Update report:
Food prices and biofuels

June 2009

Report to EECA and MAF Policy
Authors
Charlotte Cudby    Nimmo-Bell & Company Limited
Michael Yap       Nimmo-Bell & Company Limited

Disclaimer
While all due care has been taken to ensure the accuracy of information in this report, no responsibility or liability is accepted for any errors or omissions of fact or opinion, or for any loss or damage resulting from reliance on, or the use of, the information it contains. Nimmo-Bell has relied upon information provided to it, and assumed without independent verification that the information is accurate and complete. This report is not intended for general circulation or publication, and may not relied upon by any party, other than the party to whom it is addressed, without Nimmo-Bell's express written approval. The report has been prepared for the specific purpose stated, and any party that relies on it for any other purpose, without Nimmo-Bell's express written approval, does so at its own risk.
# Table of contents

1 Executive summary ......................................................................................................... 1  
2 Introduction ..................................................................................................................... 5  
3 Food prices ....................................................................................................................... 6  
   3.1 International food prices .......................................................................................... 6  
   3.2 Food prices in New Zealand .................................................................................... 8  
4 Changes in food price drivers ........................................................................................ 9  
   4.1 Demand factors......................................................................................................... 9  
   4.1.1 Consumption ........................................................................................................... 9  
   4.1.2 Macroeconomic forces .......................................................................................... 10  
   4.1.3 Food policy ............................................................................................................. 12  
   4.1.4 Biofuel related demand ......................................................................................... 12  
   4.2 Supply.......................................................................................................................12  
   4.2.1 Resource constraints to inputs of production ...................................................... 13  
   4.2.2 Climate events ........................................................................................................ 15  
   4.2.3 Agricultural policy ................................................................................................ 15  
   4.2.4 Stockpiles ................................................................................................................. 16  
   4.2.5 Commodity markets .............................................................................................. 16  
   4.3 Summary – supply/demand factors ....................................................................... 17  
5 Role of biofuels .............................................................................................................. 17  
   5.1 Biofuels production & current policies .................................................................. 17  
   5.1.1 United States ........................................................................................................... 17  
   5.1.2 European Union ..................................................................................................... 20  
   5.2 Changes to biofuels policies ................................................................................. 21  
   5.2.1 United States ........................................................................................................... 21  
   5.2.2 European Union ..................................................................................................... 22  
   5.2.3 Conclusion on future direction ............................................................................. 22  
6 Conclusions about food prices and biofuels .............................................................. 23  
   6.1 Retail food prices ..................................................................................................... 24  
7 Implications for New Zealand ...................................................................................... 26  
8 References ....................................................................................................................... 28
Food Prices and Biofuels – Update Report

1 Executive summary

A September 2008 report commissioned by EECA and MAF Policy explored the linkage (if any) between rising food prices and biofuels production. In 2008, the Energy Efficiency and Conservation Authority (EECA) together with Ministry of Agriculture and Forestry (MAF) Policy sought an international review of literature to better understand the causes of rising food prices and their linkage (if any) to biofuels production. The report released in September¹ aimed to inform the New Zealand debate on the impact of first generation² biofuels on food prices.

As food prices have declined, this update report seeks to explore the reasons why. Since then, some of the key drivers of food prices have reversed direction leading to a rapid decline in commodity prices during the latter part of 2008. The International Monetary Fund (IMF 2009) reports food commodity prices decreasing 34 percent in the second half of 2008 (led by corn, soybeans, and edible oils).

This report reviews new³ international literature with the aim to understand what factors have driven food prices back down, and comment on what role (if any) biofuels have had.

The major drivers of food prices remain the same but the direction of these drivers has reversed due to the global financial crisis and recession, and expanding production. Our review confirmed that the major drivers of food prices identified in the September report⁴ remain the same - oil price, food supply and demand, the US dollar (USD), and market distorting policies – but the direction these drivers are moving in has reversed. The two main events that explain this change are the global financial crisis and recession, as well as greater than expected crop production in 2008.

¹ The final report of this work prepared by Nimmo-Bell & Company Limited is available from http://www.eeca.govt.nz/node/1516
² Biofuels – first generation transportation fuels derived from crops such as maize, sugarcane, grains, rapeseed and soybean.
³ Released since mid-2008
⁴ The September 2008 report discussed the main food price drivers and how they interacted – this report does not repeat this discussion. This report focuses on the shorter term recent global developments since then.
The lower oil price reduced biofuel demand. The USD appreciated and food production increased. These three trends together lowered food prices.

Food producers’ margins are squeezed with low output prices and high input costs. Credit is also difficult to obtain. Hence, food production is likely to contract again.

Food prices have decreased recently because of short term economic changes.

So the drivers that have moved food prices down in the last nine months are primarily short term economic changes. The longer-term fundamental drivers outlined in the September 2008 report remain the same, and the recession has simply muted their influence on food markets probably just for as long as the downturn lasts.

These longer-term drivers include (for example):

- growing food demand from population growth and increasing affluence;
- supply constraints for food commodity production (e.g. available land and water)
- market distortions in the global agricultural system means that food commodity prices are more volatile than they otherwise would be.

Food commodity prices have decreased quicker than production costs, squeezing profit margins. If input prices remain high relative to output prices, then supply of food commodities is likely to contract again. The oil price is rising again, from a low of US$38 at the end of 2008 to US$70 in June 2008, so it remains to be seen whether energy intensive inputs (e.g. fertiliser) adjust or not. The financial crisis also meant that credit was harder to obtain, and this disproportionately affects developing countries, adversely impacting on agricultural development.

Even before the financial crisis, access to credit was a major barrier for agricultural development in less developed countries.
### When oil prices are lower (as they are now), biofuel support policies are now a more important influence on their continued production.

Biofuel growth in the few years leading up to 2008 was driven mainly by high oil prices (as high as US$143 per barrel in the third quarter of 2008). But now, at much lower oil prices, biofuel support policies have become a more important influence on their continued production. The US mandates that a certain amount of renewable fuel must be blended with gasoline, while in both the US and EU, the use of subsidies means biofuel production can continue even when it would be otherwise uneconomic. These types of support measures put a floor to demand and price falls. This means that the demand for biofuels feedstocks, while it has decreased, will have fallen less than it would have without those policies (meaning the price decline for those commodities would also have been less).

### Biofuels policies are evolving. Lifecycle impacts of biofuels on greenhouse gas reductions and indirect land use change are becoming more important.

Biofuels policies are changing, however, in response to concerns about the lifecycle impacts of biofuel production. Support policies for biofuels are increasingly considering the greenhouse gas reduction potential of different biofuel types, and the indirect land use change (ILUC) impacts (e.g. on other food crops not used for biofuels such as wheat, and/or on deforestation).

### The policy changes are in their infancy.

But these changes are still in their infancy. The precise impacts on food markets remains to be seen, and will depend on how the policies are implemented. For example, in the USA the Obama Administration’s new policies look set to give greater encouragement to second generation biofuels, but there is a proposed transition period where support for corn-based ethanol will remain, but for how long and in what way is still unclear.

### Biofuel technology is changing rapidly. The long term impact of biofuels on food markets is uncertain.

Biofuel technology is also changing rapidly, with increasing investment in second generation technologies, as well as new ideas emerging around food based biofuel feedstocks (e.g. use of corn-based ethanol by-products for cattle feed in the US). Concerns about the ILUC impacts of second generation biofuels remain also, particularly on tropical deforestation. So the long term outlook for the impact of biofuels on food markets remains highly uncertain.
At the retail level, overall inflation has dropped sharply, but food inflation has not dropped by as much and is still particularly high in developing countries. Retail prices do move differently to commodity prices for a range of reasons set out in the September 2008 report. Ultimately it is about the proportion of food that consumers buy that is made up of various commodities, versus the proportion of transport, energy, labour and other costs such as exchange rates (CBO 2009).

In New Zealand, food commodities only account for a low proportion of retail consumer food products, which means the lower food commodity prices will not directly translate through to retail prices in New Zealand. There will be some impact, but it will take time for this to flow through the supply chain. In addition, the New Zealand dollar has depreciated against the USD (although it is appreciating again now, but not to the levels reached in 2008) and this will temper any food price decline flow through to retail prices.

Our distance to markets and sources of imported food mean that oil price and exchange rate changes and their impact on supply chain costs (e.g. wages, energy, transport and storage) continue to have a much greater influence on retail food prices than commodity prices.

In conclusion, the core messages in the September 2008 report still hold. The primary drivers of food prices are oil prices, macroeconomic changes influencing exchange rates, and underlying supply and demand for food. Biofuels adds another dimension to the equation, but biofuels are not a primary driver of food prices. Biofuels policies have more impact on biofuels use, and other policies such as trade and agricultural policies will play a major role on the linkage between biofuels and food markets in the future.

\[6\] Many studies reinforced conclusions reached in the September 2008 report that energy costs were the single most important influence on retail food prices.

\[7\] A USDA study (cited in Mirasol 2009), found that labour costs accounted for 38 cents in each dollar consumers spent on food in the US.
2 Introduction

The Energy Efficiency and Conservation Authority (EECA) together with Ministry of Agriculture and Forestry (MAF) Policy sought an update of the Nimmo-Bell Rising Food Prices and Biofuels report (September 2008), taking into account recent developments in the global economy that have taken place since the initial report was written, such as:

- The global financial crisis and recession.
- The collapse in the oil price.
- The significant drop in many agricultural commodity prices\(^8\).
- The appreciation of the US dollar.
- The higher global production of many agricultural commodities relative to expectations in mid-2008.

The objectives of the September 2008 report were twofold: to identify primary drivers of food prices, and to identify their linkage (if any) to biofuels production. The report concluded that the primary drivers of rising food commodity prices were a combination of factors including; the high oil price, the weak US dollar (USD), high food commodity demand and limited supply response, and market distorting policies. Biofuels played a part in rising food commodity prices, but it was only part of the story and there was very little impact from biofuels on retail prices in developed countries.

This update report assumes the reader is familiar with the September 2008 report, and does not go over those arguments. Rather this report reviews recent international literature to examine the impact of recent economic developments on food prices and biofuels.

As with the September 2008 report, figures used in this report are sourced from various international literatures. They are chosen to illustrate trends and observations and will not have consistent structures and time periods. Major food commodities generally refer to the basic commodities grains and vegetable oils.

Definition of terms used in this report follows:

- Food prices and food commodity prices - generally refer to wholesale or export prices.
- Food retail prices - prices paid by consumers for products that have been processed and handled through the supply chain.
- Terms used interchangeably include grains/cereals, corn/maize and rapeseed/canola.

\(^8\) though these are still high by historic standards
• Coarse grains - subset of grains that are used for animal feed.

• Biofuels – first generation transportation fuels derived from crops such as maize, sugarcane, grains, rapeseed and soybean. This study focuses on ethanol and biodiesel as they represent the bulk of renewable transport fuels produced.

The report begins with an introduction to international food commodity price trends, and New Zealand food price trends (Section 3). Section 4 explores the causes of commodity price decreases in terms of demand and supply dynamics. Section 5 outlines the current state of biofuels production, with a comment on recent policy developments. Section 6 makes conclusions about food prices and retail food prices. The report ends by discussing implications for New Zealand (Section 7).

3 Food prices

3.1 International food prices

The third quarter of 2008 saw a sharp market correction that ended the commodity price boom of the last five years. By the end of 2008 the International Monetary Fund (IMF) commodity price index had decreased 55 percent from its peak in July – see Figure 1.

Figure 1: Commodity price trends

The rate of decline in food commodity prices is less than other commodities, due to the lower price elasticity of the underlying demand – demand for food remains high. The demand and supply drivers influencing lower food commodity prices are discussed in Sections 4.1 and 4.2.
Figure 2 illustrates the relative trends in consumption, production and prices for major food crops. Production now exceeds consumption leading to expanding stockpiles.

**Figure 2: Food price index, production, consumption and stockpiles**

Food commodity prices decreased by 34 percent in the second half of 2008; led by corn, soybeans, and edible oils (IMF 2009). Figures 2-4 illustrate this decline, but also show that prices remain above long-term norms (especially when expressed in non-USD terms; Section 4.1.2. discusses the impact of exchange rates), and the trend in 2009 to date indicates prices may have bottomed out. The trend has shifted upwards once again, but just marginally (see Figures 3 and 4).

**Figure 3: Selected food commodity price trends**

---

9 Major food crops represented here are wheat corn rice and soybeans (IMF 2009).
The UN Food and Agriculture Organisation (FAO) (2008) cautions that developing countries are the most affected by higher food import costs. Less-developed countries and low-income-food-deficit countries experienced increased food import costs of about 33 percent over 2008 compared with 18 percent in developed countries. With the financial crisis, poorer countries will also find it more difficult to get finance needed for their food (and other) imports. Later FAO work (2009a) confirms that high food prices are continuing in developing countries despite the significant decrease in international commodity prices, even when all prices are denominated in US dollars.

3.2 Food prices in New Zealand

New Zealand’s inflation data released in April 2009 showed that both overall consumer price index (CPI) and food price inflation for the past year were on a downward trend. The overall annual CPI increase of 3 percent to April 2009 was less than the high of 5.1 percent reached in the third quarter of 2008. The transport industry was identified as the main contributor of the CPI slowdown because of the lower oil price (NBR 2009).

Food price inflation remains higher than the CPI (as was discussed in the September 2008 report), at 7.6 percent to April 2009. Yet it was the smallest annual increase since July 2008 (see Figure 5). It was also the first month where the monthly change was negative; since March 2009 food prices decreased 0.6 percent, with the most

---

10 The Food Price Index is the average of 6 commodity price indices (Meat, Dairy, Cereals, Oils & Fats, Sugar) weighted with the average export shares (FAO 2009b).
significant decrease due to the fruit and vegetables subgroup (down 2.0 percent), and in particular kiwifruit (down 54.8 percent)\(^{11}\) (Statistics New Zealand 2009).

**Figure 5:** New Zealand food price index

![Food Price Index](image)

Grocery food prices in the year to April 2009 increased 6.7 percent, with bread experiencing the greatest increase at 12.8 percent while rice was 4\(^{th}\) at an increase of 44.9 percent (Statistics NZ 2009).

## 4 Changes in food price drivers

The September 2008 report\(^{12}\) discussed the main food price drivers and how they interacted – this report does not repeat this discussion. The fundamental long-term trends noted in that report remain valid today – these include, for example, population growth, changing diets, thin international trade, declining investment in productivity research and so on. This report focuses on the shorter term recent global developments since September 2008.

### 4.1 Demand factors

#### 4.1.1 Consumption

The growth in demand for food commodities has slowed (see Figure 6), but only marginally and not as significantly as commodity prices have declined. Food commodity demand by developing countries has not changed much at all. Demand changes from population and income usually occur gradually and their impacts on world markets and prices are not as significant in the short term as events such as the financial crisis or supply shortages (FAO 2008). High food prices during most of 2008

\(^{11}\) Kiwifruit is coming into season and large price falls usually occur in April and May.

\(^{12}\) Section 3.1 and Figure 1.
did lead to an initial contraction in demand from consumption, but due to the inelastic nature of food demand, that alone would not have accounted for the decline in prices. Demand for food commodities for biofuels dropped significantly as shown in Figure 6, and that has been due to the decline in oil prices (see Section 4.2.3). But it was the macroeconomic forces (discussed next, Section 4.1.2) that have been the major influence on lower food commodity prices (Abbott et al 2009).

**Figure 6: Change in demand for major food crops**

![Figure 6: Change in demand for major food crops](source: IMF 2009)

Most key studies reviewed for this report (e.g. USDA 2009b, IMF 2009, World Bank 2009a) suggest that when economic growth picks up, the key demand forces influencing rising commodity prices during 2008 will continue particularly population and income growth in developing countries and supply constraints (particularly with the uncertainties around a changing climate).

### 4.1.2 Macroeconomic forces

The FAO (2008), IMF (2009), Farm Foundation (Abbott et al 2009), and International Food Policy Research Institute (IFPRI 2008) all attribute the decline in food prices primarily to macroeconomic forces connected to the financial crisis and global recession, particularly financial flows, exchange rates and global demand. These factors – particularly the appreciation of the USD - had a more immediate impact on food commodity prices than did cost push and substitution effects (e.g. for biofuels) (Abbott et al 2009).

The IMF (2009) estimated that in the last quarter of 2008, advanced economies’ gross domestic product (GDP) (North America, Europe, advanced Asia) contracted 7.5 percent\(^{13}\), and the same amount again in the first quarter of 2009. Emerging economies are also contracting with an overall decrease in GDP for the last quarter in 2008 of 4 percent\(^{13}\) (though some economies continue to expand, though generally at

---

\(^{13}\) From the same period a year earlier.
slower rates than in 2008). The decline in GDP is attributed to both less trade and more difficult financial conditions.

Another influence is lower oil prices (discussed later in section 4.2.1), which decrease US import costs, improving the trade balance and influencing the dollar to appreciate. An appreciating currency then decreases the prices of traded goods such as oil and commodities. In addition, the increasing link between energy and food prices (the energy equivalence of food) adds a mechanism by which the exchange rate/crude oil price changes are passed on to agricultural prices (Abbott et al 2009).

In addition, spot commodity prices have generally declined much more than futures prices, meaning that futures curves for many of the major commodities are now showing an upward sloping trend, suggesting that markets expect prices to rise in the future (but not necessarily to the highs experienced in 2008 in the short-medium term). This, combined with lower demand, provides incentives for further stockpiling (IMF 2009). Stockpiles are discussed in Section 4.2.4.

**USD appreciation**
The USD began to appreciate in July 2008, when markets realised the rest of the world was also experiencing major flow-on effects from the US recession and financial crisis (Abbott et al 2009). Capital began to flow back into safe havens such as the United States, as crisis hit financial institutions around the world have increased their preferences for government securities. This increased the pressure on currencies such as the USD to appreciate (IMF 2009, World Bank 2009a).

Figure 7 shows major currency movements. The Euro, U.S. dollar, and Yen have all appreciated notably, while the Chinese Renminbi and other currencies pegged to the dollar (including those in the Middle East) have also appreciated in real effective terms. Most other emerging economy currencies have weakened sharply and for those that are net food importing countries this could suggest (a priori) food prices in those countries may remain higher (IMF 2009).
4.1.3 Food policy
In a general sense, protectionism is on the increase; the World Bank (2009b) reported that several countries, including 17 of the G20 have implemented trade distorting measures affecting other countries since the G20 signed a pledge in November 2008 to avoid such measures. While it is outside the scope of this report to delve into this in any detail, the highly protected nature of food markets means it is likely this trend will be having an impact on food commodities and their prices. General trends were covered in the September 2008 report.

4.1.4 Biofuel related demand
Demand for biofuel feedstocks from food crops has declined markedly due to the lower oil price (see Section 4.2.1). Because of this, food commodity prices were considered to have declined more than they otherwise would have, as food demand remains high\(^{14}\) (IMF 2009). Biofuel production is outlined in more detail in Section 5.1.

4.2 Supply
The September 2008 report noted the existence of supply lags, where supply tends to be slow to respond to increased demand and/or prices. Indeed, this is what we are seeing now as producers responded to high prices in 2008 with increased global production. The increase is from more crop area and higher yields (mainly due to

\(^{14}\) The September 2008 report showed that biofuels were responsible for 59% of demand growth in grains, and 56% of demand growth in vegetable oils (Nimmo-Bell 2008).
more favourable climatic conditions, rather than significantly increased productivity per se) (IMF 2009) – see Figure 8.

Figure 8: World harvest of grains and oilseeds (000 hectares)

4.2.1 Resource constraints to inputs of production

The major changes here have been:

- increased crop area in response to persistent high output prices in the years leading up to 2008 (as noted above);
- marked decrease in the oil price, but related production costs have not decreased as much (e.g. energy, fertiliser);
- reduced availability of credit due to the financial crisis.

Other long term resource constraints discussed in the September 2008 report remain, including those around land and water. Developing countries, in particular, face additional barriers such as low investments in rural infrastructure and agricultural research; these barriers have existed for some time, but have been exacerbated by the recession.

Oil

Oil has been the commodity most affected by the rapid decline in global economic activity; prices peaked at an all time record (real and nominal) in the third quarter of 2008 at US$143/barrel, and declined rapidly to reach US$38/barrel by the end of 2008 (Abbott et al 2009). Since then it has been on a gradual rise (with much volatility) and in recent months has generally been in the range of US$50-$60, though just today the oil topped US$70 (Hall 2009).

The economic contraction in developed countries significantly reduced demand for oil in late 2008, while oil demand from developing countries slumped in early 2009 as the flow-on impacts of the US recession began to affect the global economy (IMF 2009) – this is illustrated in Figure 9, below.
Figure 9: Change in oil consumption

Data on futures options for oil shows that in the short-medium term it is more likely that prices will be higher rather than lower than the trough reached in late 2008, but the recovery may not necessarily reach the highs experienced during 2008 either. The key point is that the market is still highly uncertain (IMF 2009) – see Figures 10 and 11.

Figure 10: Crude oil futures (1)
Production costs
The September 2008 report outlined that many production costs are influenced significantly by oil prices. Production costs have not decreased as much as oil prices have. Also, grain and oilseed output prices have in addition decreased quicker than production costs, meaning profit margins will be tighter for producers in 2009/10. If lower commodity prices and tight margins continue, production may decrease putting upward pressure on prices. In response to weaker demand particularly for biofuel production, and tightening credit conditions, global production area and fertilizer use is, indeed, expected to reduce again. At the same time, stocks are still at relatively low levels despite the recent increase. So the lower expected supply will likely put a floor on price decreases (Abbott et al 2009; IMF 2009).

Availability of credit
Availability of credit is another key factor in the face of the financial crisis, and this will adversely affect developing countries (where it was a constraint to agricultural development even before the financial crisis) (IMF 2009; World Bank 2009a).

4.2.2 Climate events
More favourable growing conditions during 2008, relative to the poor harvests experienced in 2006/2007 (Nimmo-Bell 2008) contributed to greater than expected production now coming onto world markets (refer also to 4.2.4 below on stockpiles).

4.2.3 Agricultural policy
The global supply response discussed above was uneven in terms of where the production increases came from, with the bulk of the additional production coming from developed countries FAO (2008). The September 2008 report noted that, particularly in developing countries, there was a trend towards the imposition of trade restrictions to protect domestic markets from the higher food prices experienced
in 2007-08. Farmers in those countries - often burdened with higher input costs and artificially low output prices – therefore had less incentive to expand production.

Conversely, many agricultural programmes in countries such as EU, US, Japan, South Korea and many others are based on price supports so that when commodity prices are low, subsidies to producers increase and production would, therefore, be higher that it otherwise would be. The World Bank estimates that trade-distorting subsidies in the US are likely to rise by US$1.8 billion between 2008 and 2009 (or an increase of 22 percent) (World Bank 2009b).

4.2.4 Stockpiles
Because of the radically different economic outlook, the US Department of Agriculture (USDA) (2009a) revised its world supply and use estimates for key commodities and Table 1 below shows how production has increased and use has decreased from expectations in 2008 (see Sections 4.1.1. and 4.1.4. for demand factors), and as a result stocks have been rebuilding. That said, stocks are still very low relative to historic levels, and this contributes to food market volatility.

Table 1: Revised USDA forecasts for food production, use and stocks

<table>
<thead>
<tr>
<th>% Change in USDA’s World Agricultural Supply and Demand Estimates (between May 2008 and January 2009)(^\text{15})</th>
<th>Production</th>
<th>Use</th>
<th>Ending Stocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>07/08</td>
<td>1.5%</td>
<td>-0.4%</td>
</tr>
<tr>
<td></td>
<td>08/09</td>
<td>1.7%</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Wheat</td>
<td>07/08</td>
<td>0.6%</td>
<td>-0.4%</td>
</tr>
<tr>
<td></td>
<td>08/09</td>
<td>4.1%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Rice</td>
<td>07/08</td>
<td>1.0%</td>
<td>0.9%</td>
</tr>
<tr>
<td></td>
<td>08/09</td>
<td>1.6%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Total Grains</td>
<td>07/08</td>
<td>0.9%</td>
<td>-0.3%</td>
</tr>
<tr>
<td></td>
<td>08/09</td>
<td>3.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Soybeans &amp; Oilseeds</td>
<td>07/08</td>
<td>0.5%</td>
<td>-1.7%</td>
</tr>
<tr>
<td></td>
<td>08/09</td>
<td>-3.1%</td>
<td>-3.5%</td>
</tr>
</tbody>
</table>

Source: USDA 2009a

4.2.5 Commodity markets
The financial crisis indirectly impacted commodity markets as speculative investors liquidated their positions in commodities in preference to government securities (IMF 2009b).

\(^{15}\) The table shows the percentage change in forecast estimates, not the actual change in production, use and stocks. For example, in January 2009 the USDA revised its May 2008 forecast for 2007/08 corn production upwards by 1.5%.
2009; World Bank 2009a). However, research indicates there is little linkage between the degree of speculative investing and the level of commodity prices (Abbott et al 2008, cited in Nimmo-Bell 2008).

4.3 Summary – supply/demand factors
The major drivers of recent food price declines are summarised in Table 2 below.

Table 2: Summary of drivers for recent food price declines

<table>
<thead>
<tr>
<th>Primary drivers</th>
<th>Secondary drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>USD appreciation from shifting financial flows due to the recession and financial crisis.</td>
</tr>
<tr>
<td>Demand</td>
<td>Lower oil price causing a rapid decline in biofuels feedstock demand.</td>
</tr>
<tr>
<td>Supply</td>
<td>Higher than expected production of food commodities from expanding crop area and more favourable growing conditions in 2008.</td>
</tr>
<tr>
<td>Demand</td>
<td>A slowing in the growth of food commodity demand. Longer-term fundamental population and income trends remain and demand has only marginally dropped off due to the recession.</td>
</tr>
<tr>
<td>Supply</td>
<td>While stockpiles have increased slightly, they remain at low historic levels putting a floor on price decline.</td>
</tr>
</tbody>
</table>

In addition, the future supply outlook is also likely to be influenced by:

- whether and how the oil price will flow through to input costs; and
- the impact on farmers from the reduced availability of credit.

5 Role of biofuels
The major change for biofuels since the September 2008 report is that the oil price is relatively much lower (hovering around the US$60 mark at the time of writing), rather than persistently above US$100. This means that while oil prices were the main force behind biofuel production during 2008, at low oil prices policies become a more important influence. Hence, this section focuses mainly on biofuels policies, with current production conditions discussed in 5.1. and future changes to biofuels policies are covered in 5.2.

5.1 Biofuels production & current policies

5.1.1 United States
The recent demand-pull linkage between agricultural commodities and oil due to the ability for food crops to be used as fuel was discussed in the September 2008 report.
During 2007-08, as farmers responded to high prices, increasing land area was dedicated to biofuels that may have otherwise been used for other crops so prices of these other crops (e.g. wheat) have also become increasingly sensitive to the oil price. Indeed, Figure 12 shows that key agricultural commodity prices have maintained their link with oil through the economic contraction.

\[\text{Figure 12: Change in major currencies 2000-Mar 2009}\]

The World Bank (2009a) explains that with current technology corn to ethanol is only economic when oil prices exceed US$50 per barrel. Above that, every percentage point increase in the price of an oil barrel causes corn prices to rise by 0.9 percent. Low oil prices should, therefore, render ethanol uneconomic, but US policies ensure production continues when it otherwise would be uneconomic – particularly the Renewable Fuel Standard (RFS) mandates which provide essentially a baseline level of biofuel production. Now that we are facing lower oil prices, policies have become a more important influence for biofuels.

Taking what happened in the US as an example; in late 2008, gasoline prices in the US fell reflecting the crude oil price, and they ended up being lower than ethanol, leading to reduced demand for corn for ethanol (Abbott et al 2009). In addition, some producers locked in high corn prices, and were not able to benefit when prices dropped (MFAT & NZTE 2009). Ethanol production capacity of around 2 billion gallons was idled in early 2009 (CBO 2009), and new investments were stalled. As a result gasoline/ethanol blenders found it difficult to find available supply to meet the increased 2008 RFS mandates, and this baseline demand helped keep ethanol prices high relative to gasoline and oil (Abbott et al 2009; CBO 2009).

Hence, ethanol and corn prices are higher than they would have otherwise been, and without the support policies less capacity would have come on-stream during 2008, and there would be less overcapacity now (Abbott et al 2009; Biofuels Digest 2009a). But the media is taking examples such as this in the corn sector to generalise all
biofuels rather than look at individual sectors and issues by merit. In this case it is policy that has put a floor on the price decline, which does not necessarily translate directly through to world food commodity prices or domestic retail prices in other countries, as was discussed in the September 2008 report.

Figure 13 shows ethanol production estimated under different oil price and policy scenarios\(^\text{16}\) (from left to right);

- blue represents the fixed subsidy (45 cents per gallon)
- light blue is RFS (15 billion gallons)
- red shows the effect of no subsidy
- yellow is a variable subsidy\(^\text{17}\) linked to the oil price

**Figure 13:** Oil price and policy scenarios (US ethanol production)\(^\text{18}\)

This illustration shows that the RFS creates a baseline level of production even when oil prices are low, as we are seeing today. At the other end of the spectrum, the blending wall breaks the link between oil and corn prices at high oil prices as shown in Figure 14 as the blending wall restricts ethanol use and, therefore, corn demand.

---

\(^{16}\) The September 2008 report outlines US policies.

\(^{17}\) The variable subsidy would be linked to the price of crude oil. This example assumes there is no subsidy if crude is higher than $70 per barrel, and the subsidy increases as crude falls below $70 (Abbott *et al* 2009).

\(^{18}\) The numbers at the top of each set of bars represent the implicit subsidy (rent) paid to ethanol producers/blenders by consumers ($/gal. of ethanol) (Abbott *et al* 2009).
In conclusion, the future direction of biofuels policies (as well as oil prices\textsuperscript{19}) is critical in understanding the link (if any) between biofuels and food markets and prices now and in the future. Many key biofuels policies are being reviewed; developments are discussed in Section 5.2.

### 5.1.2 European Union

Similar to the US, low oil prices and the credit crunch have reversed the fortunes of European biofuels producers. In the same period that oil prices fell over 65 percent, prices for European rapeseed for biodiesel fell only 30 percent, reducing demand for biofuels and squeezing margins (as input costs remained high). Many companies have ceased operating and new projects have been put on hold. The relative impact on different countries across the EU depended on the amount and means of government aid (Reuters UK 2009).

\textsuperscript{19} As discussed in Section 3.1, expected future oil prices are highly uncertain.
5.2 Changes to biofuels policies
Key biofuels policies are being reviewed; this section focuses mainly on US developments, but briefly covers EU directions as well.

5.2.1 United States
The current version of the ethanol subsidy is set to expire in 2010 and is, therefore, likely to be reviewed in 2009 (Abbott et al. 2009). New policies were announced by the Obama administration in early May, and whether these will replace current policies or simply augment them is unclear (except that it will replace the RFS, see below); future changes will also depend on consultation carried out on the proposed policies in the next few months.

The proposed policy is known as RFS2, and amends existing 2007 RFS rules. Essentially, there has been a change in emphasis away from corn-based ethanol towards biomass, cellulosic\(^{20}\) and other advanced biofuels as well as non-biofuel energy sources (e.g. wind, solar). Fuel eligibility for the RFS will now be determined by comparing lifecycle greenhouse gas (GHG) emissions profiles with gasoline or diesel\(^{21}\). It is expected that there will be a transition period where corn-based ethanol will still be promoted. Comments on the new rules will be open for 60 days and they are expected to be implemented by January 2010 (USDA 2009b; VNF 2009).

The continued support for ethanol producers (even as a transition measure) will be controversial in the face of increasing research suggesting that in some scenarios corn ethanol and soy biodiesel can produce more emissions over their lifecycles than gasoline (Grunwald 2009). In addition, other food producing groups (e.g. meat sector, food packaging groups) are lobbying against biofuels generally (rather than corn ethanol) and are blaming them primarily for increasing food prices in 2008 despite numerous reports to the contrary. In a similar vein environmentalists are concerned about indirect land use change (ILUC) elsewhere in the world (particularly the loss of rainforests), even though pressures on land uses from current biofuel production are largely occurring within the USA, with impacts on prices elsewhere. Many of these issues were discussed in the September 2008 report and are not, therefore, repeated here.

In addition to the proposed RFS2 rule, nearly $2 billion in funding opportunities has been announced for supporting existing investments in renewable energy and

\(^{20}\) For example, crop residues.

\(^{21}\) To be eligible for RFS2, advanced biofuels and biomass diesel must reduce GHG emissions by 50% relative to 2005 gasoline or diesel profiles, while cellulosic biofuel must be 60% below the baseline. Also, the EPA will have the power to adjust these thresholds downwards to ensure targets can be met (VNF 2009).
supporting new energy sources. Some funding will go to corn-based ethanol projects but the vast majority is expected to be on non-corn feedstock technologies (USDA 2009c).

5.2.2 European Union

As mentioned in Section 5.1.2., EU biofuels producers are struggling with lower oil prices and thinner margins. EU imports of US biodiesel have also been targeted by EU biofuels producers as another contributor to their misfortunes and anti-dumping duties were imposed in March 2009 (additional tariffs ranging from EUR26-41 per 100kg for an initial period of six months) (BioenergyWiki 2009).

Political support for biofuels in the EU is decreasing both because of the high profile food price debate of 2008, but more significantly because of concerns about the overall lifecycle impact of biofuels on the environment (Reuters UK 2009; BioenergyWiki 2009). Abbott et al (2009) notes that subsidies in the EU have fallen, but the future of mandates is still unclear; most countries are behind their ambitious targets which are unlikely to be realised in the present environment.

In addition, recent analysis by the EU on biofuels policies that impact on trade (Bouet 2009) has shown that biofuels market liberalisation would result in the best environmental outcomes because countries would be able to achieve least cost GHG emissions reductions by being able to trade with the most efficient producers. Producers such as Brazil would benefit, while the impact on developed country biofuels markets would be mixed.

5.2.3 Conclusion on future direction

Overall increasing global concern about the net environmental impact of biofuels in terms of overall avoided GHG emissions over their lifecycle, including from ILUC\(^{22}\), is likely to drive future policy developments (concern about the link to food is part of this equation). California has already decided to incorporate ILUC impacts in its low carbon fuel standard (Biofuels Digest 2009b), while recent trends in the US and EU (as discussed in Section 5.2.) show a move in this direction also. But including lifecycle analysis (LCA) and ILUC into policy in a practical way will be challenging and controversial as measurement of complex interactions often between countries, and of indirect impacts is problematic, but methods are developing (e.g. Bouet 2009). In addition, President Obama has promised that the RFS2 LCA estimates will be subject to rigorous scientific peer review to ensure the best science is being employed. That said political constituencies in developed countries for domestic biofuels support

---

\(^{22}\) Concern centres on both ILUC impacts within a country (e.g. expanding corn at the expense of soy and wheat in the US) and beyond the border (e.g. on rainforest encroachment).
remain strong and so future outcomes will depend on how the democratic process plays out.

Productivity gains and/or improved technology are other factors that will be important in the future, but what is possible in the near term is highly uncertain. Such developments may lower first generation biofuel production costs, lowering the sensitivity of biofuel crops to low oil prices. Also, significant research is ongoing into alternative biofuels technology which may lead to other non-food sources (such as cellulose, algae, jatropha for biofuel production, or to other energy sources like solar or wind (USDA 2009b). In a similar vein by-products of ethanol production (e.g. dried distillers grains, corn gluten feed and meat, corn oil and so on) are increasingly becoming economic for use as cattle feed, reducing the pressure on coarse grain prices from biofuel demand. There are some limitations (e.g. variable moisture content, nutrient variation etc.) but these are not major and work is ongoing to overcome these barriers to their use (USDA 2009d). The use of biofuels may be supplemented by other options such as encouraging electric or hydrogen-powered vehicles.

6 Conclusions about food prices and biofuels

Developments since the September 2008 report indicate the primary drivers of food commodity prices remain the same – oil price, food supply and demand, the USD, and market distorting policies - but the direction they are moving in has reversed markedly.

Leading up to September 2008, oil and food prices surged due to increasing demand as well as actual and anticipated supply shortages. Food demand was augmented by the increased demand for biofuels. Since September 2008, due to the financial crisis and subsequent global recession, demand for commodities (especially oil) has plummeted, while at the same time supply for key commodities increased. For food commodities this has led to world stocks recovering slightly from very low levels. Shifting financial flows have led to the USD appreciating and commodity prices falling. Falling spreads between the oil price and feedstock prices at the end of the boom and beyond has led to significant contractions in biofuels industries (Abbott et al 2009).

While commodity markets have, indeed, been affected by biofuels, other factors – such as high oil prices and macroeconomic forces - have influenced commodity prices far more than biofuels. Several other studies undertaken since our September 2008 report have also reinforced both the conclusions in that analysis and in this report (e.g. Abbott et al 2009, GBC Feb09, CBO 2009, and many others).

It is biofuels policies that are the main driving force behind biofuels. So the future impact of biofuels on food commodities will be highly dependant on the future
direction of policies (biofuels policies as well as agricultural development and trade policies) and technological change.

IFPRI (2008) suggested that two fundamental issues were underlying the recent difficulties (both boom and bust) in food-related trade:

- Low investment in agriculture and aid; and
- Relying on stockpiles to regulate prices rather than freeing up trade.

Detailed analysis of future policy direction and implications for commodity and food prices is outside the scope of this report. The World Bank (2009a) work did note, however, that for long term increases to food prices to be avoided (with or without biofuels) the key will be adopting appropriate policies that avoid market distortions, while encouraging investment in agricultural land productivity, sustainability and economic development across the globe.

The direction of biofuels policies is shifting. There is a move away from promoting certain types of biofuels (e.g. corn ethanol, soy biodiesel) towards encouraging the production and use of biofuels based on their potential for greatest GHG reductions based on LCA. In the longer term this may help to reduce the demand pressure for biofuels feedstocks that would be diverted from food crops, but this is highly dependant on how the policies are implemented, and also on the direction of technological change. This change in direction is promising, as it will certainly increase the emphasis on efficient production.

6.1 Retail food prices
The relative impacts on different countries of changing commodity prices, and on food prices affecting consumers in those countries, vary considerably. In general, changing food commodity prices (both up and down) affect lower income countries more than higher income countries; higher income countries in general have more complex supply chains, consume greater proportions of processed goods, and spend less of their total income on food. Other macroeconomic factors are important such as exchange rates etc. that determine where the impacts are felt. The September 2008 report outlined in more detail how and why retail prices move differently to commodity prices and broader food prices. This section focuses on recent developments.

Figure 15 shows global inflation trends to January 2009 as reported by the IMF. Overall (headline) inflation has dropped sharply, influenced heavily by falling transport costs led by the collapsed oil price. Food inflation has dropped too but not as significantly and remains high particularly in developing countries.
Various studies (e.g. Abbott et al 2009; Mirasol 2009) outline reasons why retail food prices have not reversed direction as commodity prices have. One key reason is that changing prices tend first to be absorbed by the supply chain, especially when the market is volatile. Eventually if price trends persist, retail prices may move, but there are other factors involved that determine the scale of price change facing the consumer. These include the complexity of the supply chain, the nature of diets, exchange rates and so on (the September 2008 report covers this in more detail). Ultimately it is about the proportion of food that consumers buy that is made up of various commodities, versus the proportion of transport, energy\textsuperscript{23}, labour\textsuperscript{24} and other costs such as exchange rates (CBO 2009).

Overall, developed countries are less likely than developing countries to experience significant decreases in their food bills due to lower commodity prices. Developing

\textsuperscript{23} Many studies reinforced conclusions reached in the September 2008 report that energy costs were the single most important influence on retail food prices.

\textsuperscript{24} A USDA study (cited in Mirasol 2009), found that labour costs accounted for 38 cents in each dollar consumers spent on food in the US.
countries tend to spend a greater percentage of their income on food\textsuperscript{25}, and commodities comprise a larger portion of their food costs (CBO 2009).

In the recent period, changing exchange rates are important in understanding whether commodity price declines will pass through to retail prices or not. Manufactured goods as well as services do not tend to pass through exchange rate changes as much as commodities do (Abbott et al 2009). Other factors such as labour costs are important in determining prices for these (Mirasol 2009). Many countries, including New Zealand, have experienced currency depreciation against the USD and this will temper any food price declines.

7 Implications for New Zealand

For New Zealand the recession and financial crisis have led to a depreciation of the New Zealand dollar against the US dollar, from a high of just over eighty US cents in early to mid 2008, plummeting rapidly to the low fifties in November 2008, then rising gradually (RBNZ 2009) to hover around the sixty cent mark during the recent month. All other things being equal this results in our imports becoming more expensive (e.g. oil, imported food) while our exports become cheaper for the rest of the world. But as is always the case in economics, all other things are not equal. The recession has meant that although our exports are cheaper due to currency movements, the drop off in global demand has overshadowed this and meat and dairy commodity prices have decreased as have other commodities. On the other hand, the outlook for meat prices is strong due to supply constraints, especially the impact of the drought in New Zealand.

In addition, because we import a high proportion of food relative to other developed countries, the pass through of lower commodity prices is likely to be tempered by the weaker New Zealand dollar.

The new biofuels policies announced by Obama (see Section 5.2.1.) are expected to help support the use of corn for biofuel production in the US at least in the short term until alternative energy sources – the key focus of the policy changes – come onstream. This is expected to help firm up meat and dairy prices (Morgan 2009) as more corn for feed is likely to be directed to ethanol production that would have otherwise been the case. But as well there are technological changes underway which will be important at least in the medium-longer term and perhaps even in the immediate future; one key example being a likely increase in the use of ethanol by-products for feed (if successful this may mean that meat prices do not firm due to increased ethanol production)

\textsuperscript{25} CBO (2009) notes that in 2007 food’s share of household spending in the US was around 6%, compared to 32% in India.
The outlook for New Zealand retail food prices is somewhat different. As noted in the September 2008 report, despite importing a high proportion of our food compared to other developed economies, retail consumer food products in New Zealand contain a low proportion of commodities. This means the scale of commodity price declines over the last few months will not directly translate through to retail prices in New Zealand, but there should be some impact. The RBNZ noted in its March 2009 Monetary Policy statement that food price inflation appeared to be moderating, though the usual lag in transmitting commodity prices to retail prices meant further declines in food inflation should be expected in the future but this will depend on what happens to the New Zealand dollar (RBNZ 2009).

In New Zealand our distance to markets and sources of imported food mean that oil price changes and its impact on supply chain costs (e.g. wages, energy, transport and storage) continue to have a much greater influence on retail food prices than commodity prices (Nimmo-Bell 2008).

So in conclusion, the core messages in the September 2008 report still hold. The primary drivers of food prices are oil prices, macroeconomic changes influencing exchange rates, and underlying supply and demand for food. Biofuels adds another dimension to the equation, but is not a primary or significant driver of food prices – biofuels policies have more impact on biofuels use, and other policies such as trade and agricultural policies will be key to the role of biofuels in the future.
8 References


BioenergyWiki, (2009), European Union, www.bioenergywiki.net (accessed 18.05.09)

Biofuels Digest, (2009a), Quo vadis?: Whither goest thou, biofuels? An Easter message from Biofuels Digest, www.biofuelsdigest.com (accessed 15.05.09)

Biofuels Digest, (2009b), Fat vs. fuel: Biofuels Digest special report on indirect land use change and biofuels emissions, www.biofuelsdigest.com (accessed 15.05.09)


Congress of the US Congressional Budget Office (CBO), (2009), The impact of ethanol use on food prices and greenhouse gas emissions, www.cbo.gov (accessed on 29.04.09)

Food and Agriculture Organisation of the UN (FAO), (2008), Food outlook – Global market analysis, a Global Information and Early Warning Service report (November 2008), http://www.fao.org/giews/ (accessed 14.05.09)

Food and Agriculture Organisation of the UN (FAO), (2009a), Crop prices and food situation, a Global Information and Early Warning Service report (April 2009), http://www.fao.org/giews/ (accessed 14.05.09)


Global Biofuels Center (GBC), (2009), Special biofuels report (global): ‘Food vs. fuel – A study of commodity markets evolution, obtained from MAF Policy 22.04.09

Grunwald, M., (2009), Stress-testing biofuels: How the game was rigged, a Time Magazine article published in May 2009 www.time.com (accessed 14.05.09)

Update report: Food prices and biofuels


Ministry of Foreign Affairs and Trade (MFAT) and New Zealand Trade and Enterprise (NZTE), (2009), *Food miles / sustainability market intelligence*, a quarterly report prepared in January 2009

Mirasol, F., (2009), *Great bounce debate*, ICIS Chemical Business, Pharmaceutical News Index, Volume 275, No. 9

Morgan, J., (2009), *Biofuel surge a bonus for New Zealand*, a Dominion Post article 11.05.09, www.stuff.co.nz (accessed 14.05.09)

National Business Review (NBR), (2009), *Inflation at 3% and declining; what now for Dr Bollard*, www.nbr.co.nz/print/101277 (accessed 17.04.09)


Reserve Bank of New Zealand (RBNZ), (2009), *Monetary policy statement March 2009*, published by the RBNZ, Wellington, New Zealand (ISSN 1770-4829)

Reuters UK, (2009), *Weak oil and imports turn EU biofuel boom to gloom*, http://uk.reuters.com (accessed 18.05.09)


US Department of Agriculture (USDA), (2009a), *World agricultural supply and demand estimates April 2009*, a World Agricultural Outlook Board publication (ISSN: 1554-9089)

US Department of Agriculture (USDA), (2009c), *President Obama issues presidential directive to USDA to expand access to biofuels*, USDA press release no. 0145.09 cited by Canadian Renewable Fuels Association, ‘Good news for Canada’ www.greenfuels.org (accessed 14.05.09)


Van Ness Feldman (VNF), (2009), *EPA issues proposed renewable fuel standard implementing regulations; Administration makes stimulus funds available for biofuels*, a May 2008 Issue Alert from www.vnf.com (accessed 15.05.09)
