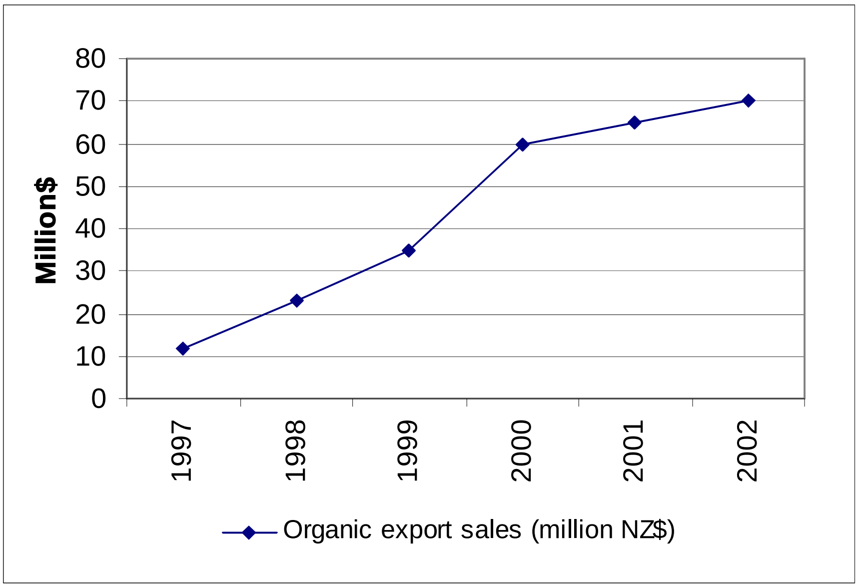


Figure3. Exports of Organic products from NZ (BioGro, 2004).

Organic horticulture (vegetable and kiwifruit production) is relatively well established within NZ. In 2001 to 2004 approximately 3.5-3.8 percent of the yearly NZ of kiwifruit crop (number of trays) was organic (Zespri Ltd., 2004). Organic livestock and arable farms, however are a relatively low proportion of their sectors (Ministry of Agriculture and Forestry, 2002). Less than 1% according to Willer & Yussefi (2004). Thus, organic raw milk production is insignificant compared to total NZ milk production of 14,016 million litres (Fonterra Co-operative Group, 2004). In NZ in 2002 there were around 4,500 cows on organic farms, each producing 6,000 litres of organic milk, that is 27 million litres in total (not all of this is sold as organic milk though) (Mason, 2002). However, Fonterra has recently shown commitment to expand organic milk production offering a 20 percent producer premium for organic raw milk. The retail price premium within NZ for organic dairy products is considerable – especially for organic liquid milk, with a mark-up in 2001 of 51 percent on organic liquid milk in retail stores.

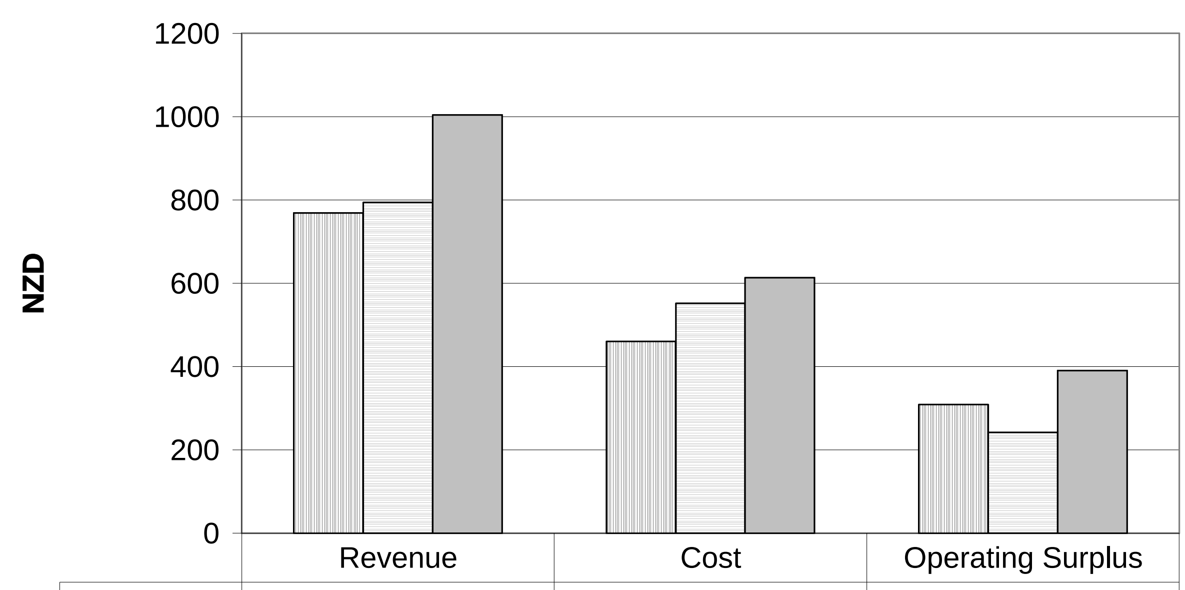
Cost of organic production

A 2002 MAF (Ministry of Agriculture and Forestry, 2002) study on costs and risks of conversion to organic production systems in New Zealand shows that for organic farms, milk production tends to be around 7 percent lower, gross farm revenue around 5 percent smaller, but also cash farm expenditure nearly 9 percent lower. This corresponds to a 10% price premium to generate the same cash surplus as a conventional farm. In the EU, milk produced per ha on organic farms is 70% to 80% of that on similar conventional farms, and the direct costs are lower (40%) (Connolly, 2002). Shadbolt et.al. (2004) refer to a 22-37% higher production cost for organic milk in the EU, a 13-23% cost increase in California, and an 11% increase in Argentina.

For the sheep and beef sector the MAF study of New Zealand production estimated a decrease in farm working expense by 8% and in revenues by 25% (no premium for organic). A premium of 23% is required to achieve the same EFS as a conventional farm (Ministry of Agriculture and Forestry, 2002). The figures are similar for EU; overall direct costs of production decline by 10% under organic production and the output decrease by 15% (Connolly, 2002).

Differences in revenues and costs on organic and conventional farms in NZ

This section reports some preliminary findings of the ARGOS programme. Initial results from the sheep and beef farms suggest that there maybe differences in cost of production. The initial results also indicate differences in resource configuration (production factors) that may well have impact on the economics and dynamics of agriculture. These results are illustrated in figures 4, which show the revenue, expenditure and operating surplus per hectare. These differences are statistically significant, but are based only on two years of data.



	Revenue	Cost	Operating Surplus
Organic	769.1304403	460.2565736	308.8738667
Integrated	794.3282347	552.0774393	242.2507954
Conventional	1004.61579	613.7620052	390.8537851

Figure 4. Per hectare comparison of sheep and beef farms in NZ.

In the case of kiwi fruit there are some preliminary results of the differences across farm types, as follows:

- Cash Orchard Expenditure/ha was approx $5000 less for organic compared to both other systems.
- Wages/ha were approx $4000 less for organic compared to both other systems.
- Fertilisers/ha were approx $650 more for organic compared to Hayward Kiwigreen.
- Repairs and Maintenance are approx $1600 less for organic compared to Hayward Kiwigreen.

These data when further analysed will provide information on relative production costs between organic and other production systems which will enable the model specification to be altered and further scenarios run.

Clearly there are considerable uncertainties facing the agricultural sector in relation to the development of the organic sector. These include the ability to predict premiums and growth rates in the various markets. In addition the impact of additional production costs is largely unknown and thus affect the decisions whether to convert to organic production. Therefore, the next section of the paper, using the trade model (LTEM), assesses some of the potential impacts on NZ agricultural returns relating to various scenarios of price premiums and production costs.

Modelling changes in markets and trade

The empirical model used in this analysis was the LTEM a multi-country, multi-commodity model, focusing on the agricultural sector in a partial equilibrium framework. The commodities and countries used in the model are given in appendix 1. The framework is used to analyse the impact of various shifts in demand or supply on the country and commodity based price, net trade levels and producer returns, with the commodities in the LTEM differentiated to organic and conventional. The model specification is given in brief below in more detail in Cagatay & Saunders (2003).

LTEM is a dynamic framework since it provides the time paths of endogenous variables within a short to medium-term time horizon. Basically, the model works by simulating the commodity based world market clearing price on the domestic quantities and prices, which may or may not be under the effect of policy changes, in each country. LTEM allows the application of various domestic and border policies explicitly such as production quotas, set-aside policies, input and/or output related producer subsidies/taxes, consumer subsidies/taxes, minimum prices, import tariffs and quotas, export subsidies and taxes.

Excess domestic supply or demand in each country spills over onto the world market to determine world prices. The world market-clearing price is determined at the level that equilibrates the total excess demand and supply of each commodity in the world market by using a non-linear optimisation algorithm. The general equation structure of each commodity at country level in LTEM is represented by eight behavioural equations and one economic identity as the in the equations 1 to 9.

$$
\begin{array}{lcll}
pt_{ij} & = & f\,(WDpt_i,\ ex_j) & (1) \\
pp_{ij} & = & g\,(pt_{ij},\ Zsp_j,) & (2) \\
pc_{ij} & = & h\,(pt_{ij},\ Zdp_j) & (3) \\
qs_{ij} & = & l\,(pp_{ij},\ pp_{ijk},\ pp_{ij,\,org},\ ssft_{ij,}\ Zsq_j) & (4) \\
qd_{ij,\,fo} & = & m\,(pc_{ij},\ pc_{ijk},\ pp_{ij,\,org},\ dsft_{ij,\,fo},\ pinc_j,\ pop_m) & (5) \\
qd_{ij,\,fe} & = & m'\,(pc_{ij},\ pc_{ijk},\ pp_{ij,\,org},\ qp_{dairy,\,j},\ dsft_{ij,\,fe}) & (6) \\
qd_{ij,\,pr} & = & m''\,(pc_{ij},\ pc_{ijk}) & (7) \\
qst_{ij} & = & n\,(qs_{ij},\ pc_{ij},\ stsft_{ij}) & (8) \\
qt_{ij} & = & qs_{ij} - (qd_{ij,\,fo} + qd_{ij,\,fe} + qd_{ij,\,pr}) - \Delta qst_{ij} & (9)
\end{array}
$$

The trade price (pt) of a commodity ($_i$) in country ($_j$) is determined as a function of world market price ($WDpt_i$) of that commodity and the exchange rate (ex_j). The total effect of world market price on trade price of the country is determined by the price transmission elasticity (Equation 1).

Domestic producer (pp_{ij}) and consumer (pc_{ij}) prices are defined as functions of commodity i's trade price (pt_{ij}) , the commodity specific production and consumption related domestic support/subsidy policies and tariffs (Zsp_j and Zdp_j) (Equation 2; 3).

The domestic supply and demand equations are specified as constant elasticity functions that incorporate both the own and cross-price effects.

Supply (qs_{ij}) is specified as a function of producer prices of the own (pp_{ij}), other substitute and complementary (pp_{ijk}) commodities and a supply shifter ($ssft_{ij}$), which represents economic factors that may cause shifts in supply. In addition to a policy variable (Zsq_j) that reflects production related policies/tariffs and the supply equation is specified to include the cross-price ($pp_{ij, org}$) effect of conventional and organic products on each other (Equation 4).

Total demand is separated into food ($qd_{ij, fo}$), feed ($qd_{ij, fe}$) and processing industry ($qd_{ij, pr}$) demand. Food demand ($qd_{ij, fo}$) is specified as a function of consumer prices of own (pc_{ij}), other substitute and complementary (pc_{ijk}) commodities. The demand equation is specified to include the cross-price ($pp_{ij, org}$) effect of conventional and organic products on each other and a demand shifter ($dsft_{ij, fo}$) representing economic factors that may cause shifts. Furthermore a per capita real income ($pinc_j$) variable in the economy and growth in population (pop_m) are included (Equation 5).

Feed demand ($qd_{ij, fe}$) is defined as a function of pc_{ij} and pc_{ijk}, the cross-price ($pp_{ij, org}$) effect of conventional and organic products on each other, the extent of dairy production ($qp_{dairy, j}$) and a demand shifter ($dsft_{ij, fe}$) (Equation 6).

Processing industry demand ($qd_{ij, pr}$) is defined as a function of pc_{ij} and $pc_{ijk.}$ In addition, food and feed demand functions also incorporate cross-price effect of conventional and organic products on each other (Equation 7).

The stocks (qst_{ij}) are determined as a function of quantity supplied (qs_{ij}), consumer price (pc_{ij}) and a stock shifter ($stsft_{ij}$) [equation 8]. There is no stock demand for raw and liquid milk. It is assumed that raw milk is stocked in the form of butter, cheese and/or milk powder.

Finally net trade (qt_{ij}) of the country ($_j$) in commodity ($_i$) is determined as the difference between (domestic) supply and sum of (domestic) demand components and stock changes in the related year [equation 9]. Since it is assumed that all produced raw milk is utilised in the form of processed products, raw milk is not traded in LTEM.

Although commodities are differentiated as organic or conventionally produced, each grouping of differentiated commodity is considered homogenous across countries of origin and destination and to physical characteristics of the product. Therefore commodities are perfect substitutes in consumption in international markets. Importers and exporters are assumed to be indifferent about their trade partners. Based on this the model is built as a non-spatial type which emphasises the net trade of commodities in each region. However, the supply and demand shares of countries in trade can be traced.

The model simulates results using various assumptions in proportions of organic and conventional production, as well as assumed impacts or shocks to markets of various scenarios relating to the preference for organic production.

Empirical Analysis

By running various scenarios in the LTEM associated with conventional and organic products, the model was used to estimate the impact on trade, prices, output, and thus producer returns for key agricultural commodities. The LTEM output is an estimation of the impact on producer returns from different assumptions relating to market developments for conventional and organic commodities. These assumptions include:

- Shifts in consumer preferences towards organic produce revealed by consumer willingness to pay a premium for organic produce. The shifts in preferences are incorporated through the use of exogenous shifts in intermediate and final demand.

- Shifts in supply curve incurred by increase in production costs associated with organic production.

This is tested against assumptions relating to the proportions of organic consumption and production share in New Zealand (NZ) and its three most important trade partners within organics; Australia (AUS), United States (US), European Union (EU) and Japan (JP). No changes in other countries in the LTEM-model were simulated.

The scenarios were developed to reflect expectations for developments in organic production on basis of the development within organics worldwide. The scenarios are based upon varying four factors relating to the organic market as follows.

Shift in consumer preference towards organic produce.

Increased consumer preference towards organic food produce implies willingness to pay an organic food premium. Price premiums for organic products in general vary a lot but most likely the longer term premiums are within the 10-30 percent “boundary”.

Thus three levels of price premiums were used in the model:

- 0 percent to reflect a situation where organic produce does not attract a premium
- 10 percent to reflect a low premium for organic produce
- 30 percent to reflect the higher premium, which is closer to current market premium

Shifts in supply curve due to increase in production costs with organic production.

In general, converting from conventional to organic production results in a decrease in production which is equivalent to a shift in the supply curve. European countries, US and JP have similar types of production methods and intensity of production; whereas NZ production is more extensive.

Thus the scenarios used in this paper are:

- A zero change in producer costs in NZ, AUS, EU, US and JP
- 10 percent increase in NZ, AUS, EU, US and JP.

Organic consumption and production rate was modelled at; 5 percent in NZ and 10 percent in US, EU and JP. Reviewing the literature this does imply growth in the organic sector, a more conservative estimate was made for NZ.

Thus in total 6 different scenarios were run. These scenarios reflect both the most likely outcomes of given market development but also some extremes to determine high risk and benefit possibilities.

The scenarios were modelled with the base year 1997, up till 2010. This report presents the 2010 model results by showing the overall effect on organic producer returns for NZ, Australia, US and the EU. These are compared with a base solution of no change in premium or production costs.

Results

Table 3. Changes in Producer Returns from Demand Preferences and Productivity Shifts

	New Zealand		US		EU		Australia	
	No supply shift	10% supply shift	No supply shift	10% supply shift	No supply shift	10% supply shift	No supply shift	10% supply shift
No demand effect	Base	1.12	Base	1.20	Base	1.27	Base	1.51
10% organic premium	1.96	0.37	1.22	0.19	2.06	0.48	2.53	0.63
30% organic premium	8.01	1.09	4.29	1.90	7.25	3.54	9.26	4.54

These results show that assuming 5 per cent organic production and consumption in NZ and 10 per cent in the rest of the world a10 per cent price premium increases total producer returns by between 1.2 and 2.53 per cent. A 30 per cent premium for organic products increases returns by over 4 per cent in the US and by over 7 per cent in the EU. However, a 30 per cent premium increases returns by 8 and 9 per cent in NZ and Australia respectively.

In case of increase in producer costs for organic production and assuming no price premium, there is a fall in producer returns. An increase in production costs even with a 10 per cent price premium for organics also leads to a fall in producer returns in the US and a small increase in returns in the other countries reported above. A 30 per cent price premium and 10 per cent increase in producer costs does lead to an increase in returns but by only 1 per cent in NZ. Thus impact on sector does seem sensitive to producer cost differentials.

Conclusion

The aim of this study has been to explore under what assumptions the development of organic agriculture would be beneficial.

The modelling results show that the countries modelled here might benefit by increasing production of organic commodities. The simulations indicate that given price premiums there are increases to returns, as expected. However, with increase in production costs whilst producer returns fall this is insignificant however it does reduce the benefits of the price premiums, again as expected. This does show the sensitivity of returns to increased production costs.

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APPENDIX 1

LTEM Model

The countries/regions included in the model are:

Argentina (AR)
Australia (AU)
Canada (CN)
Europe (EU) – 15 nations
Japan (JP)
Mexico (MX)
New Zealand (NZ)
United States (US)
Rest of the World (RW)

The commodities included in the model are:

Wheat (WH)
Coarse Grain (CG)
Maize (MZ)
Oilseeds (OS)
Oilseeds meals (OM)
Oils (OL)
Beef (VL)
Sheep Meat (SM)
Milk, farm (MK) - assumed not traded
Milk, liquid & other products (ML) – assumed not traded
Butter (BT)
Cheese (CH)
Whole milk powder (MW)
Skim milk powder (MS)
Apples (AP)
Kiwi fruit (KW)

The above listing is separated into those commodities that are produced conventionally and those produced organically.