



DAIRY NOTIONAL PROCESSORS' ASSET BETA
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Prepared by:

Cambridge Economic Policy Associates Pty Ltd in association with
Freshagenda Pty Ltd



freshagenda

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EXECUTIVE SUMMARY

Cambridge Economic Policy Associates (CEPA), in consortium with Freshagenda, has been asked by the New Zealand Commerce Commission (the Commission) to establish whether Fonterra's proposed approach to estimating the asset beta for the Notional Processor is appropriate.

In particular the Commission has sought specialist knowledge on the international dairy industry in order to identify the risk exposure of international dairy comparators. The key issue that the Commission is seeking our advice on is whether a downward (or any) adjustment is required to the average beta calculated from the sample of 'comparable' companies.

The Dairy Industry Restructuring Act 2001 (DIRA) sets out an approach for the calculation of the farm gate milk price by the dominant producer, Fonterra, with the intent of promoting the efficient operation of dairy markets in New Zealand and to ensure New Zealand markets for dairy goods and services are contestable.

The approach provides for the calculation of notional revenues (assuming milk is converted into a defined basket of products and exported) and deducting operating and capital costs associated with processing and transport after milk leaves the farm. The costs which are deducted are a mixture of actual costs and notional costs, including those of a "Notional Processor". Processing costs include a return on capital, calculated using an estimate of the weighted average cost of capital (WACC). The Commission is not required to estimate the WACC and its parameters; rather it is required to consider whether Fonterra's approach complies with legislative requirements.

The estimate of the asset beta is a crucial determinant of the WACC, and thus the farmgate milk price. Fonterra has proposed an asset beta of 0.38. This is lower than the asset beta estimated using a comparator group, of national and international companies, proposed by Fonterra's advisor Auckland UniServices. Fonterra's advisor argues that the systematic risk for the Notional Processor is lower than for the comparator group, as the cash flows, and therefore asset beta, of the business are more similar to that of a price capped/ revenue capped business such as an electricity lines business (ELB).

Measuring asset beta for the dairy sector

The asset beta measures the extent to which changes in the value of a company is related to changes in the value of the stock market as whole. The asset beta therefore reflects the way that investors view the company, its prospects and how these relate to economic growth.

The value of a dairy processing business is related to the long-term prospects for the dairy industry, including revenue growth, and the required operating and capital expenditure to support it. Faster economic growth increases demand for dairy products, which increases the

size of the dairy industry, giving the processing company scope to invest and increase value for its shareholders. Its cost base will also reflect a specific mix of inputs.

In a mature economy like New Zealand, the drivers of ELBs' revenues are somewhat different. Network growth is somewhat decoupled from economic growth, related to factors such as changing patterns of electricity demand and supply, rather than changes in economic growth. The input cost pressures for ELBs are also likely to be different from those of the Notional Processor. Another difference is that the Notional Processor is assumed to export all of its commodity outputs, while the ELBs services are provided domestically.

The suggestion that the asset beta of the Notional Processor should be derived from ELBs (and therefore the energy sector) relies on analysis of short term cash flows and does not reflect how investors would view an investment in this business. In our view, the evidence presented so far does not justify the assumption that an ELB's characteristics and risk profile will result in the same systematic risk profile as that of the Notional Processor. Moreover, the Commission's comparator sample for the energy sector is much wider than regulated ELBs and includes generators and vertically integrated companies.¹ The argument that an international collection of electricity utilities with a range of different types of regulation provide the best proxy for the Notional Processor is unconvincing.

In contrast, the Commission's approach as set out in its Input Methodologies (IM) to deriving asset betas using comparators from the same sector has been developed and applied successfully over a number of years. Our analysis of overall systematic risk for the Notional Processor compared to sector comparators supports the use of this approach.

Comparators should have systematic risk similar to the Notional Processor

By design, the risks faced by the Notional Processor are limited. In particular, under the DIRA price risk is passed through to farmers via the farmgate milk price calculation, and so the Notional Processor does not bear price risk. This might suggest that the business is very low risk compared to comparator companies that may face commodity price risk. However, our analysis indicates that dairy price variation is not correlated with general stock market movements, and so may not be systematic. This is supported by the analysis of commodity-based companies' betas, which show little difference between commodity and non-commodity exposed businesses.

Our analysis also indicates that exposure to other risks is similar for the Notional Processor and the comparator group, in particular cost risks, risk of asset stranding, and financing risks.

Most importantly, the scale of long term growth opportunities for the Notional Processor are likely to be similar to those of other dairy businesses. Although we note environmental policies and land resources may mean that New Zealand is close to 'peak cow' numbers, the

¹ This is because of a need to (1) ensure a sufficient number of companies are included to produce a robust estimate, and (2) because it is not possible to adjust for every difference in regulatory regime or company structure.

overall value of the industry still has scope to grow. In addition, the times at which investors will reflect changes to future investment requirements into valuations are likely to correlate for the Notional Processor and the dairy industry. The analysis of the Commission's advisor, Dr Lally, is helpful to assess the validity of this. In Lally (2016a), the author sets out a decomposition of the asset beta, in which the value of the short-term betas is assumed to be low, as costs are assumed to be negatively correlated with positive market shocks. The question of the level of the asset beta can therefore be assessed by consideration of the variation in the long-term value of the business compared to the market.

Sector comparators' asset betas have averaged 0.45 – 0.58

Estimates of asset beta are normally made by comparison with companies in the same broad sector. This is because investors will typically view changes in the value of companies across the sector in response to both short term and long-term factors similarly. This is the approach set out in the Commission's IM for the electricity, gas, and airport sectors. Accordingly, we have estimated the asset beta for a range of comparators using the IM approach.

Our full data set of 39 companies reflects the comparators selected by Fonterra's advisor. The full set of companies has an average asset beta of 0.50 – 0.58 in the most recent five-year period, and between 0.45 – 0.50 in the five-year period to 2013.

Sub-sample groups all have similar asset betas to the full sample

In order to help assess the validity of the average asset beta from the whole comparator group, we also undertook a detailed analysis of the companies and identified sub-samples comprising those which are predominately dairy focused, those which are commodity exposed, and thus higher risk, those which enjoy cost-pass through arrangements, and those with regulated prices. For the latest five-year period, to January 2018, the asset betas for the different subgroups are similar, and the weekly average is between 0.49 and 0.59. For the previous five-year period to January 2013, the asset betas for the commodity exposed and cost pass through groups are similar, but the dairy comparators had lower asset beta averages, 0.41 to 0.47, and two companies with regulated milk prices show a much lower asset beta of 0.3.

Conclusions

Our analysis indicates that dairy industry companies are a reasonable proxy for asset betas in the dairy industry in general, and the notional processor in particular. The betas for subsamples of industry comparators are similar, giving validity to the use of broader comparators. The full range of comparator estimates is 0.45 – 0.58, and we have not seen sufficient empirical support for an asset beta below the bottom end of this range.

1. INTRODUCTION

The New Zealand Commerce Commission (the Commission) engaged Cambridge Economic Policy Associates (CEPA) and Freshagenda to assist it in assessing whether Fonterra's proposed approach to calculating the asset beta estimate for the Notional Processor (NP) is justified. In particular the Commission has sought specialist knowledge on the international dairy industry in order to identify the risk exposure of international dairy comparators. The key issue that the Commission is seeking our advice on is whether a downward (or any) adjustment is required to the average beta calculated from the sample of 'comparable' companies.

Under the Dairy Industry Restructuring Act 2001 (DIRA) Fonterra is required to calculate and set a base dairy milk price for the purpose of providing an incentive to Fonterra to *operate efficiently* while providing for *contestability* in the market for the purchase of milk from farmers.² In regards to the latter, notional costs, revenues, or other assumptions taken into account in calculating the base milk price are required to be practically feasible for an efficient processor.³

Under DIRA, the Commission is required to review Fonterra's base dairy (farmgate) milk price calculation. The Commission is not required to estimate the WACC and its parameters, rather it is required to assess Fonterra's own estimation for consistency with DIRA. The Commission, in its 2017 final report, dated 15 September 2017, was unable to conclude that the asset beta of 0.38 used by Fonterra for the 2016/17 base milk price was not practically feasible for an efficient notional processor.

1.1. What does the asset beta represent and how is estimated?

The equity beta indicates how volatile returns on the investment are relative to the equity returns on the stock market as a whole.⁴ The term is intended to cover systematic or non-diversifiable risk; risk that cannot be removed through diversifying into a broader portfolio of companies. A higher equity/ asset beta leads to a higher overall WACC.

The asset (or unlevered) beta translates empirical equity beta estimates into the equivalent beta for a company with zero gearing.

Companies' betas are not directly observable and are instead estimated from data on companies' and markets historical returns. Because a number of regulated companies are not listed, (for example in New Zealand Vector is the only publicly listed network owner) and their asset betas may be affected by regulatory decisions, regulators will typically look at a range of comparable companies to estimate the asset beta.

² DIRA, s150A(1).

³ DIRA, s150A(2).

⁴ NZCC (2016b), page 681.

'Comparability' typically extends to the same broad sector and whether the companies are subject to broadly similar regulatory regimes. For example, the Commission's Cost of Capital Input Methodologies (IM), for electricity lines and gas pipelines companies, start with the average asset beta over a sample of 'energy' sector companies in NZ, Australia, UK and USA. This sample ranges from pure play electricity lines/ gas pipeline business to fully integrated utilities or generation companies. The Commission does make an uplift (of 0.05) to the sample average asset beta for the gas distribution business to reflect New Zealand conditions. For airports, the Commission uses a sample of airports from various jurisdictions and makes a downward (0.05) adjustment for the average asset beta to correct for the multi-divisional businesses some of the airport groups operate.

1.2. Fonterra's approach to calculating the asset beta

Fonterra's approach to estimating the asset beta appears to differ from the Commission's established IM approach. The difference arises due to Fonterra making a large downward adjustment, using the Commission's asset beta estimate for ELBs, to its estimated mid-point of its comparator sample. The downward adjustment is based on Fonterra's assumption that the Notional Producer (NP) has lower exposure to systematic risk than the majority of the sample. The main argument for this assumption is that the Notional Producer is able to transfer commodity price risk to farmers by paying farmers *ex-post* based on the residual of commodity revenue and notional costs. In addition, Fonterra's consultant, Auckland UniServices (hereafter referred to as UniServices), considered that, based on the Milk Price Manual, all volume risk is passed back to farmers in setting the farmgate milk price.

1.3. The Commission's view of the asset beta estimate

While Fonterra (and its consultants) addressed a number of issues raised by the Commission between its draft and final report, the Commission highlighted, in its final report, a number of aspects of Fonterra's approach that it could not verify or considered that further analysis would be worthwhile. These included the Commission's view that:

- The UniServices (2017b) relatively tight range of 0.49 to 0.53 of estimates of the asset beta for comparators with differing levels of commodity price exposure did not appear to support the argument that non-commodity processors are less able to transfer risk to suppliers.
- Estimating the betas based on weekly and four-weekly estimates for the two most recent five-year periods would be more consistent with the Commission's standard approach.
- The information provided by Fonterra on the comparators' pricing (i.e., transfer of systematic risk) may not be as complete or accurate as possible. The Commission noted that Frontier only provided additional information on 20 out of the 40

companies in the sample, information was at a high level, and information on prices was included for only some of the companies.

- Information from the asset beta used for the ELBs is not necessarily a better guide to the NP's asset beta than information from comparators in the same sector.

Broadly the Commission found that Fonterra had provided some evidence to support its view that the NP would bear less risk than the majority of the comparator sample. However, the Commission did not consider the magnitude of the adjustment was well justified.

Based on the above the key issue that the Commission is seeking our advice on is whether a downward (or any) adjustment is required to the average beta calculated from the sample of 'comparable' companies.

1.4. Our approach

In order to advise the Commission on the appropriateness of Fonterra's approach, we propose to estimate the asset beta in line with the approach taken by the Commission in its updated Input Methodologies on the cost of capital. The five-step process set out by the Commission is as follows⁵:

- Step 1: identify a sample of relevant comparator firms.
- Step 2: estimate the equity beta for each firm in the sample.
- Step 3: de-lever each equity beta estimate to get an estimated asset beta for each firm in the sample.
- Step 4: calculate an average asset beta for the sample.
- Step 5: apply any adjustments for regulatory differences or differences in systematic risk across services to the average asset beta for the sample.

Step 1 is the critical piece of analysis that has been the focus of the asset beta debate since 2014. In order to come to a view on the most relevant comparators we need to understand:

- What are the risks faced by the NP, as set out in the Milk Price Manual?
- What are the differences between the risks the NP is exposed to and those of the within sector comparator companies?
- Based on the findings from answering the above, are within sector companies the most appropriate comparators, or should other regulated sectors asset betas be the starting point?

⁵ NZCC (2016b), pages 680-681. The Commission's approach has a sixth step – re-levering the asset beta to estimate the equity beta, however as this report focuses on the asset beta, we do not concern ourselves with this step.

To come to a view on the above questions and calculate the asset beta as per the Commission's approach, we:

1. Set out our process for selecting an appropriate comparator, parameters that need to be considered, and discuss the assumptions made for the NP, and therefore its risk profile (Section 2).
2. Set out how we have undertaken the five-step process, with the details on how we have selected appropriate comparators (Section 3).
3. Provide our conclusions on the appropriateness of Fonterra's proposed asset beta (Section 4).

2. CHOOSING COMPARATORS AND THE NOTIONAL PROCESSOR'S RISK PROFILE

In this section we set out:

- our theoretical approach to selecting comparators to estimate the asset beta, and what are the key parameters;
- the definition of the NP and the assumptions on how it should operate;
- how the pass-through of changes in milk prices and volume affect the NP's risk profile; and
- a consolidated list of what we see as the material factors affecting the NP's risk profile.

In Section 3, we set out our selected comparator group(s) and their asset betas.

2.1. Rational for choosing comparators

Appropriate comparator companies for estimating the asset beta are those that are likely to have similar systematic risk. This means that the impact of changes in the value of economic and other variables affecting average company valuations in the stock market will influence the value of comparator companies in a similar way to the company for which the asset beta is being estimated.

Discussions of appropriate comparators for the NP have focused on two possible comparator groups:

- Industry (or 'within sector') comparators – the sample proposed by UniServices (2017b).
- Other regulated sectors – namely Electricity Lines Businesses (ELBs, as proposed by UniServices and Lally (2016a)).

We consider that the best starting point is to identify companies that are likely to have similar systematic risk is to choose companies that have similar characteristics. It is possible that companies with different characteristics will have the same systematic risk as the NP, but that will be coincidental, and it would be difficult to identify such companies in advance of estimation. Although there is no generally accepted approach in the finance literature for selecting comparators for asset beta estimation, we consider that the following criteria provide a sensible starting point:

- Similarity of operating requirements and conditions.
- Similar drivers of long term cash flows and investment

In the extensive discussions on the risks facing the NP, there has been much discussion about short term cash flows, which has been used to justify Lally (2016a) proposal of using the ELB asset beta, but little about the long-term future growth opportunities or operating requirements and conditions across different sectors.

Decomposition of the asset beta

The asset beta reflects the covariance of the returns on an asset with those of the stock market. This covariance can, however, be decomposed into different components, as derived in Lally (2016a). In that paper, the asset beta was shown to be comprised of the sum of a terms relating to the variation of short term operating cash flows, and a term relating to the value of the asset at the end of the period. We have provided more detail of the decomposition in ANNEX B of this report. It is worth noting that Lally (2016a) considers, for the NP and the ELBs, that only the value term makes a positive contribution to asset beta in this decomposition, and that this positive contribution is most plausibly caused by errors in setting the cost of capital.⁶ Dr Lally sets out that “plausibly” the biggest source of error in the valuation component is the regulator erring in setting the market risk premium (MRP) in the cost of equity, and the regulator’s error would likely contribute positively to the beta.⁷ Dr Lally expects the other component of the decomposition, the difference between actual and allowed opex, to contribute negatively to the asset beta.

On the basis of the above, and if the regulatory framework was well designed and the regulator does not err in setting the cost of capital, Lally (2016a) suggests that the asset beta is likely to be negative for a revenue-capped business. However, observed betas for listed, regulated, ELBs are almost always positive, as supported by the Commission setting the beta for ELBs at 0.35.⁸

While it is plausible that the regulator may continuously err in setting the cost of capital, we consider that the empirical evidence from listed regulated companies supports the proposition that asset betas reflect the longer-run growth opportunities and investment requirements of the industry.⁹

How do operating characteristics and conditions affect the overall asset beta?

Operating conditions are standard considerations for the asset beta. Companies in different sectors have different operating characteristics, for example, network business typically have high operating leverage (i.e., a ratio of high fixed to variable costs) while companies with higher variable labour components will have lower operating leverage. High operating leverage can be expected to lead to ‘gearing up’ of revenue cyclicality which increases the systematic risks to cash flows. This is because profits are likely to respond more sharply to changes in the economic environment and therefore stock market movements. For example, qualitative analysis we undertook for the Office for Rail Regulation in the UK,¹⁰ indicated

⁶ This is set out as equation (3) in ANNEX B, but is equation (4) in Lally (2016a).

⁷ Lally (2016a), pages 8-9.

⁸ To the best of our knowledge regulators in other jurisdictions have also used positive betas for regulated network businesses.

⁹ It is also plausible that the opex beta component may contribute positively to the asset beta rather than negatively.

¹⁰ CEPA, *Advice on estimating Network Rail’s cost of capital*, a report prepared for Office of Rail Regulation, June 2013, pages 51-53

material relative risk differences across regulated industries including for areas such as: capital expenditure, opex, operational gearing, uncertainty mechanisms and regime and policy.

Different sectors also face different cost pressures, reflecting, for example different proportions of skilled labour or the level of construction activity. If systematic risks created different cost pressures across the sectors the asset betas would be affected. We can see from the breakdown of the NP's costs in ANNEX C, its capital costs are a very small proportion of its overall annual costs.

Profit margins (operating profit or EBITDA / revenue) are also relevant. Cyclicalities are likely to be higher for companies with lower margins, as a small change in revenues leads to a greater proportional change in profits and cash flows. Other things being equal, companies with margins that are similar to the NP's margins are more likely to face similar systematic risk.

In addition, it may be considered that the regulatory framework has a material impact on the operating characteristics of the industry. However, well designed regulatory frameworks are designed to incentivise companies to be as efficient as possible. This is discussed further below, but the implication is that it is the industry that primarily sets the operating characteristics, rather than the regulatory framework.

What determines contribution of the long-term component to the overall asset beta?

Companies invest to create value for their shareholders. Changes in investment expectations therefore lead to changes in the value of companies. The way in which the investment profile changes in response to cyclical factors is therefore crucial to the determination of the long-term component of asset beta. In this subsection, we first show why it is reasonable to expect investment to create value, before discussing the cyclicalities of investment.

Investment is valuable for two reasons. First, the decision rule of companies is to invest only if the expected return from an investment exceeds the cost of capital. In a regulated sector (like ELBs), the expected return is set by the regulatory process, and this is typically above the return required by investors. In New Zealand, this is explicit, with the Commission setting returns at the 67th percentile of possible returns.¹¹ Second, investors, in particular in infrastructure sectors, value investment growth directly, preferring companies with a visible investment pipeline. This can be easily seen in analyst reports for regulated networks that focus on RAB growth as underpinning dividend growth.¹²

What determines investment changes, and what would make the investment profile of an industry more (or less) systematic? Investment is typically either driven by growth, with capacity needed to be built to accommodate increased demand, or alternatively it is replacement for existing capacity. Investment can also be driven by technical change, but for

¹¹NZCC (2016b), page 10.

¹² For example, see Credit Suisse (2015), Morgans (2017), and Credit Suisse (2017).

the purpose of this paper we treat technical change as a factor that determines replacement capex.

The cyclical nature of investment growth will be driven by the relationship of demand to GDP growth, i.e. the income elasticity of demand. Sectors where the income elasticity is higher would typically have a higher asset beta.

Replacement capex is typically not cyclical as it would be determined by the life of assets. There will be factors related to systematic risk, for example if replacement costs are correlated to the business cycle.

These prospects for the NP are likely to be correlated with global growth in the dairy industry, as this will likely be associated with increased dairy volumes in New Zealand. A faster growing industry would lead to increased requirement to invest in processing facilities, leading to a corresponding increase in shareholder value.

Global dairy industry growth is associated with Global GDP growth. The OECD projects a 2.1% CAGR in fresh dairy products and 1.7% CAGR in processed dairy products (OECD (2017)). Most of the increase – 87% – is projected to arise from developing countries, and the reason for this growth is increasing incomes, the population growth, as well as changing diet (OECD (2017)). Global dairy product demand is therefore related to global GDP growth. The New Zealand dairy industry is expected to benefit from this growth, with Fonterra expecting New Zealand Liquid Milk Equivalent (LME) volumes to grow sustainably at 1.5% CAGR.¹³

We do note however, that there are expected to be ongoing constraints on milk production growth in New Zealand in coming years for a variety of reasons.

Increasing community pressure for stricter environmental regulation of dairy farming operations – reflected in policy platform of the new NZ Labour Government and in stronger enforcement by local government agencies – will add to physical constraints and on-farm production costs.

It is widely accepted in the industry that NZ has reached “peak cow” owing to these limits, leaving any ongoing growth to come from increasing intensification on farms (increasing per-cow yield through better pasture management and supplementary feeding). Choices will become more complex for producers – weighing up whether to invest in higher on-farm production of forages to increase feed availability which may, in turn, limit grazing areas.

The challenges in weather in recent years – the increasing frequency of extremes of drought and excessive wet conditions – has been a major contributor to plateauing NZ milk output, with no growth over the past four seasons (based on another expected decline in 2017/18).

Investment constraints on industry growth are already apparent. The lack of growth in farming land values in recent years has dried up flows of new equity investments in farm aggregations and conversions from other land use.

¹³ Fonterra (2017b), page 13.

While these constraints may limit the outlook for volume growth, price growth, as demand for dairy products increases will still fuel investor value in the dairy industry.

For other sectors, the relationship of the long-term value to stock market values is likely to be rather different. In particular, electricity distribution network investment in mature economies is driven largely by the need for replacement expenditure, and changes to the pattern of generation and demand. The relationship to economic growth is weaker than for the dairy industry. For example, Krishnamurthya & Kriströmb (2013) estimate an income elasticity of demand for electricity of around 0.1.

Conclusions on NP and the comparator groups

In order to help identify appropriate comparators, we need to consider what the NP construct is, what impacts the Milk Price Manual may have on its risk profile, and what is the systematic risk for each of the different (material) elements of the NP's risk profile. We do this in the subsections below, before matching these risk characteristics to comparators in Section 3.

2.2. What is the Notional Processor?

Different definitions of a processing company provide different levels of risk, which in turn could lead to different estimates of asset beta.

- *(Milk Price Manual) Notional Processor* – this assumes an entity that is aligned entirely with the milk price manual calculation (a description of the farmgate milk price methodology is contained within ANNEX C for reference).
- *Fonterra Actual Business* – as per Fonterra's NP Business, except it includes the portions of Fonterra's business relating to the manufacture and sale of both RCPs and commodity products not included in the Farmgate Milk Price Manual's reference commodity basket, such as cheese, casein and milk protein concentrate.¹⁴

The asset beta assumption is required for the Notional Processor, rather than the Actual Business. As we discuss in Section 2.5, we do not consider that Fonterra's asset beta is an appropriate estimate for the NP.

An important requirement for the WACC calculation, and therefore for the asset beta, is that the assumptions should reflect a rate of return required for a "practically feasible" efficient processor. The Commission set out in its approach paper that it considers 'practically feasible' to mean that "it must be possible for an efficient processor operating in New Zealand to replicate or achieve the component being assessed."¹⁵ Open Country *et al* noted in their June 2017 submission, that there is a risk that Fonterra (and its consultants) are using the

¹⁴ UniServices (2014), page 4.

¹⁵ NZCC (2017a), *Our approach to reviewing Fonterra's Milk Price Manual and base milk price calculation*, 15 August 2017, page 5.

methodology of the Milk Price Manual to justify the risks that the NP would face rather than the considering the nature of the NP’s business. We note, however, the Commission’s view that if Fonterra is able to shift commodity price risk to farmers then there should be no reason why other processors could not do the same.¹⁶ We have adopted this view in this report, and we note that if this is the case for all processors then it may be reasonable to assume companies in the comparator group can do the same.

The table below highlights key assumptions made regarding the NP in the estimating the farmgate milk price. We then discuss what this means for the risks faced by the NP in the following sub-section.

Figure 2.1: Key assumptions made for the Notional Processor

Assumption	Details
Commodity business	Standard dairy commodity manufacturer that produces: <ul style="list-style-type: none"> • whole milk powder (WMP) • skim milk powder (SMP) its by-products: <ul style="list-style-type: none"> • butter • anhydrous milk fat (AMF) • buttermilk powder (BMP). Collectively these are known as the RCPs. ⁵²
Milk Collection	Collects and uses the same amount of milk as Fonterra each season. The notional producer also uses the same milk composition.
Production and export	All products produced in New Zealand and all exported.
Site footprint	Site footprint is the same as Fonterra’s commodity processing site footprint. ⁵³
Sales channel	Sells products through GDT and off-GDT sales channels. ⁵⁴
Pricing	Prices achieved are aligned to Fonterra’s prices achieved for the reference commodity products. ⁵⁵
Conversion rate	Sales revenue converted to NZD at the same conversion rates as achieved by Fonterra.
Lactose	Lactose for standardising milk powders imported.
Company structure	Like Fonterra, the notional producer is assumed to be a co-operative.
Capital charge	Uses a ‘spread back’ asset approach, which results in capital charges in both the initial year and in subsequent years which are independent of the year in which the notional producer’s assets were assumed to have been installed.

2.3. Implication of the Milk Price Manual methodology on the NP’s risk profile

While the milk price is not set based on a revenue cap or price cap basis, the allocation of risk for the NP depends on the commercial and regulatory framework. UniServices and Lally (2016a) have both argued that the NP faces risks similar to a revenue-capped regulated company. As set out in UniServices (2014), the NP bears similarities to a regulated revenue capped business. However, there are some key differences with a revenue capped business:

¹⁶ NZCC (2017b), *Review of Fonterra’s 2016/17 base milk price calculation: Dairy Industry Restructuring Act 2001*, September 2017, page 19.

- There is full pass through of raw milk costs, which makes up a significant proportion (~80%) of the NP's costs.¹⁷ Therefore, only a small proportion of NP's total operating expenditure is subject to the risk/reward of input cost changes.
- The NP bears some pricing risk due to longer-dated contracts and off-GlobalDairyTrade platform (GDT) prices (although we understand this to be a small proportion of revenue). However, in regards to the latter, UniServices (2016) noted that in the author's view this should not impact the asset beta as at the margin any increase in milk supply is likely to be sold on-GDT.¹⁸
- A revenue capped business typically has almost all its costs set *ex ante*. While the NP's costs are set based on efficient costs (and therefore replicate *ex ante* cost setting), the volume is set perfectly on an *ex post* basis. While fixed costs are considered just that, variable opex can be adjusted for actual volumes.

Companies can feasible compete with the NP, whereas revenue caps are generally used for more pure monopoly businesses.

A key objective of incentive regulation is that it is intended to mimic the pressures on companies operating in competitive markets for companies with natural monopoly characteristics. This means that the risks for companies in well-designed regulatory frameworks should be similar to companies in competitive markets. However, we note that regulators may introduce specific mechanisms to transfer risk between investors and consumers if it believes this will lead to a more efficient outcome.

While a firm operating in a competitive market would be subject to market prices, in order to assess its profitability, and therefore whether it continued to operate, a competitive processor would need to determine its own view of forecast efficient milk costs, efficient opex and the margin it can earn on its products. This is similar to how a regulator sets allowances, i.e., with an assessment of efficient costs, a forecast of demand, and an appropriate rate of return. The key difference, is that the regulated firm typically has a fixed revenue allowance or price cap. In a well-designed regulatory framework, if the regulator sets the allowed costs at an efficient level then the output prices set may replicate those in a competitive market.

On this basis, using the asset beta composition set out in Lally (2016a), reproduced in ANNEX B, a competitive processor's asset beta could be viewed as following (where the processor's expectations of costs are used instead of allowances to determine the asset beta):

$$\beta_{CDP} = \frac{Cov(R, R_m)}{\sigma_m^2}$$

$$= \frac{Cov\left(\frac{EMIL - MIL}{V_0}, R_m\right)}{\sigma_m^2} + \frac{Cov\left(\frac{EOPEX - OPEX}{V_0}, R_m\right)}{\sigma_m^2} + \frac{Cov\left(\frac{V_e}{V_0}, R_m\right)}{\sigma_m^2} \quad (05)$$

¹⁷ UniServices (2014), para 4.3.

¹⁸ UniServices (2016), page 25.

Where:

β_{CDP} = asset beta for a competitive processor

R_m is the rate of return on the market portfolio

σ_m^2 is its variance

$EMIL$ = forecast expenditure on milk purchases

MIL = actual milk purchase costs

$EOPEX$ = is the forecast expenditure on other (non-milk purchase) operating costs

$OPEX$ = actual other operating costs

V_0 denotes the current value of the business

V_e denote the value of the business at the end of the regulatory period

We assume changes in margins, or at least investors views on the company's profitability, from variations in volumes and prices are captured in V_e . If commodity prices/ volumes increase due to systematic factors – with competitors being affected by these shocks as well – then the processor will bear this risk until it is able to pass on the changes, which is likely to have a positive impact on the beta; for example, as real income increases (decreases) demand for dairy products is likely to increase (decrease).

However, if MIL and OPEX are correlated to market returns to a similar level as revenue then this will offset the opportunities associated with a positive beta. For example, while a processor can benefit from higher prices when real income per capita increases it may face a similar increase in its variable input costs, therefore the negative beta impacts offset the positive beta impacts. We note, investors could take a view that a positive GDP shock will lead to a regulated entity further outperforming its allowance (i.e., if there is some form of indexation), this is one reason why we agree with UniServices (2016) that cost shocks could have both negative and positive impacts on beta.

2.4. Description of risks faced by the Notional Processor

In this sub-section we discuss what the key risks we consider that the NP faces, including whether we consider that the risk is systematic and therefore appropriate to be captured in the asset beta term, and summarise key points made by UniServices and Dr Lally. We note that numerous other risks have been raised by Fonterra's consultant, such as: super flush risk (UniServices (2014), page 8), receivables risk (UniServices (2014), page 13), and temporary supply shocks (UniServices (2014), page 13). After reviewing the prior consultancy reports and submissions, we believe the risks listed in Table 2.1 are the most material.

Table 2.1: Risks borne by the Notional Processor

Type of risk	Is the risk systematic?	Does the NP bear the risk?
Revenue risk – price (passing on changes in the GDT price)	<p>The relationship between the market returns and price risk will depend on whether market returns are affected by milk commodity prices, or vice-versa.</p> <p>In a country where a material part of the market is driven by the dairy/ agriculture sector, there may be expected to be some systematic risk.</p> <p>It is difficult to determine empirically whether a relationship between market returns and the commodity prices exist, as prices will be affected by volumes. However, we have undertaken an analysis of the correlation between the NZD dairy price indices and the NZX50 equity market index.¹⁹ Testing various periods, two-years, five-years, and full length of available dataset, and various monthly lags, we could not identify a strongly positive correlation between the two series.²⁰ This is not definitive, but does suggest that dairy commodity price risk may not be significantly systematic.</p> <p>Localised climate conditions affecting production is unlikely to be a systematic risk, but could affect price and volume.</p>	<p>We consider that the NP does not bear price risk.</p> <p>S150C of DIRA requires that price risk is passed through, with this achieved through the farmgate milk price calculations. This view is consistent with UniServices and Lally, both of whom make points related to comparators and Fonterra’s actual business around this risk.</p>
Revenue risk – volume (difference between forecast and actual volume of	<p>With respect to volume risk, this could affect both revenues and costs – higher volumes should lead to higher revenues and costs. Under this heading, we focus on the revenue aspect of this only.</p> <p>The discussion of volume risk for revenues is similar to the discussion for price, with respect to whether the risk is systematic.</p>	<p>Based on the current interpretation of the Milk Price Manual, we consider that the NP does not bear volume risk. This is consistent with Lally, Fonterra and UniServices.</p> <p>Lally (2016a) considers that with revenue capping, there is no volume risk and that the NP is comparable to a firm under a revenue cap. UniServices (2014) consider that the features of the regime mean that this is equivalent to rate of return regulation.</p>

¹⁹ Respectively, Bloomberg indices ‘NZD Commodity dairy price index (NAZCDAIR)’ and ‘(NZSE50FG)’.

²⁰ The dataset examined ran from 31 January 2001 to 29 December 2017.

Type of risk	Is the risk systematic?	Does the NP bear the risk?
commodities sold)		UniServices (2014) notes that because of the <i>ex post</i> nature of the pass-through, the NP does not bear volume risk.
Exchange rate – difference between expected and actual exchange rate	<p>Exchange rate risk is likely to be correlated with GDP/ other macro-economic variables and this risk is something that an exporter would face. If GDP were falling, we would expect the currency to depreciate. This should increase the returns to the exporter, where exports are priced in USD. This implies a reduction in the beta, although as companies in the index will be importing and exporting, the beta impact could be limited.</p> <p>Hedging is possible to help mitigate this risk (at least for a fixed period of time), however it is costly and can expose parties to further counterparty risk.</p> <p>We note that UniServices (2016) considered that exchange rate risk was non-systematic. However, we consider that the stock market index will be affected by movements in exchange rate, and while a company may take out a hedge for its cash flows this will typically be short term (up to a year), costly, and not affect the longer-term value of the business.</p>	The NP is technically exposed to exchange rate risk. However, as the NP’s hedging costs, which are related to the systematic risk from exchange rate exposure in the market, are recovered via the Milk Price Manual calculation the NP in practice does not face exchange rate risk. ²¹
Efficient costs – differences between expected/ allowed and actual costs.	<p>There will be elements of cost risk that are driven by economy-wide factors (systematic risk) and elements of cost risk driven by company-specific factors (non-systematic risk). As Fonterra has high operating leverage, there could be greater sensitivity to GDP shocks.</p> <p>Lally (2016a) discusses that the beta impact of a cost shock could be positive e.g. an oil price shock (as per UniServices (2014)), although it is more likely to reduce the beta as high GDP growth causes an increase in both the market return and input costs (as</p>	<p>We consider that the NP does bear some risk. The extent to which the NP bears this risk depends on the relative balance between the use of actual costs and notional costs. Where actual costs are used ex-post, the NP does not bear this risk. However, where a notional cost is used, as per standard price control assumptions, the NP would bear this risk. Both Lally and UniServices agree that the NP does face some risk.</p> <p>An example of this could be with the 2017 and Fonterra closing a number of plants due to lower volumes. If the NP faces the risk of</p>

²¹ Fonterra (2017a), page 9.

Type of risk	Is the risk systematic?	Does the NP bear the risk?
	<p>competition for inputs increases). This in turn causes company returns to fall, hence the negative beta.</p>	<p>volumes fully reflected on revenues, but partially or not reflected on costs, then it would face risks.</p> <p>In practice, we understand (as per UniServices (2014)) that the NP is largely insulated from unit costs, but there is some risk that exists on the number of units used.</p>
<p>Asset stranding – risk that assets will no longer be utilised during/after a sustained downturn.</p>	<p>We consider that asset stranding is a systematic risk, although it is asymmetric as the NP will only face asset stranding risks from a systematic negative shock.</p> <p>UniServices (2014) considers that asset stranding will have a systematic component if some demand or costs shocks are systematic in nature. Overall, UniServices considers that asset stranding risk from a change in the RCPs could have both a systematic and unsystematic component. Non-systematic risk factors could include significant drought or localised natural disasters.</p> <p>Lally (2016a) concurs with UniServices’ theoretical analysis on asset stranding risk, but notes the absence of empirical support for the assumptions used around the probability of stranding and the impact of that stranding. Lally considers that this leads to a very small WACC adjustment via the market risk premium rather than the asset beta.</p>	<p>The presence of a RAB is intended to provide protections around asset stranding, by permitting this to be recovered over time. The NP would bear differences between what is the assumed notional RAB and their actual capital investments, so we consider that the NP does face some risk.</p> <p>UniServices (2014) notes that the Milk Price Manual (Rule 30) provides that fixed assets should be removed from the reference assets due to a change in RCPs as long as they don’t result in a price that is ‘significantly’ less than competitors in NZ are able to pay. This provides a protection against some of these risks.</p> <p>Furthermore UniServices (2014) discusses how some assets retain economic value at the end of their assumed lives and therefore this may offset assets that have not been fully depreciated for the actual company. In addition to this, the author notes how the Milk Price Manual references a prudent level of buffer capacity to cover variations in short-term supply.</p> <p>We agree with previous commentators that the NP bears an asset stranding risk. We consider that it is appropriate to consider it in the beta, as it is systematic, for the purposes of comparing risks to comparators.</p>
<p>Scale – larger businesses may be less flexible to changes</p>	<p>The issue of scale itself is a company-specific risk term, rather than something more systematic in nature. However, a company’s scale could impact upon its ability to mitigate other risks that are systematic in nature and so this would need to be taken into</p>	<p>Not applicable.</p>

Type of risk	Is the risk systematic?	Does the NP bear the risk?
resulting from systematic factors.	account. As the site footprint is aligned with Fonterra's own site, the NP would not be bearing a specific risk around scale in itself.	
Sales phasing – Fonterra phases its sales	We do not consider that sales phasing and any risks from the timing are systematic in nature. It is difficult to see why GDP and other macro-economic variables would be linked with sales phasing.	Not applicable.
Counterparty risk – non-payment by customers.	We consider that this is a systematic risk, as failure to pay will be affected by growth. However, the counterparty risk will not be directly correlated with GDP and market growth, as bad debts are bounded on one side (i.e., all debts are paid).	The NP would not bear this risk, as under the Milk Price Manual they receive all revenue from the volume of commodities sold, acting as a counterparty then for farmers. This is consistent with Lally and UniServices.
Financing risk – differences between expected and actual (debt) financing costs.	Interest rates comprise the risk-free rate and a debt premium, and changes in these are systematic, with a direct impact on debt costs and value, and an indirect impact on equity values. The impact depends on a variety of factors (see page 36) and may be cyclical or countercyclical.	We understand that the NP's cost of debt is set <i>ex ante</i> and is based on average debt costs for corporates as a whole. Therefore, it would be subject to financing risk from differences between <i>ex ante</i> and realised costs. In addition, it will bear the risk of differences in industry financing costs from those of average corporates (Systematic) and of the NP itself compared to the industry (non-systematic).

In relation to the revenue (price and volume) risk, our analysis of the correlation between the NZ dairy commodity prices and the stock market returns did not indicate that dairy commodity revenue (at least the element driven by price) is systematic.²² The correlation for various time intervals are provided in Table 2.2.

Table 2.2: Correlation between NZD commodity price and NZ stock exchange top 50²³

	2-year (to 29/12/17)	4-year (to 29/12/17)	31/1/2001 to 29/12/2017
Correlation	-0.40	0.07	0.06

We have not been able to replicate this analysis for other markets, but if the absence of a relationship holds for dairy companies in other countries then their inability to pass on price fluctuations in raw milk inputs may not have a material impact on their asset betas. However, as we have not estimated this relationship for overseas counties, we do not believe this high-level analysis is robust enough to be definitive on this issue. Therefore, in Section 3, we still consider the relative revenue risk for the comparator groups.

On this basis, consideration of the systematic risk in other components of the NP's risk profile will be important in forming a view on which comparators to use to estimate the asset beta.

2.5. Risks for Fonterra Actual Business

In addition to the risks discussed that could affect the NP, there is a further risk that we refer to here for Fonterra's actual business. This relates to the choice of product and services actual undertaken relative to those assumed in the farmgate milk price calculation.

2.5.1. Product and services mix

UniServices (2014) refers to Lally (2008) and states that revenues and profits from essential products or services are less sensitive to real GDP shocks compared to revenue and profits from discretionary products and services. UniServices then notes that "[c]ommodity ingredients are an essential component to value added dairy products and should have a relatively low elasticity of demand compared to discretionary goods or services."²⁴ This suggests a lower asset beta for milk commodity goods.

We need to decompose this. If the demand for luxury goods falls and commodity ingredients are a component of value-added dairy products then demand for the proportion of commodity ingredients should fall in line with that of the demand for higher value dairy products. However, as not all commodity ingredients go into value added dairy products the overall income elasticity for commodity ingredients is likely to be lower than for Fonterra's

²² We note that this is likely to be more of an issue for those business that sell domestically rather than export. However, given the global commodity market for dairy products the international influences on price and volume should affect prices/ volumes for domestic focused companies.

²³ Tickers: ANZCDAIR Index and NZSE50FG Index.

²⁴ UniServices (2014), page 23.

product mix as a whole. This affect will be dependent on the share of revenue between value-added products and commodity ingredients.

This means that in theory comparator companies which sell more luxury goods/ services are likely to have a higher asset beta.

2.5.2. Fonterra shares

There are additional reasons why the measured beta for Fonterra is unlikely to represent the business risk for the NP:

- The listed entity is a trust structure which owns shares in Fonterra, rather than Fonterra itself being listed. Most shares in Fonterra are owned by its supplying farmers. The trust provides a mechanism for outside investors who are not allowed to hold shares in Fonterra (i.e., non-supplying farmers) to invest in the share capital. This trust structure represents less than 10% of the value of the overall business and liquidity in the shares is low compared to other dairy companies, making beta estimates less reliable.
- The objective of the company is not to maximise value for its shareholders through dividends and capital gains, but rather to offer value though the combination of share ownership and using Fonterra as the route to market for dairy products. This is different from the objectives of a NP intending to maximise value to its own shareholders.²⁵

2.5.3. Implications

The risk profile for the NP and the Fonterra actual business are not the same. As such, the Fonterra quoted beta is not the appropriate reference point for this analysis.

²⁵ In Fonterra's booklet "[Good things happen when we work together](#)" it is stated that "The Co-op's number one priority is, and always has been, to maximise the total payout to our farmers" and "We work hard to maximise the value of our farmers' milk and drive the highest possible total payout back to our farmers", comprising the farm gate milk price, dividend on the shares, and other benefits from its Farm Source programme. This contrasts with the objectives of a company whose shareholders are not suppliers of the product being processed and sold by it.

3. ASSET BETA ESTIMATION

In this section we set out our five-step approach (outlined in Section 1.4) to estimate the asset beta for relevant comparators, and we consider the weight we can place on this estimate for determining the asset beta of the NP.

In making its decision for the IM review the Commission focused on the asset beta over the two most recent five-year periods, based on weekly and four-weekly observation frequencies. Reference was made to the two preceding time periods and daily estimates. The estimates were based on all trading days averaged rather than focusing on an individual reference date. In de-levering the equity beta, we have used the simplified Brennan-Lally CAPM and have assumed a debt beta of zero in our calculations.

3.1. Step 1: Identifying suitable comparators

The first step involves identifying the most suitable comparators. For companies that are not listed on a stock exchange, asset beta estimates are made from those of comparator companies. We do this by first considering the appropriateness of comparators in:

- The UniServices (2014) comparator dataset. We investigated whether there were other dairy companies that could be included in the sample; we were unable to identify any additional companies.
- Sectors the Commission regulates (and sets asset betas for) – electricity, gas and airports.

3.1.1. Implications for selecting appropriate comparators

UniServices comparator set

Our starting point for this analysis is the full sample of the 39 companies presented by UniServices (2017b) for our analysis. This sample does not include Fonterra itself. A full description of the 39 companies selected as comparators for our full sample is contained in ANNEX D.

Based on the type of company the NP is, the sector it operates in and some of the material aspects of its risk profile, we consider the following features are likely to help identify a range of sub-samples with which to compare the NP to:

- *Dairy comparators*: Base products are in line with the NP, however with greater proportions of higher value add products, asset betas may be high than the NPs. Our assessment of the exposure to milk is subjective, taking account of:
 - The significance of raw milk sources to the overall dairy business and the importance of dairy where groups are diversified (such as Danone).
 - The market mix of the processor.

- The apparent scope to pass on changes in milk costs to customers.
- *Commodity exposure*: Comparators with the majority of their revenue coming from commodities. Comparators may have a mix of commodities – for some commodities like cocoa, we may expect these to have a higher income elasticity of demand. This sub-sample includes companies with exposure to dairy and/or other commodities, including grain, oilseeds, corn, livestock, sugar and cocoa. This group is likely to provide one of the strongest parallels of comparators to Fonterra, with exposure to commodity markets for inputs as well as a significant portion of outputs. Most of these companies make margins arbitraging between inputs and outputs, some of which are processed. A number of comparators in this group undertake some processing –corn, oilseeds, sugar –as well as pure trading activities. The key difference is that price discovery in Fonterra’s case is achieved using its own mechanism, while raw material and wholesale prices in most other contexts are discovered using transparent commodity market indicators.
- *Ability to pass-through commodity price changes*: If this is feasible, it would reduce the asset beta as there is greater flexibility to adapt to systematic shocks. This is comparable to the NP’s pass-through of raw milk costs. The assessment of the scope for pass-back is subjective, taking account of:
 - The determinants of farmgate prices in each context.
 - The formality in supplier-processor contractual relationships.
 - The process for setting prices in direct milk supply contracts (which differs for example between Dairy Crest and Danone, whereas in the latter there is the influence of collective negotiation in some regions).
 - The length of price signal provided.
 - The market mix of the processor.
- *Regulatory price caps*: Determinations on price cap utilities provide ‘lower bound’ asset betas. As the comparators – Dean Foods and Saputo – have fixed sale prices, only their volumes can change with systematic shocks. However, both price and volume of input costs will move. This leads to a reduced beta (margins decrease with a positive macro shock and increase with a negative shock).

Based on our analysis in Section 2.3, a key difference between the regulated (notional) and a non-regulated processor is how quickly each can pass on differences between actual and forecast costs. For the NP, the regulatory period is 1 year, whereas for the competitive processor it depends on its contractual arrangements and competitors’ ability to pass on the same changes (i.e., competitive pressure).²⁶ As we discuss further below, our analysis of the

²⁶ If a processor cannot pass on the charges then it raises a question about what is ‘practically feasible’ for a notional processor.

comparator sample indicates that some processors can pass on prices changes in the following month (therefore they only bear a small price/ volume risk between input raw milk costs and sales), while other companies have annual price caps (therefore they may face greater counter cyclical risk than the NP).

In Table 3.1 overleaf we set out our analysis of how different regions, and therefore companies, approach to milk price setting. This analysis has helped us form the sub-samples listed in Table 3.2.

Table 3.1: Regional approach to setting (receiving) milk prices

Region	Milk price determination	Frequency of change	Scope to pass through	Relevant to:
US	<ul style="list-style-type: none"> • Regulated end-use prices under government orders (which apply in specified regions) for classes of milk are set by formulae which reference cheese, butterfat and protein wholesale prices. • Prices are determined after a deduction for processor costs (called “make allowances”) which are not seen by industry as being accurately reflective of contemporary cost structures. Processors run the risk of cost variations to these elements of the formulae. • Prices are pooled to producers in each region, whereby producers are deemed to face the same market exposure in each case, regardless how their milk is actually used in processing plants. • Companies and co-operatives can vary from regulated pricing (which is regarded as minimum) in terms of blending returns or at times discounting when over-supply conditions exist. • Fluid milk companies are exposed to greater differentials between market conditions for packaged milk 	Monthly prices across all classes of milk	<p>Diluted and lagged - Movements in the basket of commodity prices have a lagged and pooled impact on farmgate prices over time. A supplier will not receive the direct signals and market risks pertaining to the processor they supply, but to those in the pooled region of their milk order.</p> <p>Suppliers to fluid milk companies (e.g. Dean Foods) do not receive direct pass-back of market signals from that segment, as prices are set according to the value of milk mostly driven by cheese prices.</p>	Dean Foods Saputo (US operations)

Region	Milk price determination	Frequency of change	Scope to pass through	Relevant to:
Canada	<ul style="list-style-type: none"> Regulated wholesale prices are determined by a government-funded industry body and by state agencies. Farmgate prices based on each region's access to market pools of fluid and industrial milk are set based on production costs, consumer affordability and market prices Farmers access each price/portion of the market by holding quotas, which entitle them access to a share of the milk pool. Over-quota supply can earn a pooled return that is shared across producers. 	Monthly	<p>No. There is minimal pass-through as prices are influenced by farm costs of production, which results in milk prices that are higher than market returns.</p> <p>Individual milk producers can secure a market exposure that is disconnected from their milk use through ownership of market access quotas.</p>	Saputo (Canadian operations)
France	<ul style="list-style-type: none"> Most companies negotiate with milk producers through collective mechanisms, sanctioned under EU law as Producer Organisations (POs) which are legally permitted to bargain on behalf of large groups of suppliers. Danone and Savencia work with POs. It is common for companies to use a two-tier pricing model where: <ul style="list-style-type: none"> A = agreed minimum or fixed price that may be adjusted by transparent formula monthly or quarterly; and B = moves directly with agreed market price indicators. 	Varies by company and market conditions – monthly and quarterly	<p>Lagged pass-through of market conditions, depending on the structure of the agreement.</p> <p>Danone has (in its latest 2017 agreement) included movements in on-farm producer costs as part of the pricing formula, along with dairy product price changes.</p> <p>Other companies use annual agreed reference prices in contracts with variable portions.</p>	Savencia Danone

Region	Milk price determination	Frequency of change	Scope to pass through	Relevant to:
	<ul style="list-style-type: none"> There are industry information agencies which provide the reference prices and other information to support the negotiation processes. 			
Switzerland	<ul style="list-style-type: none"> Uses a blend of A (products sold domestically), B (products sold elsewhere in the EU) and C (products exported out of the EU) prices for respective portions of milk which varies by company depending on their market exposures. A-category pricing is set by industry body for about 60-70% of milk, while market movements directly affect B and C prices. 	Monthly	Partial. Regulated A prices are affected by producer costs, while the smaller portions (B and C) move directly with market signals, but vary from company to company.	Emmi
Ireland	<ul style="list-style-type: none"> A variety of approaches in use. Companies either contract directly or have standard agreements. Prices are announced by most companies <u>following</u> the month of supply. There are indexed prices in use (Glanbia in particular) allowing suppliers to lock in a portion of milk for multiple years at a base price determined by expected market returns, varying if market movements are greater than a threshold. 	Monthly	<p>Partial due to the use of risk-managed agreements, but for many prices are an ex-post announcement.</p> <p>Many producers remain on monthly prices that move directly with market returns, while an increasing number opt for multiple-year agreements where prices move if the market variation exceeds a minimum threshold. The competition between a large number of buyers in the Irish market may mitigate the direct transmission of market signals, where companies have different product or market mix situations.</p>	Glanbia Kerry Foods

Region	Milk price determination	Frequency of change	Scope to pass through	Relevant to:
UK	<ul style="list-style-type: none"> • There are a large number of buyers in the UK market offering differentiated direct supply contracts, prices and terms that reflect the various end-uses of their milk (across market and product segments) and the required precision of matching milk production with processor demands. • These include back-to-back arrangements with large retail customers. • Increased prevalence in recent years of grocery chains contracting direct with producers, linking a significant portion of milk price movements to changes in audited farm costs. 	Monthly	Yes. Product price changes are reflected relatively directly in milk price movements, especially for companies exposed to cheese markets (Dairy Crest) or where marginal milk solids prices and the movements in currencies affect processing margins.	Dairy Crest
New Zealand	<ul style="list-style-type: none"> • Annual pricing agreements apply in each production season (June-May). Prices are stated in \$/kg milk solids, but actual rates are used per kg butterfat and protein. • Generally, milk pay-outs are made progressively through the season based on a stipulated program that gradually steps up the pay-out in the latter part of the season (referred as advances) as cash flow permits each company (such that the supplier takes on cash flow risk). 	12 months. Companies vary their full year pay-out estimates with significant market movements.	High for Fonterra (as it is passed on ex post for the NP) Other companies (which have different product mix exposures and business models, but with high commodity exposures) are obliged to match based on competition for milk.	Fonterra Synlait

Region	Milk price determination	Frequency of change	Scope to pass through	Relevant to:
Australia	<ul style="list-style-type: none"> Annual pricing agreements per season (July-June) are declared at the start of the season, generally regarded as “opening” prices, expressed in monthly milk pay rates for each milk component (fat and protein) over the full season. Common practice is to announce a full year estimate (generally 10-15% higher than the “opening”) based on forecasts given expected market conditions. Prices are topped up throughout the year if market movements warrant. These are called “step-ups” but these price rises are generally planned into milk budgets by companies. In rare occasions (twice in 30 years) prices have been stepped down. Strong market movements ahead of expectation will see higher step-ups paid. Fresh milk companies tend to smooth the monthly milk payment rates and offer higher prices than manufacturers to ensure year-round milk supply. Fresh processors offer up to 5-year milk supply contracts with provision for market movements. 	12 months, varying full-year estimates with market movements; some agreements are longer.	Yes, but subject to competitive tension and lagging/smoothing in many cases despite differences in product mix and the scope to improve earnings above commodity returns.	<p>Bega</p> <p>Fonterra (milk intake has over recent years been less than 10% of NZ intake volumes)</p> <p>Saputo (small part of global business)</p> <p>Murray Goulburn</p> <p>Parmalat (small part of global business)</p>
China	<ul style="list-style-type: none"> Large processors mostly source from commercial farms on 	Monthly, varying with market conditions and milk availability	Moderate, strong influence of government in ensuring farm sustainability	Mengniu Yili

Region	Milk price determination	Frequency of change	Scope to pass through	Relevant to:
	contracts that have little transparency. <ul style="list-style-type: none"> • Milk prices changes monthly based on changes in demand and supply conditions, including the influence of landed prices of imported milk powders and UHT milk 			Bright

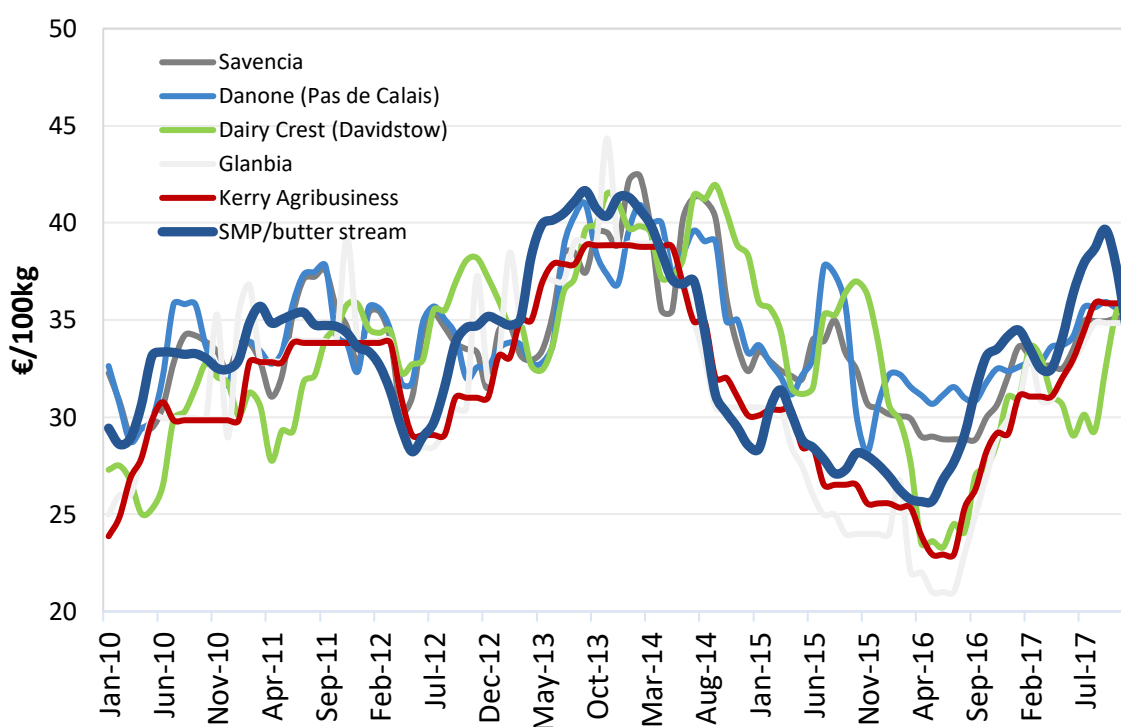
Source: Freshagenda & CEPA

European dairy company prices

It is helpful to consider the characteristics of the European based dairy companies in more detail.

The dairy companies have different levels of exposure to commodity markets. Typically, listed companies do not have significant commodity manufacturing activities and manage milk requirements at close to their processing needs. In contrast, processors that are cooperatives generally adopt policies to collect every litre of supplier milk. The chart shows a comparison between the commodity returns expressed in milk value (which is the milk return from Skim milk powder and butter) and the respective milk prices of the European comparators.

Figure 3.1: Selected European farmgate milk prices (€/100kg)



Source: Freshagenda

While the global businesses of Glanbia and Kerry are less exposed to commodities, they source milk from Ireland for their ingredients plants, which have more exposure to global markets than the other companies shown. Dairy Crest benchmarks producer milk prices into its cheese plant against wholesale cheese markets (which at times in the UK do better than powder and butter commodities), while Danone and Savencia smooth their returns with higher fresh domestic product use.

This means is that, while companies have exposure to different markets and commodity values affect everyone, some companies receive more direct commodity market signals depending on the way that prices are bargained and the market mix of their processor.

Sub-samples

The table below shows the companies selected within the sub-samples.

Table 3.2: Comparator sub-samples

Company	Dairy companies (18)	Commodity exposed (10)	Cost pass-through (10)	Regulated milk price (2)
Archer-Daniels-Midland		✓		
Bega	✓	✓		
Bright	✓		✓	
China Mengniu	✓		✓	
Dairy Crest	✓	✓	✓	
Danone	✓		✓ ²⁷	
Dean Foods	✓			✓
Emmi	✓		✓	
Glanbia	✓			
GrainCorp		✓		
Grupo Lala	✓		✓	
Yili	✓		✓	
JBS			✓	
Mead Johnson Nutrition	✓			
Murray Goulburn Co-op	✓	✓		
Olam International		✓		
Parmalat	✓		✓	
Saputo	✓	✓		✓ ²⁸
Savencia	✓		✓	
Synlait	✓	✓		
Tate & Lyle		✓		
Want Want China	✓			
Wilmar International		✓		
Yakult Honsha	✓			

Source CEPA and Freshagenda analysis

Fifteen companies in the full sample are not allocated to any of the sub-samples, these are: ABF, BRF, Bunge, Conagra, Cr Hensen, General Mills, Hershey, Ingredion Inc, Kellogg, Kerry, Kraft Heinz, Mondelez International, Nestle, NH Foods, and Unilever. These are typically companies predominantly

²⁷ Based on EU units

²⁸ Based on US and Canadian operations.

receiving revenue in the Fast-Moving Consumer Goods (FMCG). While these companies are likely to face different income demand elasticities and input mix to the NP, their operations may be sufficiently similar to the NPs to help increase the robustness of the asset beta averages (see our discussion on sample size below).

As we can see from Table 3.2, there is a reasonable overlap between 'dairy companies' and the other the sub-samples. Five of the 'commodity exposed' companies, nine of the 10 'pass-through' companies, and both of the regulated milk price companies, appear in the 'dairy companies'. Twenty-four companies in total appear in our sub-samples. This means we can assume broadly similar operating systematic characteristics, if not revenue systematic characteristics, between a large proportion of the companies in the sub-samples.

Sample size

We have identified the sub-samples for the purposes of risk profiles, and present analysis for the four sub-samples, however we note that there are benefits to using the full sample that may outweigh the use of the sub-samples' averages. These benefits include:

- Using the full sample avoids making a judgement on whether the risk profiles of individual companies are a better match for the NP. While we have aligned the risk profiles on the basis of the companies' operations and production there is a subjective element to this process.
- Some companies' asset betas are highly volatile over time. Therefore, reducing the sample size may result in significant movements in the asset beta each time it is assessed. This calls into question the robustness of the estimate and is a particular issue when reviewing the asset beta each year.

The Commission, in its IM decision noted similar points in its arguments for using an energy sample that included a range of companies operating in the energy sector, including generation and vertically integrated companies, rather than a sub-sample of those companies that were identified as being 'pure' lines businesses and operating under a similar regulatory regime.²⁹ The standard errors of the samples can be assessed to determine the confidence that can be place on the sample average representing the population average. As the samples contain companies from a number of countries estimating the sample average is complex. One way of estimating the standard error for this type of sample is set out in Lally (2008),³⁰ however an estimate for the industry effect is required to determine the sample standard error and calculating this is beyond the scope of this study. However, if we assume the same industry effect is the same for each sample, then on a relative basis, the full sample has a lower standard error than the sub-samples, except for the 'regulated milk price' sub-sample. For the latter, the estimate is sensitive to the choice of the industry effect parameter and the calculation does not produce a result for the four-weekly estimates if the industry effect is

²⁹ NZCC (2016b), pages 682-683.

³⁰ See Lally (2008), Section 5.3

low. While the standard error may be low, as there are only two companies in the sample the average would be highly susceptible to outlying observations.

Regulated industries

The Commission uses within sector comparators to develop beta estimates for the ELBs, GPBs and airports. The Commission (see Commission (2016b)) estimates the asset betas for the different sectors as follows:

- **ELBs.** Asset beta (of 0.35) based on the averages across a broad sample of 72 energy sector companies.³¹ This includes vertically integrated energy companies and those not subject to a regulatory regime.
- **GPBs.** Applied an uplift of 0.05 to the ELBs' asset beta (to give an asset beta of 0.40). The uplift was justified on the combined reasoning of gas having a higher income elasticity of demand, and New Zealand's gas penetration being relatively low thereby providing greater scope for growth than in the electricity sector.³²
- **Airports.** Asset beta based on a sample of 26 airports from various jurisdictions.³³ The Commission made a 0.05 downward adjustment to the average asset beta (of 0.65) to correct for the multi-divisional businesses some of the airport groups operate.

Both UniServices and Dr Lally have argued that the methodology set out in the Milk Price manual indicates that an appropriate asset beta comparison for the NP is the asset beta the Commission determines for the ELBs. Although we note that in UniServices (2014), the author noted that his estimate of 0.375, includes an uplift of 0.035 to reflect, in part, "some uplift [compared to the ELBs' asset beta] ... on account of the market weight if the Notional Business was listed on the NZX."³⁴

As both Dr Lally and UniServices noted the asset beta for ELBs is an appropriate comparison point for the NP, we have focused on providing analysis of the ELBs' risk profile in the next sections and have not considered GPBs or airports.

3.1.2. Overview of risks faced by the NP and its comparators

In Table 3.3 below, we undertake a qualitative assessment of whether the relative systematic risk for the comparator groups will be similar to or differ from that of the NP, for each of the following components:

- **Revenue risk.** The NP does not bear price or volume risk as this is transferred to farmers via the raw milk payment. Therefore, this risk component is focused on whether the sub-sample comparators are able to pass through changes in prices (and

³¹ Ibid, page 684.

³² NZCC (2016b), page 10.

³³ NZCC (2016b), page 769.

³⁴ UniServices (2014), page 7.

therefore volumes) to their suppliers, or, in the case of the ELBs their exposure to volumes and/or prices changing outside of their control. As we consider 'other opex' (non 'raw' inputs such as milk, grains, etc) and capex as separate risk components our assessment excludes these risks (i.e., gross revenue taking account of the 'raw' inputs).

- **Exchange rate risk.** This depends on the overall stock market exposure to exchange rates. A heavily export oriented stock market will likely be negatively correlated with exchange rates, and import (services) orientated markets will be positively correlated. While businesses can hedge exchange rate risk (at a cost), this is typically done for short periods (one year or less) and the business's valuation will still reflect the impact of changes in the exchange rate. It should be noted that even if a company has no international exposure, the asset beta of can still be affected by exchange rate risk because of the relationship between exchange rates and interest rates.
- **Other opex.** The exposure to opex systematic risk depends on companies' ability to pass on systematic related changes in input (operating) costs. Different input costs will have different relationship to systematic drivers, for example wages for different types of labour may decrease (increase) at different rates. This component is related to the next component 'operating leverage'.
- **Operational leverage.**³⁵ This represents the ratio of variable costs to fixed costs. While not a risk component per se, but it can dampen or exacerbate systematic opex risk. Typically, if a company, operating in a competitive market, has a higher proportion of variable costs to fixed costs then it will be able to increase (decrease) more opex in line with changes in conditions than a company with a lower proportion of variable costs to fixed costs.
- **Capex.** Companies will need to invest in new capacity to meet changes in demand, and to ensure that existing assets remain functioning. Costs may be systematic in nature; investment to expand is likely to be systematic because demand growth is related to GDP growth, and input costs for capex (e.g., hiring of equipment, wages, etc) are also likely to be cyclical. In contrast, replacement/ refurbishment expenditure is less likely to be cyclical or countercyclical, as it will reflect the age/ reliability of the assets.
- **Asset stranding.** A sustained downturn in demand may lead to the stranding of assets. Changes in demand are likely to be systematic, however asset stranding is an asymmetric risk as only a downturn is likely to lead to asset stranding.
- **Counterparty risk.** Almost all companies face the risk that some customers will not pay. This risk is likely to be as systematic (and cyclical) as in 'good times' the number of bad debtors should decrease, while in 'bad times' they will increase.

³⁵ We did not set this out in Table 2.1 as it is only relevant as a relative measure.

- **Financing risk.** Interest rates on corporate debt comprise the risk-free rate and a debt premium. The risk-free rate is determined by local monetary policy in the context of international conditions. The debt premium for a company reflects the market price of risk for lending to corporates as a whole, specific industry factors, and individual company effects, and these market, industry and company factors are reflected in credit rating agency decisions. Interest payments are also determined by how much debt is at fixed rate, its issuance date, and tenor. Changes in interest rates have a direct impact on cash flows and debt value (to the extent that interest rates are fixed), and an indirect impact on equity values (through the change in the discount rate). The size of the impact depends on the extent to which output prices reflect financing costs, the structure of the debt portfolio, and how the combined effect of changes in growth and interest rates affect the equity value. Changes in the risk-free rate, and changes in the debt premium other than for individual company effects are systematic risks, and the net impact of the above factors may be either cyclical or counter-cyclical.

We have attempted to set out whether each comparator group's risk is likely to be higher or lower compared to the NP. This is subjective and identifying the correct relative risk assessment will depend on knowing investors' long-term view of the company's/ sectors' systematic risk. Therefore, for some risks we have only been able to set out whether we think the risk will generally be 'different' compared to that of the NP. A lower (higher) relative systematic risk assessment should be interpreted as lowering (increasing) the asset beta.

Another point to note is that it is difficult to calculate a weight for each of the components. Some will have a relatively small impact on beta – for example we assume that counterparty risk will be small – and some will be much more significant, such as input costs.

We note that there are a number of other factors raised in Lally (2008) that can affect the asset beta. These include:³⁶

- **Nature of the customer.** This can capture a number of different aspects such as: public or private sector customer, domestic or international customer, and personal or business customer. Different mixes of customers can lead to different systematic risk.³⁷ For example, public sector customers should have lower sensitivity to real GDP shock.
- **Pricing structure.** Firms with a proportion of revenues that are based on variable charges are more likely to be sensitive to macroeconomic shocks than those firms whose charges are fixed.
- **Contract prices.** The duration of contract prices with suppliers and customers.

³⁶ Lally (2008), pages 49-50.

³⁷ As noted in Lally (2008), page 49, demand from foreigners tends to reduce the asset beta as their demand is likely to be less sensitive to New Zealand GDP shocks.

- **Real options.** The opportunity of the company to adopt/ introduce new products. A firm that has a greater opportunity for growth options should be more sensitive to macroeconomic shocks.
- **Market weight.** The weight of an industry in the market index against which its beta is defined pulls the beta towards 1.

The 'nature of the customer', 'pricing structure', 'contract prices' and 'real options' all relate to the revenue risk and elasticity of demand to some degree and we have not attempted to identify separately the differences across the groups for each of these factors.

Market weight may be an issue if the market share of the company sectors in the sample are a significant proportion of the market index used to estimate the beta. However, to the best of our knowledge the comparators have limited weight in their market indices.³⁸ Fonterra Shareholder's fund also has limited weight in the NZX50 index. Therefore, we do not consider this factor to be significant.

³⁸ The listed network company, Vector, is included in the NZX50, however its weight is under 2%.

Table 3.3: Review of relative systematic risks

Type of risk	NP	Dairy companies	Commodity exposed	Commodity price pass through	Regulated milk price	ELBs
Revenue risk	<p>No risk. Passed-through. However, changes in longer term revenue expectations may affect long-term value and thus systematic risk (see comment on capex)</p>	<p style="text-align: center;">↑</p> <p>Depends on comparators' ability to pass on price risk and volume risk. Some commodities/ value-added producers may have higher income demand elasticities than the NP's commodities. If price/ volume risk cannot be passed on this will increase the (positive) systematic risk.</p>	<p style="text-align: center;">=</p> <p>Similar risk Companies have the ability to pass on price risk relatively rapidly.</p>	<p style="text-align: center;">=</p> <p>Similar risk. Have a regulated price. If the income demand elasticity for milk is low then the volumes will not be strongly correlated with macro-economic shocks.</p>	<p style="text-align: center;">=</p> <p>Similar risk Volumes may have some correlation with GDP, but the use of a revenue-cap minimises systematic risk from this.</p>	
Exchange rate	<p>No risk. The NP's hedging costs are funded under the Milk Price Manual calculation.</p>	<p style="text-align: center;">= or ↑</p> <p>Higher but low risk. We can assume that companies in these groups will be exposed to exchange rate risks, but for those companies selling domestically as well as exporting, will have lower systematic risk than the solely export orientated companies. Hedging can reduce the short-term impact of movements in the exchange rate, however this has a cost associated with it.</p>	<p style="text-align: center;">=</p> <p>Low risk. These companies typically sell locally and the majority of costs are likely to be local.</p>	<p style="text-align: center;">=</p> <p>Low risk Inputs will be exposed to exchange rate risk, but not outputs. Positive macro shocks are likely to appreciate local currency which may reduce costs in the short term. However, higher exchange rates associated with higher interest rates, which is typically negative for utility valuation, and this effect is likely to dominate asset beta determination.</p>		

Type of risk	NP	Dairy companies	Commodity exposed	Commodity price pass through	Regulated milk price	ELBs
Opex (excluding raw milk)	Faces risk. Faces difference between actual costs and allowances. However, some costs are set based on actuals.	= Similar or lower risk profile. Comparators will bear/ gain if actual costs are higher/ lower than forecast. Overall, this depends on their ability to pass on costs changes in costs. Dairy companies will have a similar mix of input costs to the NP.	= Potentially different. This group covers companies that may have materially different opex structures. However, this is only for 50% of the sample.	= Similar risk profile. Comparators will bear/ gain if actual costs are higher/ lower than forecast. Pass-through companies will have a similar input cost mix to the NP.	= Similar risk profile. Comparators will bear/ gain if actual costs are higher/ lower than forecast. These companies will have a similar input cost mix to the NP.	≠ Different Different mix of opex. Ability to out-/under-perform (i.e., against wage growth) likely to be different.
Operational leverage	Low risk The NP construct means the operational costs are able to adjust for volumes.	= or ↑				≠ to ↓
		Higher (although depends on contracting) The companies may be able to adjust operating resources depending on volumes.				Different ELBs have high operational gearing. A higher level of fixed costs is likely to expose the ELB to different systematic risk. Under a revenue cap the fixed costs are allowed for.
Capex/ investment	Faces valuation risk The NP invests to respond to long term	=				↓
		Similar				Lower

Type of risk	NP	Dairy companies	Commodity exposed	Commodity price pass through	Regulated milk price	ELBs
	increases in demand, and the value of the NP responds to changes in demand expectations. Investment increases likely to enhance value.	Comparator companies will invest to meet future demand and replace existing assets. Asset replacement cycle will be similar to NP as historic development of processing facilities similar. Changes in future investment similar to NP as factors affecting demand and the cost of investment are similar.				ELBs investment cycles are almost certainly different from that of the NP. Future capex needs driven by technical change rather than demand. Historic investment cycles different making replacement cycle different. In addition, the make-up of the inputs (e.g., copper wires, cables, etc) to capex are likely to be quite different.
Asset stranding	Faces risk. Subject to changes in demand and Fonterra needs to carry excess capacity.		=			↓ Lower (no) risk. The RAB is effectively guaranteed through regulation.
Counterparty risk	No risk. The milk price formula ensures all estimated revenue is passed on to the NP.		↑			= No risk The revenue cap approach effectively ensures an allowance is made for bad debt.
Financing risk	Faces risk. The NP can pass on a cost of debt based on the market cost		↑			↓ Lower risk. Credit rating agencies assess credit risks from ELBs using a

Type of risk	NP	Dairy companies	Commodity exposed	Commodity price pass through	Regulated milk price	ELBs
	<p>of corporate debt for an average company set ex ante, averaged over five years.</p> <p>The NP may set its financing strategy to match the assumed revenue as closely as possible. However, it will still bear the risk of differences between the <i>ex ante</i> and realised costs. In addition, it will bear the risk of changes in its debt premium that are different for corporates as a whole. These risks are in part market or industry related and therefore systematic.</p>	<p>corporates as a whole. Comparator businesses are also likely to have some revenues fixed in advance based on their expected costs including financing costs, and therefore to bear the risk of ex ante and realised costs being difference. The drivers of these changes are likely to be similar between the NP and the comparator group.</p> <p>Many companies in the comparator group will not be able contractually to pass through changes in the risk-free rate and average industry debt costs. However, market prices are likely to respond to changes in average financial costs as well as other input costs. This suggests higher risk for the comparator group reflecting the absence of contractual pass through, offset by lower risk as specific industry financing cost effects can potentially be passed through. On balance we would expect the combined effect to be higher risk for the comparator group.</p>				<p>distinct methodology in comparison to other industries, typically giving higher ratings than for other companies with similar financial metrics, in particular if the regulatory regime is stable. The asset backing of the RAB further enhances the credit quality. Investors favour utility investments at times of heightened financing risk, indicating financing risk is less cyclical than for other industries.</p> <p>Credit ratings for ELBs are typically relatively stable, leading to greater stability in the cost of debt.</p>

Source: CEPA & Freshagenda

As we noted above, the assessment is subjective (investor considerations for each component in each sector need to be known) and it is difficult to place weight on individual components. However, we consider that the analysis demonstrates that comparators from the sample are more likely to have similar risk profiles to the NP than the asset beta for ELBs (and by extension the energy companies included in the Commission's energy sample). Specifically, our assessment indicates that the NP and other companies in the same (or similar sectors) are more likely to have similar opex, capex, operational leverage and asset stranding risks than for those in the electricity sector.

While there are similarities with how short-term revenue is treated for the NP and ELBs (as argued by Dr Lally and UniServices), and that this lowers the systematic risk profile for the NP, we consider that there are significant differences in other components of the risk profiles. In our view, the comparators from the sub-samples are much more likely to provide a match across these components than the ELBs. Our reasons include:

- We believe that investors will value the future revenue streams from milk processors differently to other sectors because they are likely to have a different relationship with macro-economic factors and therefore systematic risks, as argued at the start of Section 2.³⁹ Therefore, the valuation effect on the asset beta for the NP will be different from those captured in the other sector (e.g., energy) samples.
- The NP's operating requirements and conditions are likely to be more similar to the industry comparators than to those of the energy businesses. The NP and within sector comparators are more likely to have similar operating bases.
- The energy sector sample contain a mix of companies some of which do not operate under regulatory regimes, and therefore they will have different revenue risk profiles to the NP in addition to the difference in their other risk components.

Unless strong evidence can be provided that the NP's characteristics – operating characteristics, response of investment plans to changes in the economic outlook, investor perceptions, regulatory regimes, etc – lead to similar risk profiles as the ELBs,⁴⁰ we believe that the most appropriate starting benchmark for the NP should be within sector comparators or those with similar product/commodity type processing. Adjustments to this starting point may be required if those components of risk – such as revenue risk and counterparty risk – are identified as materially affecting the asset beta. However, as we above (and in Section 2.4) and through our estimation of the sub-sample betas below (in particular the 'pass-through' sub-sample), it is not clear that the pass-through of price risk lowers the NP's systematic risk to a similar level to the ELBs.

³⁹ A similar point was raised in Castalia (2016), page 4.

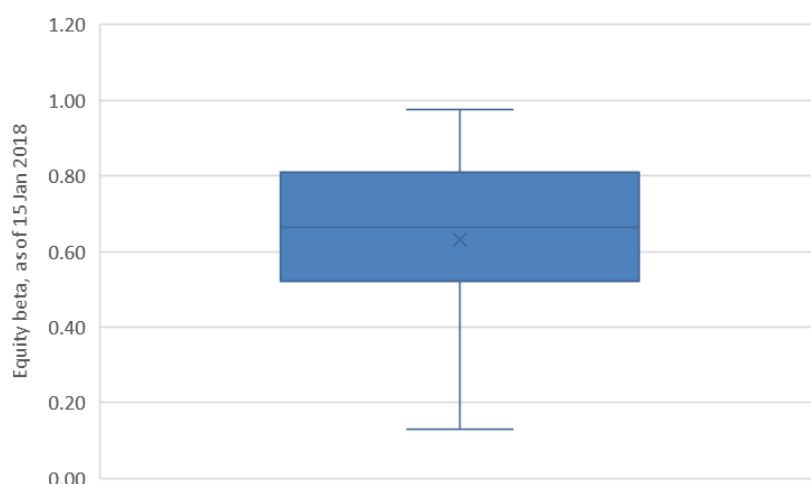
⁴⁰ As proposed by UniServices in Lally (2016a) and Lally (2016b).

In the following sections we therefore estimate the asset beta ranges for the full and sub-samples, rather than focus on estimating appropriate adjustments for the asset beta for the ELBs.

3.2. Step 2: Estimating the equity beta for individual firms

The individual equity beta estimates are contained in ANNEX E. The figure below gives a high-level summary of the equity betas, noting that these are affected by the level of gearing, so they are less comparable than asset betas. This is based on the latest five-year period, up to 15th January 2018, using weekly data. The 'x' denotes the sample average.⁴¹

Figure 3.2: Box-and-whisker plot of individual equity betas for full sample



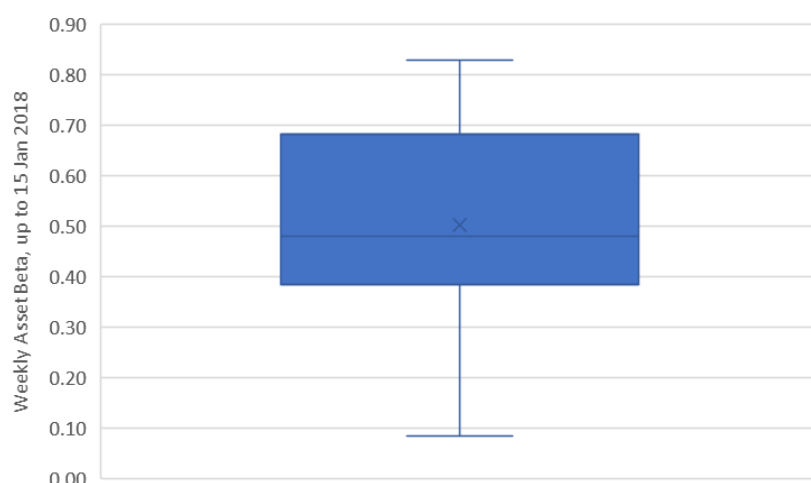
Source: Bloomberg, CEPA analysis

3.3. Step 3: De-lever equity betas to obtain individual asset betas

The individual asset beta estimates are also contained in ANNEX E. We have presented the same summary diagram as for the equity beta, noting that average gearing across the sample is 18%. This is based on the latest five-year period, up to 15 January 2018, based on weekly data.

⁴¹ The top line = highest value; top of the box = upper quartile; line in the box = median; bottom of the box = lower quartile; and bottom line = lowest value.

Figure 3.3: Box-and-whisker plot of individual asset betas for full sample



Source: Bloomberg, CEPA analysis

3.4. Step 4: Calculate asset betas for the overall sample

We show below average (mean) asset betas for our overall samples, based on different measures of asset beta. We present this information for the two most recent five-year time horizons.

Table 3.4: Asset beta across samples, five-year period to 15 January 2018

Chosen sample	Daily	Weekly	4-weekly
Full sample	0.58	0.50	0.56
Dairy companies	0.58	0.53	0.59
Commodity exposed	0.53	0.49	0.52
Cost pass-through	0.55	0.51	0.54
Regulated milk price	0.57	0.49	0.61
Across all sub-samples	0.56	0.51	0.57

Source: Bloomberg, CEPA analysis

Table 3.5: Asset beta across samples, five-year period to 15 January 2013

Chosen sample	Daily	Weekly	4-weekly
Full sample	0.50	0.45	0.49
Dairy companies	0.46	0.41	0.47
Commodity exposed	0.55	0.52	0.63
Cost pass-through	0.53	0.49	0.59
Regulated milk price	0.30	0.30	0.30
Across all sub-samples	0.51	0.47	0.53

Source: Bloomberg, CEPA analysis

The large movement in the asset beta for the 'regulated milk price' group may illustrate the issues with estimating a beta based on a very small sample (two companies). Different operating conditions for either of the two companies during the sample periods have a significant impact on the average.

We also note, in the period during and following the GFC, beta statistics may be affected,⁴² so these statistics may need to be treated with caution. However, we include both five-year periods in our discussion of the ranges in Section 3.6 below.

We proceed to discuss what this evidence means for setting the asset beta for the NP.

3.5. Step 5: Apply any adjustments/ interpret overall evidence for beta

The empirical evidence does not support an adjustment to the sample or sub-sample averages for the NP's risk profile as the averages, aside from the 'regulated milk price' sub-sample, are similar. In other words, high commodity exposed companies have a similar average beta to those that are able to pass through costs, and to the full sample.

However, the dairy companies and commodity exposed groups contains companies with commodities and products that have high income elasticity and the cost-pass through group does not have the same 'perfect' pass through as the NP. Therefore, an argument can be made for a downward adjustment to the full sample average. It is not possible to estimate this adjustment empirically. The Commission's 0.05 asset beta adjustments made for gas (upwards) and airports (downwards) provide a precedent for such a risk adjustment.⁴³

3.6. Summary

In terms of our chosen sub-samples, given the volatility of individual beta estimates, larger samples are likely to provide more robust estimates; aside from the dairy sub-sample all the samples would typically be considered small.

Our initial hypothesis was that companies with a regulated milk price are likely to have countercyclical risk (depending on the nature of the regime) than firms without a regulated milk price, leading to a lower asset beta. However, this gives the highest asset beta using the 4-weekly measure of our comparators for the most recent five-year period, but it was the lowest in the previous five-year period. As there are only two companies in this sub-sample we are not confident in placing substantial weight on these estimates.

The dairy comparator sub-sample (with 23 companies) has similar asset beta averages to the full sample in the most recent five-year period, but lower averages for the five-year period to 15 January 2013. The weekly asset beta average of 0.41, for the five-year period to 15 January 2013, is quite low relative to all the other averages (excluding the regulated milk price group).

⁴² Hasnaoui & Fatnassi (2014)

⁴³ See NZCC (2016b), pages 703-738 and 743-746.

Our two other sub-samples – commodity-exposed and cost-pass through – asset betas are more stable across the two five-year periods. There is some, although more limited, variation across these two sub-samples and the full sample.

Focusing on the full sample, which is likely to produce a more robust estimate, the asset betas range between 0.45 and 0.58 across the two periods.

As previously noted, the ‘dairy companies’, ‘commodity exposed’ or ‘pass-through’ sub-samples are likely to have risk profiles that lead to slightly higher asset betas than the NP’s (i.e., more commodities/ products with higher income elasticity and imperfect price pass-through). These three sub-samples have a slightly higher and wider range than the full sample, 0.46 to 0.63, if we exclude the ‘dairy companies’ weekly observation for the five-year period to 15 January 2013. Therefore, we consider that there is an argument for a small downwards adjustment. We cannot empirically estimate this adjustment, but consider that the Commission’s 0.05 adjustment for gas (upwards) and airports (downwards) provide a reasonable precedent for the magnitude of an adjustment for these types of risk profile differences.

4. CONCLUSIONS

We have sought to establish whether the asset beta of 0.38 used by Fonterra for the 2016/17 base milk price is practically feasible for an efficient notional processor.

Our theoretical and empirical analysis has led us to conclude that an asset beta of 0.38 is unlikely to be appropriate for the NP; rather a higher asset beta would be more appropriate.

Our analysis indicates that it is more appropriate to start with a sample of companies that operates in a similar industry, with similar scope for future growth and efficiencies, and investment and operating conditions, and then adjust for relative risk, rather than start with a sample from a different sector and make adjustments to this.

We consider that the comparators selected by UniServices (2014) are broadly appropriate for empirical analysis. We look at separate sub-samples to test the sensitivity of the results to different groupings and consider our results are sufficiently reliable for use in setting the asset beta.

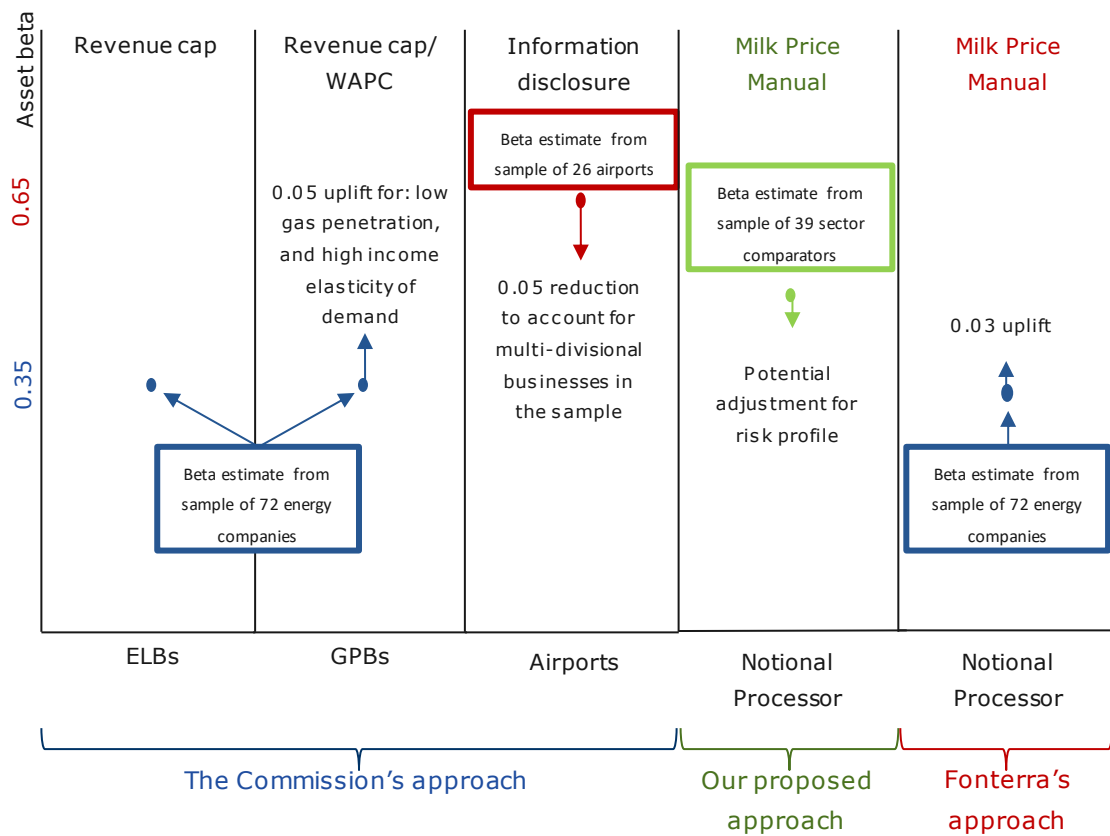
Our asset beta estimates for the dairy group of companies are similar to those of UniServices, although our range is wider (0.45-0.58 from our analysis across the full, commodity exposed and cost pass-through samples compared to 0.49-0.53 for UniServices (2017b)).

However, in contrast to UniServices (2017b) and Lally (2016a), we consider that the comparator set is the most appropriate reference point for the asset beta of the NP, rather than the asset beta estimated from the energy company sample used for the ELBs. We consider that there are significant differences between the dairy sector and the energy sector in:

- how investors' value the industries; and
- the operating characteristics of the industries, such as operating leverage, rates of high skilled to low skilled labour, and investment plans.

In addition, as illustrated in Figure 4.1, we consider that our proposed approach is more aligned with the Commission's IM approach than Fonterra's approach.

Figure 4.1: Comparison of approaches to using comparators to estimate the asset betas



Source: Commission (2016b), CEPA analysis

We disagree with the adjustment made by UniServices (2017b) to arrive at an asset beta of 0.38. In our view there is no strong rationale for decreasing the asset beta below the low end of our asset beta range (0.45) for dairy comparators.

ANNEX A REFERENCES

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ANNEX B LALLY (2016A) ASSET BETA DECOMPOSITION

In Lally (2016a)⁴⁴, Dr Lally sets out an approach to assessing the asset beta of a revenue-capped Notional Business. First, Dr Lally specifies the net cash flows for a business similar to that of the Notional Business, but pays for milk like any other input (instead of it being treated as a pass through). Dr Lally also assumes depreciation is zero and there is no debt financing (a debt beta of zero is also assumed); these assumptions do not change the interpretation of the assessment.

$$NCF = RMIL + ROPEX + kB - MIL - OPEX \quad (01)$$

Where:

NCF = Net cash flows

$RMIL$ = regulatory allowance for efficient milk purchase costs

$ROPEX$ = regulatory allowance for other (non-milk purchase) operating costs

k = allowed cost of equity

B = regulatory asset base

MIL = actual milk purchase costs

$OPEX$ = actual other operating costs

The rate of return can then be calculated as:

$$R = \frac{NCF + V_e}{V_0} = \frac{(RMIL - MIL) + (ROPEX - OPEX) + kB + V_e}{V_0} \quad (02)$$

Where:

V_0 denotes the current value of the business

V_e denote the value of the business at the end of the regulatory period

Dr Lally then specifies the asset beta for a 'revenue-capped business operating in then normal manner' as:

$$\begin{aligned} \beta_{RC} &= \frac{Cov(R, R_m)}{\sigma_m^2} \\ &= \frac{Cov\left(\frac{RMIL - MIL}{V_0}, R_m\right)}{\sigma_m^2} + \frac{Cov\left(\frac{ROPEX - OPEX}{V_0}, R_m\right)}{\sigma_m^2} + \frac{Cov\left(\frac{V_e}{V_0}, R_m\right)}{\sigma_m^2} \end{aligned} \quad (03)$$

Where:

β_{RC} asset beta for a revenue-capped business

R_m is the rate of return on the market portfolio

⁴⁴ Lally (2016a), page 8.

σ_m^2 is its variance

The first term reflects the covariance between the milk purchase costs and the market returns; the second is the operating costs covariance with market returns; and the last is the change in valuation covariance.

Dr Lally states that, because the Notional Processor is able to pass-through the milk purchase costs (MIL) it does not bear the risk associated with the first term in (3). Therefore, the asset beta for the NP is as follows:

$$\beta_{NP} = \frac{Cov\left(\frac{ROPEX - OPEX}{V_0}, R_m\right)}{\sigma_m^2} + \frac{Cov\left(\frac{V_e}{V_0}, R_m\right)}{\sigma_m^2} \quad (04)$$

Where:

ROPEX = regulatory allowance for other (non-milk purchase) operating costs

OPEX = actual other operating costs

R_m is the rate of return on the market portfolio

σ_m^2 is its variance

V_0 denotes the current value of the business

V_e denote the value of the business at the end of the regulatory period

After concluding the composition of the asset beta for the NP will look like equation (4), Dr Lally argues the following:

- Milk purchase and operating costs are positively correlated with macroeconomic shocks i.e., if GDP increases then the costs to businesses will increase (as competition for inputs increase). While Dr Lally does not specify whether this argument is for business with revenue caps, given the construct we assume this is the case. A business that is not constrained by a revenue-cap will be able to increase its prices (within reason given competition and demand elasticity) to cover the higher costs. However, because of contractual arrangements, there may well be a delay before it can achieve this. UniServices (2014) argues that the risk is positive and UniServices (2017) suggests it could be positive or negative.
- If the regulator errs in setting the cost of capital then the last term (the valuation term) is uncertain, and plausibly the biggest source of potential error in setting the allowed cost of capital is the risk premium in the cost of equity. Dr Lally goes on to state that errors in estimating the MRP are likely to be correlated to market returns, i.e., when returns are high (low) the MRP will be over (under) estimated. Therefore, V_e will have a positive effect on the NP's beta.

In regards to the latter point, Dr Lally appears to assume that the valuation risk will be the same across any sector. In addition, because only a proportion of the NP's costs are subject

to macro-economic shocks (with the remainder passed-through) “the beta of the Fonterra Notional Business must be larger than that of a revenue-capped business operating in the normal fashion.”⁴⁵

Based on the above, Dr Lally’s finds that the appropriate asset beta for Fonterra’s Notional Business should be the Commissions asset beta for ELBs, 0.34 (now 0.35), less a deduction for demand risk (which Dr Lally assumed to be zero, but is no longer applicable as a revenue-cap now applies to ELBs) and an increment for the deletion of the milk price risk.

⁴⁵ Ibid, page 9.

ANNEX C FARMGATE MILK PRICE METHODOLOGY

Fonterra calculates the farmgate milk price by using a notional construct ('the Notional Processor'). This notional construct is used to set an efficient milk price (i.e. a milk price that is derived by Fonterra or another efficient processor producing only commodity dairy products).

Fonterra's milk price manual⁴⁶ sets out a subtractive approach to calculating the farmgate milk price. This is determined *ex-post* by:

- the total revenue from sales in NZ dollars Fonterra would earn if the equivalent of all raw milk supplied to Fonterra was converted into the Reference Commodity Products (RCP) mix, sold on international markets.
 - the five RCP commodities include two standard dairy products and three of its by-products.
 - whole milk powder (WMP)
 - skim milk powder (SMP)
 - butter
 - anhydrous milk fat (AMF)
 - buttermilk powder (BMP)
 - actual data is used to reflect the actual prices received by Fonterra on the GlobalDairyTrade platform (GDT) and off the GDT.
 - actual data on volumes sold is also used.
 - this means that all commodity price risk is borne in the base farmgate milk price i.e. by farmers, consistent with s150c of DIRA⁴⁷.
- less cash/ operating costs
 - this covers the costs of collecting raw milk from farms, processing it into the RCP product mix and transporting the product to the point of export from New Zealand, as well as costs of selling the finished product, overhead and tax expenses.
- less capital costs
 - this provides for a return of and a return on capital assets through depreciation and the cost of capital (including working capital).

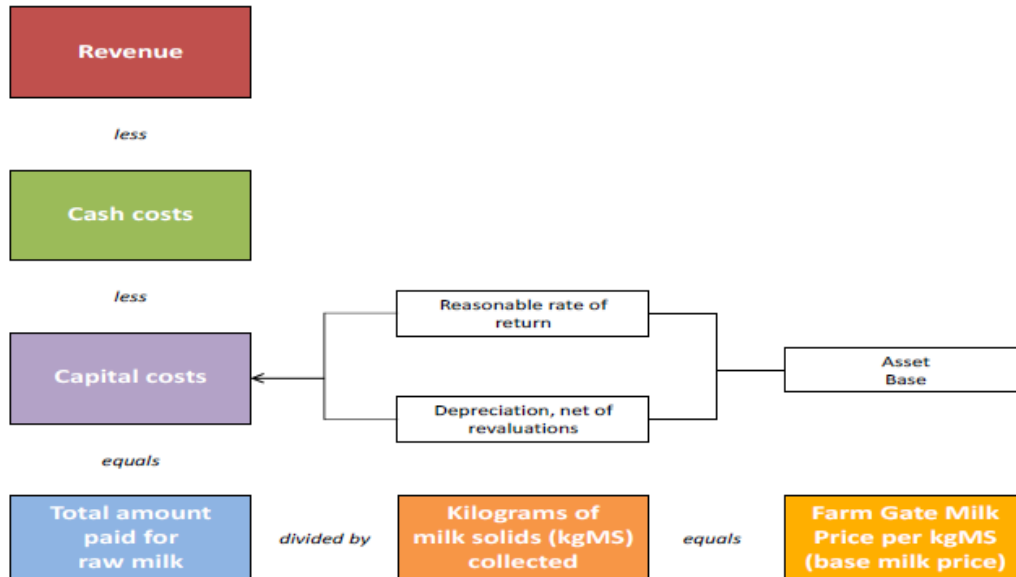
Fonterra estimates the operating and capital costs associated with the value chain after the raw milk leaves the 'farm' and subtracts these from the revenue term. The cost estimates are

⁴⁶ Fonterra (2016), *Farmgate milk price manual – Part A: Overview*, 1 August 2016.

⁴⁷ NZCC (2017b), paras 2.26-2.27.

based on a mix of Fonterra’s actual costs and ‘notional costs’. The residual is an estimate of the total amount paid for raw milk, which is then divided by the kilograms of milk solids (kgMS) collected to give a farm gate milk price per kgMS. This is summarised in Figure C.1: .

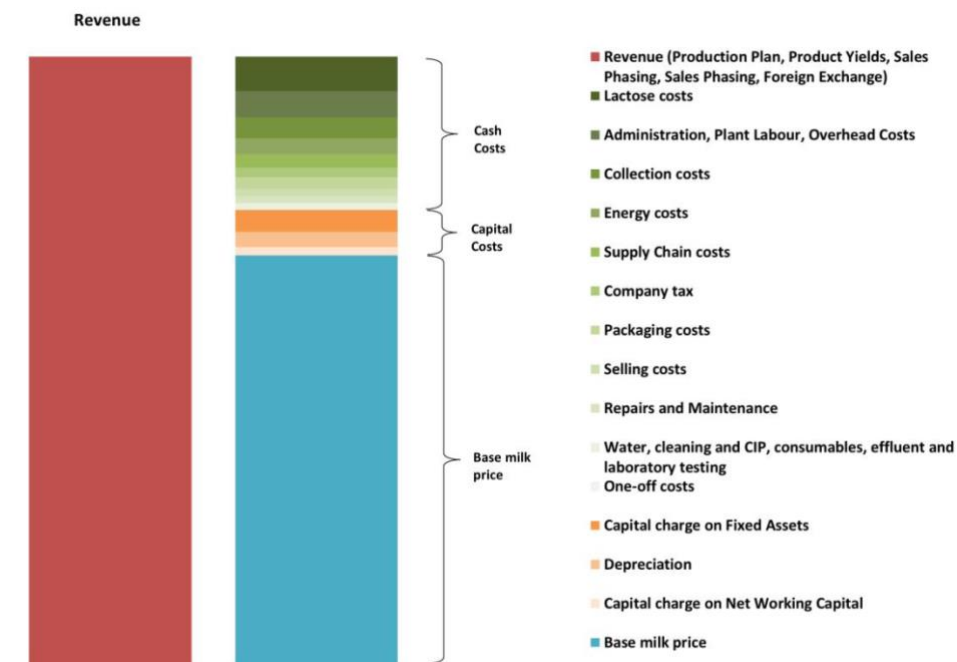
Figure C.1: Fonterra’s base milk price methodology



Source: NZ Commerce Commission (2017a)

The NP’s weighted average cost of capital (WACC) is applied to an estimate of all the capital employed to processes the RCPs. The relative size of each of the components is illustrated in Figure C.2: overleaf.

Figure C.2: Relative size of components of the base milk price



Source: NZ Commerce Commission (2017a)

The amount recoverable for a purely notional processor is therefore equal to the sum of cash/operating and capital costs. Where these two costs are reduced for given revenues, the farmgate milk price increases. A higher asset beta, and therefore higher capital costs, is associated with a lower farmgate milk price.

ANNEX D DETAILED REVIEW OF THE COMPARATORS

D.1. Comparative summary

The table below sets out information on the full comparators set used by UniServices (2017b), the starting point for our comparator analysis.

Table D.1: Descriptions of comparator companies

Company	Summary	Predominately dairy focused?	Segmental details (revenue split)	Milk price structure – processed products	Ability to pass on final processed prices	Other commodity/ingredient price structure
Archer-Daniels-Midland Company	Major commodity trading and processing, group with global operations	No	<1% dairy 97% commodities 3% value-add flavours and ingredients	N/A	No	Mostly using quoted commodity prices at origination
Associated British Foods	Diversified MNC engaged in various food and grocery sectors, plus clothing retail	No	<1% dairy 20-25% commodities in sugar, grains and other 75-80% branded consumer goods and specialised ingredients	N/A	No	Mostly using quoted commodity prices at origination. Sugar contracts in the UK provide for upward adjustment from agreed minimum prices
Bega	Australian dairy group, mostly focused on cheese and ingredients	Yes	100% dairy (reducing with 2017 expansions) 45% commodity exposure 55% branded consumer products	Season prices, adjusted at intervals if markets move	No	N/A
BRF S.A.	Meat and food processing group based in a number of regions	No	No dairy (sold in 2015) 55-60% commodities ~40% branded processed foods	N/A	No	Mostly using quoted commodity prices at origination (limited livestock application after sale of beef operations)

Company	Summary	Predominately dairy focused?	Segmental details (revenue split)	Milk price structure – processed products	Ability to pass on final processed prices	Other commodity/ingredient price structure
Bright Dairy & Food Co., Ltd	Chinese milk and dairy products group	Yes	100% dairy 100% packaged foods	Monthly prices per contracts	Yes	N/A
Bunge	Major commodity trading and processing, group with global operations	No	No dairy 100% commodity exposure	N/A	No	Mostly using quoted commodity prices at origination
China Mengniu	Chinese milk and dairy products group	Yes	100% dairy 100% packaged foods	Monthly prices	Yes	N/A
Chr. Hansen	MNC food ingredients group	No	Dairy portion indeterminate 100% specialised ingredients	Don't buy raw milk	No	Using commodity traders and contracted suppliers
ConAgra Foods	MNC food product group	No	100% value-add	N/A	No	Using commodity traders and contracted suppliers
Dairy Crest	UK dairy foods group	Yes	100% dairy 100% branded packaged foods	Monthly prices per contracts	Yes	N/A
Danone	MNC dairy, drinks and nutrition products group	No	45-50% dairy (as well as nutrition products which contain dairy and other ingredients) 100% branded packaged foods and drinks	Monthly prices per contracts, some commitments provided for agreed minimums in France	Yes	Using commodity traders and contracted suppliers
Dean Foods	US dairy and drinks group	Yes	>95% dairy 100% branded packaged foods and drinks	Regulated milk prices in US	No	N/A
Emmi AG	Swiss dairy foods group	Yes	100% dairy <5% commodity exposure	Monthly prices per contracts	Yes	N/A

Company	Summary	Predominately dairy focused?	Segmental details (revenue split)	Milk price structure – processed products	Ability to pass on final processed prices	Other commodity/ingredient price structure
			95% branded dairy foods			
General Mills	MNC food product group	No	6-8% dairy 100% branded packaged foods, snacks and meal ingredients	Don't buy raw milk	No	Using commodity traders and contracted suppliers
Glanbia	Nutritional food products group	Yes	100% dairy 25% commodities through subsidiary and JV businesses 75% branded nutrition products and specialised ingredients	Don't buy raw milk	No	Using commodity traders and contracted suppliers (including Irish associated entities)
Graincorp	Australian grain and oilseeds trading group	No	No dairy 75-80% grains and oilseeds commodities 15-20% processed malt ingredients supplier	N/A	No	Mostly using quoted commodity prices at origination
Grupo Lala	Latin American dairy and drinks group	Yes	>95% dairy >95% branded packaged foods and drinks	Monthly prices	Yes	N/A
Hershey	US food and confection group	No	Uses dairy ingredients as inputs 100% branded packaged foods and drinks	N/A	No	Using commodity traders and contracted suppliers
Ingredion Incorporated	Multiregional specialised ingredients supplier	No	No dairy 100% specialised ingredients	N/A	No	Using commodity traders and contracted suppliers
Inner Mongolia Yili	Chinese milk and dairy products group	Yes	100% dairy 100% packaged foods	Monthly prices per contracts	Yes	N/A
JBS S.A.	MNC meat (red meat, poultry and	No	No dairy (sold out in 2017) 60-70% commodities (estimated)	N/A	Yes	Mostly using quoted commodity prices at origination, variable pricing of livestock purchases in

Company	Summary	Predominately dairy focused?	Segmental details (revenue split)	Milk price structure – processed products	Ability to pass on final processed prices	Other commodity/ingredient price structure
	pork) processing group		30-40% in packaged meat and other processed food products			various regions directly reflecting market conditions and competitive tension
Kellogg	MNC food and drinks group	No	No dairy 100% branded packaged foods and drinks	N/A	No	Using commodity traders and contracted suppliers
Kerry Group	Nutritional food products group	No	10-15% dairy No reported commodity exposure 20-25% branded consumer goods, remainder in speciality ingredients and flavours	Monthly prices per contracts (Irish business)	Yes	Using commodity traders and contracted suppliers
Kraft Heinz	MNC food and drinks group	No	20-25% dairy 100% branded packaged foods and drinks	N/A	No	Using commodity traders and contracted suppliers
Mead Johnson	Child nutritional food products group (formerly listed, sold in 2017)	Yes	>90% dairy-based products 100% branded packaged nutritional and drinks products	Don't buy raw milk	No	Using commodity traders and contracted suppliers
Mondelez	MNC food and drinks group	No	10% dairy 100% branded packaged foods and drinks	N/A	No	Using commodity traders and contracted suppliers
Murray Goulburn	Farmer-owned dairy products and drinks processor	Yes	100% dairy 40-45% commodity exposure ~50% branded packaged foods	Annual milk pricing, varies through season with step-up increments	Yes	N/A
Nestle S.A.	MNC food, drinks and personal care product group	No	35-40% dairy	Varies, supply agreements in some areas	No	Using commodity traders and contracted suppliers

Company	Summary	Predominately dairy focused?	Segmental details (revenue split)	Milk price structure – processed products	Ability to pass on final processed prices	Other commodity/ingredient price structure
			100% branded packaged foods, drinks, and nutritional products			
NH Foods	Fresh and processed meats and other foods group, with operations in most continents	No	3% dairy 15-20% commodity exposure 25-30% packaged processed foods in brands Remainder in packaged meats	N/A	No	Mostly using quoted commodity prices at origination
Olam International	Major commodity trading and processing, group with global operations	No	<5% dairy 97% commodities <3% packaged foods	N/A	No	Mostly using quoted commodity prices at origination
Parmalat SpA	Italian dairy drinks and foods, operating across Americas, parts of Europe and Africa	Yes	~93% dairy <1% commodity exposure 100% branded packaged foods and drinks	Monthly prices in some regions, annual contracts in Australia	Yes in some geographies with monthly milk pricing	Using commodity traders and contracted suppliers
Saputo	Canadian dairy drinks and foods group, mostly focused on cheese and ingredients	Yes	100% dairy ~50% commodity exposure (in food service and international markets) 40-45% packaged consumer products (milk, cheese)	Regulated prices Canada and US, annual agreements Australia, monthly prices Sth America	No (regulated prices apply in dominant regions)	N/A
Savencia	French dairy foods group, mostly focused on cheese	Yes	100% dairy 100% branded products and specialised ingredients	Monthly prices per contracts	Yes in some geographies with monthly milk pricing	N/A

Company	Summary	Predominately dairy focused?	Segmental details (revenue split)	Milk price structure – processed products	Ability to pass on final processed prices	Other commodity/ingredient price structure
Synlait	NZ dairy ingredients manufacturer	Yes	100% dairy ~80% commodities ~20% consumer packaged goods	Season prices, adjusted at intervals if markets move	Not during season, but in closing prices	N/A
Tate & Lyle	Diversified MNC engaged in various ingredients sectors, mostly sweeteners	No	<5% dairy 60-70% bulk commodities 30-40% specialised ingredients	N/A	Yes – in sugar purchase arrangements	Mostly using quoted commodity prices at origination, otherwise using commodity traders and contracted suppliers
Unilever plc	MNC food and household product group	No	<10% dairy 100% branded packaged foods and drinks	Don't buy raw milk	No	Using commodity traders and contracted suppliers
Want Want China Holdings	Chinese dairy and snacks group	Yes	~50% dairy 100% branded packaged foods and drinks	Buys ingredients rather than milk	No	Using commodity traders and contracted suppliers
Wilmar	Major commodity trading and processing, group with global operations	No	No dairy 75-80% commodities 15-20% packaged consumer goods (bakery and oils)	N/A	No	Mostly using quoted commodity prices at origination
Yakult	Specialised health drinks company based in Japan, with franchised and JV operations globally	Yes	100% dairy (products extracted from milk) 100% value-add	Don't buy raw milk	N/A	Using contracted supplier

Source: Freshagenda & CEPA

D.2. Companies grouped by type

The table below groups our comparators into the sub-sample groups selected.

Table D.2: Selection of sub-comparators

	High commodity exposure	Ability to pass-through costs (either ex post, or relatively rapidly)		Regulated milk price	Does not have high commodity exposure, ability to pass through costs or regulated milk price	
High (=>70%) proportion of revenue from dairy	Synlait Bega Dairy Crest Saputo Murray Goulburn	China Mengniu Dairy Crest Parmalat Emmi Mengniu	Dairy Crest Grupo Lala Yili Savencia	Dean Foods Saputo (in Canada and US)	Glanbia Yakult	
Medium (<70% >30%)		Danone (EU units)			Mead Johnson Want Want	
Low (<=30%)	ADM Olam International Tate & Lyle Wilmar International Graincorp	Bright Foods JBS			Chr Hansen General Mills Hershey Kraft Heinz Unilever	ABF Mondelez International Nestle (limited locations) Kerry (Irish inputs)
No dairy revenue	Bunge BRF				ConAgra Ingredion NH Foods Kellogg	

Source: Freshagenda & CEPA

D.3. Comparator analysis

D.3.1. ABF

Key features

- Diversified commodity processor and FMCG group, including significant non-food (discount clothing retail) activities.
- Significant grocery and retail business helps stabilise earnings.
- Earnings are stable but trended weaker through 2015 and 2016 due to commodity exposure in sugar unit.



Source: Freshagenda

Key risks

- Strong competition in the clothing retail and grocery sectors against other branded and private label lines.
- Currency fluctuations affecting results from overseas regions.
- Fluctuations in commodity prices across categories, but most significantly sugar and wheat.
- Exposure to economic conditions and political risks in a number of developing regions.

Commodity exposures

- Raw commodities are an important portion of cost of goods sold (COGS) of the food business, but small to overall group costs.
- The group sources commodities in grains, sugar and sugar beet, and oilseeds.

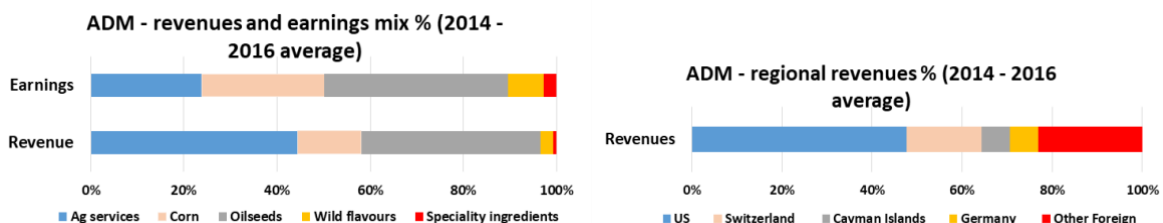
Scope for pass back

- The group sources raw materials and ingredients in commodity markets at origination points.
- Sugar is processed (mostly) from beet, under supply agreement with growers, which include minimum price conditions. Adjustments (upward only in the UK market) are paid ex-post based on market price performance.

D.3.2. ADM

Key features

- Multinational bulk commodity trading and processing group, sourcing in a number of commodities and geographies.
- Major processor of corn and oilseeds.
- Earnings have varied largely due to fluctuations in commodity prices and supplies, including from weather impacts. High earnings in 2014 reflected better trading margins and the effect of new added-value business units.
- Margins in origination, processing and marketing are thin.
- Has diversified into specialised ingredients and products, which helped lift margins.
- Earnings weaker in recent periods due to low commodity prices for grains and oilseeds.



Source: Freshagenda

Key risks

- Fluctuations in commodity prices across categories.
- Exposure to economic conditions and political risks in a number of regions where it has sourcing and processing assets.
- Currency fluctuations against home US\$ currency.

Commodity exposures

- Raw commodities are a significant percentage of COGS.
- The group primarily deals in corn, oilseed and grains but trades a wider range of agrifoods.

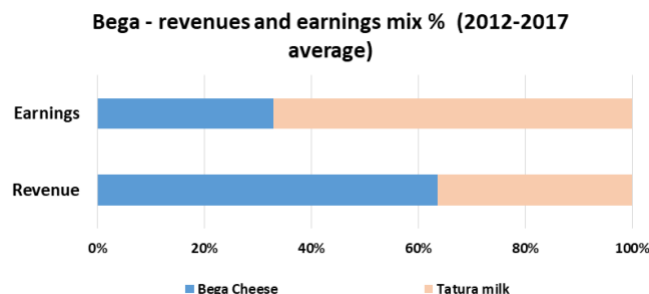
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets at many origination points.
- ADM does not appear to operate with significant scope to make ex-post adjustments to prices based on market or processing outcomes.

D.3.3. Bega Cheese

Key features

- Cheese and ingredient processor operating in Australia.
- Owns a significant cheese brand which is managed by a key partner (Fonterra).
- Earnings are relatively stable but for exposure to higher milk prices due to competitive tension within the Australian industry.
- Strong performance in 2014 with a surge in commodity dairy prices, whereas in 2015 milk prices were driven higher than sustainable levels by a competitor.
- Diversifying away from commodity exposures through non-dairy investments and added-value nutritional product extensions (not affecting 2017 or prior earnings).



Source: Freshagenda

Key risks

- Fluctuations in commodity prices affecting milk prices and commodity cheese and ingredients prices.
- Strong competition in meal and snacking markets against branded and private label lines.
- Performance in major toll-processing contracts.

Commodity exposures

- Raw commodities (milk and bulk cheese) are a significant percentage of COGS.
- A significant portion of activities are toll processing, whereby it earns a margin on processed product without full exposure to market fluctuations.

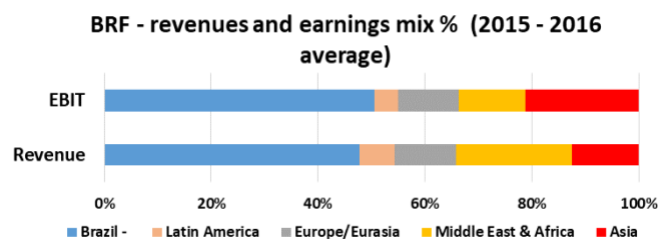
Scope for pass back

- The group is in a position to pass changes in product prices to milk producers in late season milk price adjustments, but that can be moderated depending on competitive conditions as it must compete with larger processors for milk.

D.3.4. BRF

Key features

- Diversified meat and food processing group.
- Operations spread across several regions, mainly focused in Brazil (46% of net revenues).
- Earnings are highly variable due to movements in commodity inputs, currencies and changes in business structure.



Source: Freshagenda

Key risks

- Currency fluctuations against Brazilian currency.
- Strong competition in the processed food sectors against branded and private label lines.
- Fluctuations in commodity prices across categories.
- Exposure to economic conditions and political risks in a number of developing regions.

Commodity exposures

- Raw commodities are a significant percentage of COGS.
- The groups sources commodities in grain, corn and oilseeds for food production, as well as livestock for processing.
- The group sources raw materials and ingredients in commodity markets at origination points.

Scope for pass back

- The group is in a position to pass changes in product prices to milk producers in late season milk price adjustments, but that can be moderated depending on competitive conditions as it must compete with larger processors for milk.
- There appears to be limited scope to manage overall business risks by passing back changes in market returns and outcomes from processing in prices to suppliers including primary producers.

D.3.5. Bright Dairy & Food

Key features

- Chinese dairy group mostly focused on drinks (UHT and fresh).
- 55% owned by a Chinese state enterprise (Shanghai SOASA).
- Earnings are stable with steady business growth but were weaker in 2014 and 2015 due to a spike in Chinese milk prices.
- Has sought diversification with overseas investments in dairy businesses, including NZ and Australia.

Key risks

- Strong competition in the milk drinks market against other branded lines (including imported UHT brands).
- Exposure to the Chinese brand reputational risk as a fall-out from food safety scandals.
- Exposure to economic conditions in major Chinese regions.
- Fluctuations in farmgate milk prices.

Commodity exposures

- Raw milk costs are a significant percentage of COGS.
- The further exposure is to imported UHT drinks from the EU and other countries, which have landed in China at discounted prices from time to time depending on commodity dairy market conditions in Europe.

Scope for pass back

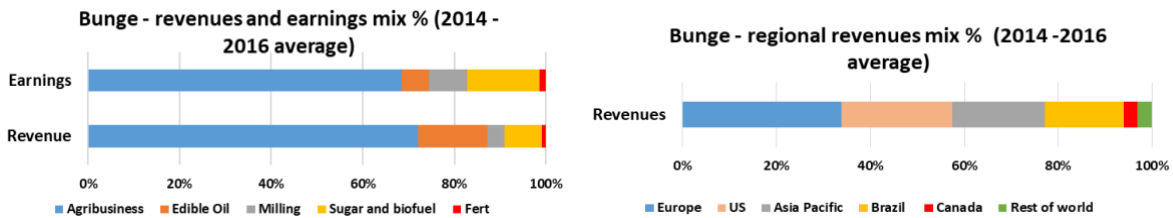
- The group is in a position to pass some changes in product prices to milk producers in monthly milk price adjustments, but that can be moderated depending on competitive conditions as it must compete in some cases with other processors for milk.
- Scope was limited when the market forced higher milk prices through the industry in 2014, which could not be recouped in the market against imported competition.

D.3.6. Bunge

Key features

- Multinational bulk commodity trading and processing group, sourcing in a number of commodities and geographies
- Major trader and processor of sugar, grains and oilseeds, but highly exposed to trading activities.

- Outside the major agribusiness unit, there are significant differences in relative profitability across processing business segments.
- Earnings are relatively stable but were affected by general falls in commodity prices in 2014 and to a lesser extent in 2016.



Source: Freshagenda

Key risks

- Fluctuations in commodity prices across categories.
- Currency fluctuations against US\$.
- Exposure to economic conditions and political risks in a number of developing regions.

Commodity exposures

- Raw commodities are a significant percentage of COGS.
- The group sources commodities in sugar, grains oilseeds, and fertilisers but trades in a wider set of commodities.

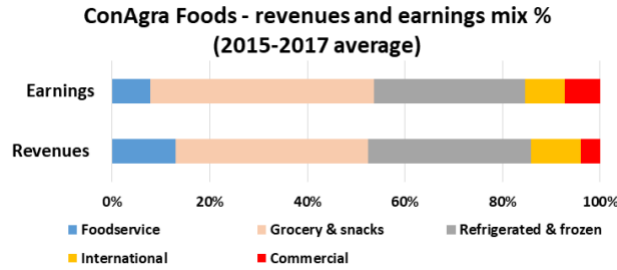
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets at many origination points in different regions.
- Bunge does not appear to operate with significant scope to make ex-post adjustments to prices based on market or processing outcomes.

D.3.7. ConAgra

Key features

- Diversified FMCG group, selling mainly into the US food market with small overseas presence.
- Operates in a number of processed consumer food categories, selling into a range of food market segments as shown.
- Earnings have varied due to the performance of business units in the portfolio.



Source: Freshagenda

Key risks

- Strong competition in the meal, beverage and snacking sectors against branded and private label lines.
- Exposure to economic conditions and consumer sentiment.
- Fluctuations in commodity input prices across categories.
- Changes in consumer preference affecting products in a range of categories.

Commodity exposures

- Raw commodities are a material percentage of COGS.
- The group sources commodities wheat, corn, oilseeds, meat and oats.

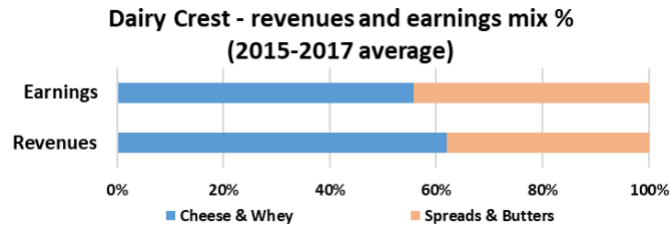
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets at origination points in US regions.
- There is no scope to pass back price changes to raw material suppliers.

D.3.8. Dairy Crest

Key features

- UK-based dairy foods group with major focus on cheese, spreads and other dairy products.
- Earnings are relatively stable over time.
- Earnings exposed to impacts of change in milk prices – showing weaker outcome in 2014 and improvement since.



Source: Freshagenda

- **Key risks**
- Fluctuations in commodity prices across categories.
- Strong competition in the cheese and dairy spreads market in grocery sector against branded and private label lines and in food service against commodity cheese from local and EU competitors.
- Currency fluctuations against Euro – affecting commodity prices in the UK which are set by the EU trade and influenced by proximity to Irish suppliers to UK markets.

Commodity exposures

- Milk input costs are a significant percentage of COGS.

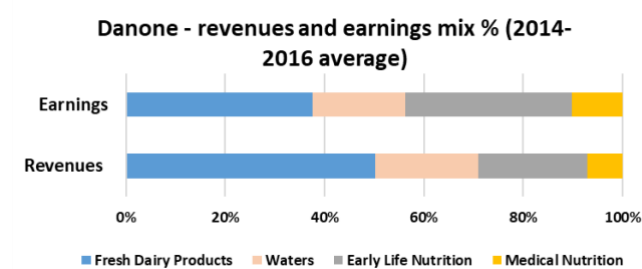
Scope for pass back

- The group is in a position to pass changes in product prices to milk producers in monthly milk price adjustments. The UK market has a large number of milk buyers that style contracts based on end-uses of milk and supply exposures.
- Milk price movements are frequent, and few agreements have price commitments of greater than monthly.

D.3.9. Danone

Key features

- Multinational dairy drinks and nutrition products group, sourcing milk and ingredients in a number of commodities and geographies.
- There are significant differences in relative profitability across segment regions, with higher value nutritional products earnings significantly stronger and more stable margins.
- Earnings are relatively stable over time.



Source: Freshagenda

Key risks

- Strong competition in the dairy and nutritional sectors against branded and private label lines.
- Exposure to economic conditions and political risks in a number of developing regions where markets are emerging.
- Currency fluctuations against the Euro.
- Fluctuations in commodity prices across categories.

Commodity exposures

- Raw milk supplies are a small percentage of overall COGS.
- The group sources other commodities and ingredients in dairy, sweeteners and oilseeds.

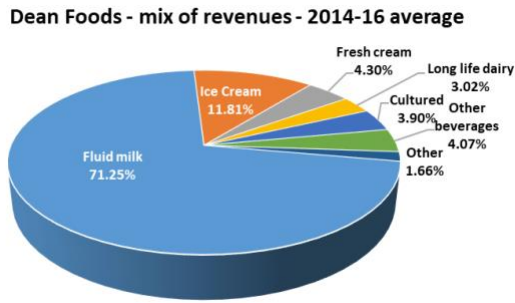
Scope for pass back

- The group is in a position to pass changes in product prices to milk producers in regular milk price adjustments in France and Spain, as well as Brazil and South Africa.
- The French market is however moderated by agreements with farm unions that provide farmers with some protection from direct responses to market movements compared to other parts of Europe.

D.3.10. Dean Foods

Key features

- US-based dairy foods group with major focus on milk drinks and fresh dairy lines
- Earnings are relatively volatile due to the fluctuations in milk input costs, which spiked in 2015/early 2015 and have weakened since.
- Dean sold an under-performing unit in 2016.



Source: Freshagenda

Key risks

- Fluctuations in raw milk prices.
- Strong competition in the milk beverage market against branded and private label lines.
- Exposure to consumer preference and trends affecting milk consumption.

Commodity exposures

- Raw milk supplies and other dairy commodities are a significant percentage of overall COGS.

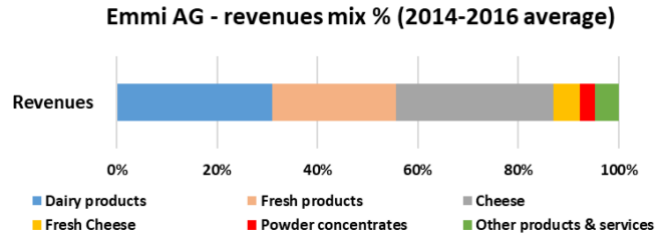
Scope for pass back

- The group is not in a position to pass changes in market prices back to supplying producers due to the existence of regulated milk prices, set according to “classes” in the US industry.
- Dean buys most of its milk in Class I – for fresh product usage.
- Class pricing is driven by monthly cheese, butterfat and milk powder wholesale prices, and derived by formula. A Class I formula is set by reference to those commodity values – not prices achieved in fresh milk sales.

D.3.11. Emmi

Key features

- Swiss-based dairy foods group with major focus on milk drinks and fresh dairy lines.
- Earnings are relatively stable but were affected by a rise in milk prices in 2014.



Source: Freshagenda

Key risks

- Fluctuations in milk and dairy commodity prices.
- Strong competition in the drinks and dairy product sectors against branded and private label lines.
- Exposure to economic conditions and consumer trends in US and European markets.
- Currency fluctuations against the Swiss Franc.

Commodity exposures

- Raw milk and dairy product commodities are a significant percentage of COGS. The input cost of milk moves with

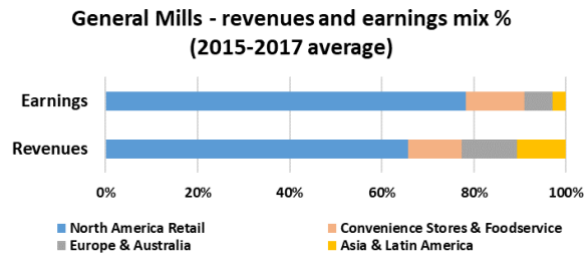
Scope for pass back

- The group is not in a free position to fully pass changes in product prices to milk producers in milk price adjustments.
- The industry has a milk class system based on the different end-use markets, with domestic (category A) milk prices being set each quarter by an industry body, based on market returns and input cost movements. This is effectively a regulated price that applies to part of the milk supply.
- About 60% of milk supplied must get into category A, while B and milk is based on returns from commodities.

D.3.12. General Mills

Key features

- Diversified FMCG group, selling mainly into the US food market with small overseas presence.
- Operates in a number of processed consumer food categories, selling into a range of food market segments as shown.
- Earnings are relatively stable but has trended weaker in recent years.



Source: Freshagenda

Key risks

- Strong competition in the meal and snacking sectors against branded and private label lines.
- Exposure to economic conditions, consumer sentiment and preferences in the North American and European market.
- Fluctuations in commodity prices across categories.

Commodity exposures

- Raw commodities are a material percentage of COGS.
- The group sources commodities wheat, corn, oilseeds, meat and oats.

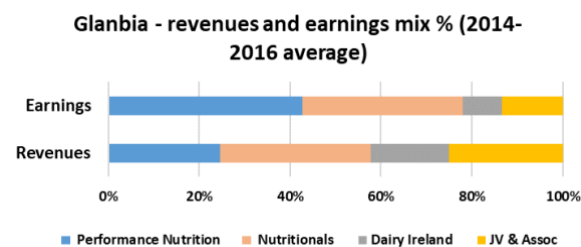
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets in US regions.
- There is no scope to pass back price changes to raw material suppliers.

D.3.13. Glanbia

Key features

- Irish-based multinational nutritional drinks and products group.
- There are significant differences in relative profitability across segment regions, with performance nutrition providing strongest and stable growth in margins.
- Earnings are relatively stable but are were affected by high commodity input costs in 2014.



Source: Freshagenda

Key risks

- Exposure to economic conditions and political risks in a number of operating regions.
- Fluctuations in commodity prices across categories.
- Strong competition in the nutritional products sectors against other branded lines and innovative products.
- Currency fluctuations against the Euro.

Commodity exposures

- Dairy ingredient commodities are a significant percentage of COGS.

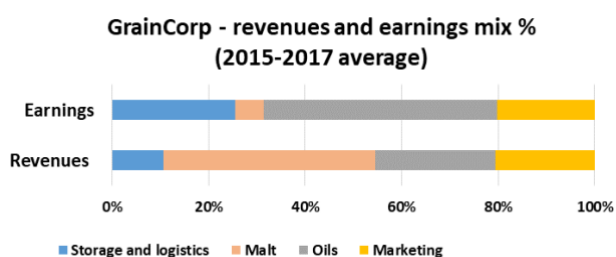
Scope for pass back

- The group sources inputs mostly as dairy commodities, but does not directly source raw milk into the business.
- It is not in a position to pass changes in market prices back to supplying producers.

D.3.14. GrainCorp

Key features

- Australian bulk commodity trading (grain) and processing (malt and oilseeds) group, sourcing within eastern Australian.
- There are significant differences in relative profitability across business units.
- Earnings have varied with crop volumes and commodity prices.
- Earnings weaker through 2014 to 2016 due to lower crop throughput.



Source: Freshagenda

Key risks

- Seasonal crop volumes for Australian east-coast wheat and barley.
- Fluctuations in commodity prices across for major grains.
- Currency fluctuations against A\$.

Commodity exposures

- Raw commodities are a significant percentage of COGS.
- The group sources commodities in wheat and other grains and oilseeds.

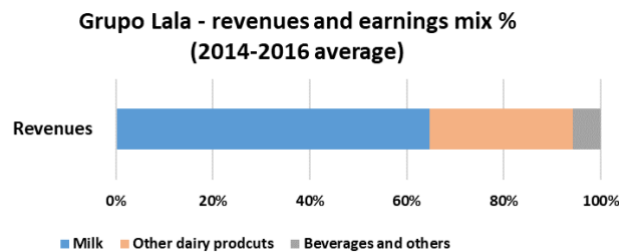
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets at many origination points in different regions.
- While there are annual grain pool pricing schemes in use which will allow for seasonal return adjustments to reflect market performance, the strong competition for grain at country grain terminals means GrainCorp does not appear to operate with significant scope to make ex-post adjustments to prices based on market or processing outcomes.

D.3.15. Grupo Lala

Key features

- Latin American milk and dairy foods group based in Mexico but with an increasing reach into other adjacent countries.
- Earnings are relatively stable due to the stability of the milk category.
- Earnings weaker in recent periods due to higher milk input costs and weak performance of newly acquired subsidiaries in Latin America.



Source: Freshagenda

Key risks

- Strong competition in the milk and dairy foods categories against other branded lines.
- Fluctuations in raw milk and commodity prices in different regions.
- Exposure to economic conditions and political risks in a number of developing regions.
- Currency fluctuations against the Mexican peso.

Commodity exposures

- Raw milk and other dairy commodities are a significant percentage of COGS, but there is little exposure to dairy commodities in the products sold.

- The group has a high percentage of sales in branded packaged milk, cheese and dairy foods.

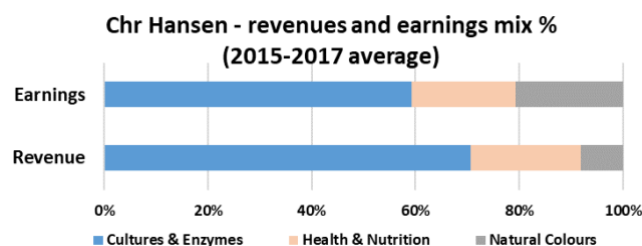
Scope for pass back

- The group sources raw milk in arrangements with local farmers in a number of countries.
- The group is in a position to pass changes in product prices to milk producers in regular milk price adjustments in Mexico and other Latin America countries where it collects milk.

D.3.16. Chr Hansen

Key features

- Scandinavian-based specialised ingredients supplier to food, nutritional, pharmaceutical, agriculture and companies. The company refers to itself as a biosciences business.
- It produces cultures, enzymes, colours and probiotics for use in a wide range of consumer products including cheese, yogurts, and nutritional foods.
- Earnings are stable demonstrating growth, especially in the past three years, with greater demand for natural ingredients, and healthy eating solutions.



Source: Freshagenda

Key risks

- Competition in the ingredients and solutions market against suppliers in each segment.
- Exposure to the variability in dairy and other food sector margins, and production volumes of cheese, fermented milk, and other key products consuming the groups products.
- Exposure to economic conditions and political risks in a number of developing regions.
- Currency fluctuations against the Danish kroner.

Commodity exposures

- The group is included in this analysis presumably because it services the dairy industry as one of its key market segments.

- The group does not source commodity ingredients, nor does it sell commodity products.

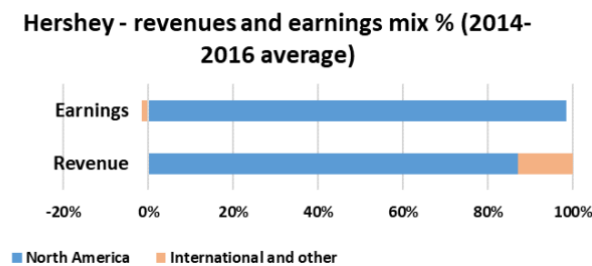
Scope for pass back

- The group sources inputs including dairy ingredients, but does not directly source raw milk into the business.
- It is not in a position to pass changes in market prices back to supplying producers.

D.3.17. Hershey

Key features

- US-based chocolate and other confectionery group, with small exposure to markets outside the US.
- Earnings are relatively stable but has trended slightly weaker since 2014, with higher commodity costs impacting results in 2016.



Source: Freshagenda

Key risks

- Strong competition in the confectionery and snacking sectors against branded and private label lines.
- Exposure to consumer preference and trends affecting confectionery consumption.
- Exposure to economic conditions and consumer sentiment within the US market.
- Currency fluctuations against US\$ in the sourcing of commodity inputs.
- Fluctuations in commodity ingredient prices across categories.

Commodity exposures

- Raw commodities are a significant percentage of COGS.
- The group sources commodities in cocoa, sugar, dairy and edible nuts.

Scope for pass back

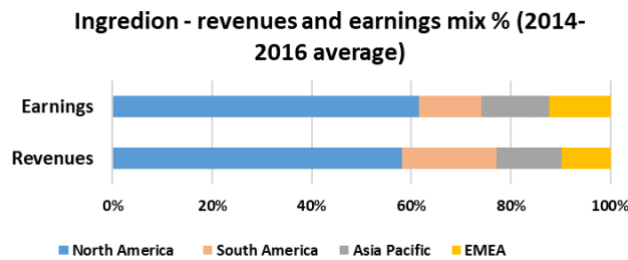
- The group sources raw materials and ingredients in transparent commodity markets and under direct supplier agreements in US and other key production regions.

- There is no scope to pass back price changes to raw material suppliers.

D.3.18. **Ingredion**

Key features

- US-based specialised ingredients (mostly starches and sweeteners) solutions supplier to food, beverage, animal nutritional, and other sectors.
- Earnings are stable but has trended upwards since 2014.



Source: Freshagenda

Key risks

- Strong competition in the starch and sweetener market, including a number of vertically integrated operations such as ADM and Tate & Lyle (included in this analysis).
- Exposure to consumer preference and trends affecting ingredients choice.
- Currency fluctuations against US\$, with significant revenues and assets outside the US.
- Exposure to economic conditions and political risks affecting demand and margins in a number of developing regions.
- Fluctuations in commodity input prices.

Commodity exposures

- Raw commodities are a significant percentage of COGS.
- The group sources commodities in corn, horticulture and other functional ingredients.

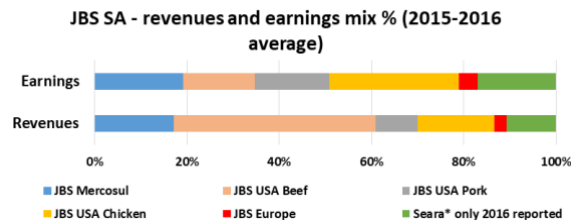
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets and under supplier agreements in US and other regions.
- There is no scope to pass back price changes to raw material suppliers.

D.3.19. **JBS**

Key features

- Multinational meat protein processor and marketer, with major operations in Brazil, USA, Australia and Europe.
- There are significant differences in relative profitability across segment regions.
- Earnings have been generally stable on a growth trajectory but a lift in feed input prices and weaker selling affected the business in 2016.



Source: Freshagenda

Key risks

- Fluctuations in commodity prices (for major inputs as well as wholesale beef and pork markets) across categories.
- Strong competition in the protein sector against other proteins and branded goods competitors.
- Exposure to economic conditions and political risks in a number of developing regions.
- Currency fluctuations against the Brazilian Real.

Commodity exposures

- JBS buys live cattle and pigs in key operating regional markets, which make up a significant portion of COGS.
- It operates major integrated poultry facilities in the US and Brazil which source grains and oilseeds at commodity inputs.
- The group has sought to reduce its exposure to commodities by increasing the extents branded packaged meat products.

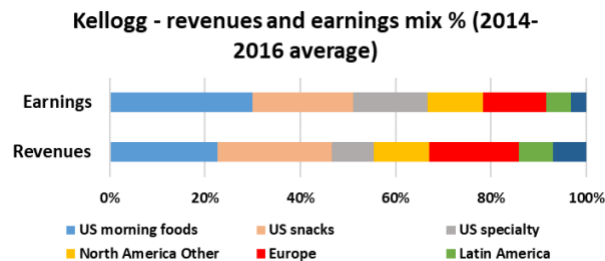
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets at origination points in US and other regions.
- There is scope to pass back price changes to raw material suppliers through livestock saleyard and over-the-hooks prices in beef and pork units.

D.3.20. Kellogg

Key features

- Diversified FMCG group, selling mainly into the US food market across a number of food categories and meal occasions (most famously “morning foods” and snacking) and with a significant overseas presence.
- Earnings are relatively stable but has trended weaker since 2014 due to declines in sales in the key segments of the US and European market.



Source: Freshagenda

Key risks

- Strong competition in the meal and snacking sectors against branded and private label lines.
- Exposure to economic conditions and consumer sentiment in mature western markets.
- Exposure to economic conditions and political risks in a developing regions where inputs are sourced (in recent times, chiefly Venezuela).
- Success in achieving leverage through brand management.
- Currency fluctuations against US\$.
- Fluctuations in commodity prices across categories.

Commodity exposures

- Raw commodity inputs are a material percentage of COGS.
- The group sources commodities in grains, cocoa, sugar, potatoes, corn and oilseeds in the US and other regions.

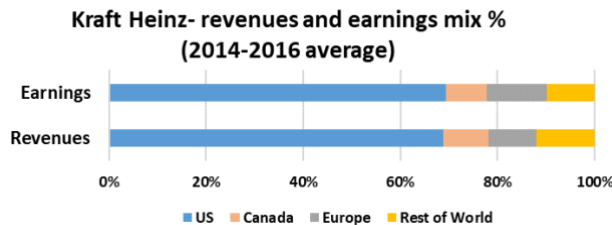
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets and under supplier agreements in US and other regions.
- There is no scope to pass back price changes to raw material suppliers.

D.3.21. Kraft Heinz

Key features

- Diversified multinational FMCG group, product of demerger of Kraft, Inc, operating chiefly in the US and with a small exposure to developing world markets – Mondelez business has the remainder of the original Kraft, Inc business.
- Earnings have surged since the merger of Kraft Foods Inc and Heinz in mid-2015, two years following the original demerger.



Source: Freshagenda

Key risks

- Strong competition in the meal, beverage and snacking sectors against branded and private label lines.
- Exposure to economic conditions, consumer sentiment and preferences in the North American and European market.
- Success in achieving leverage through brand management.
- Currency fluctuations against US\$.
- Fluctuations in commodity prices across categories.

Commodity exposures

- Raw commodities are a material percentage of COGS.
- The group sources a wide range of commodities in dairy, coffee, meat, wheat, cocoa, sugar, corn and oilseeds.

Scope for pass back

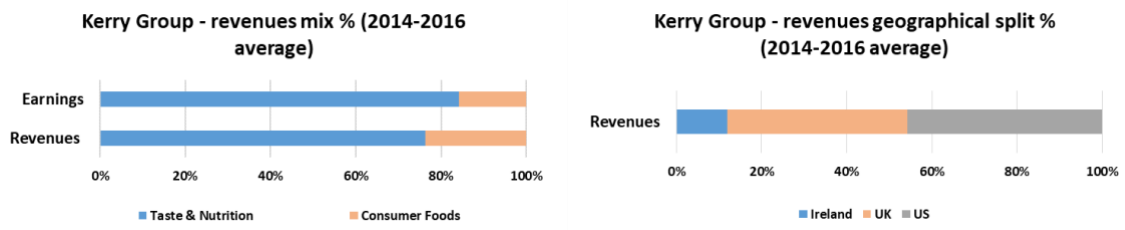
- The group sources raw materials and ingredients in transparent commodity markets and under supplier agreements in US and other regions.
- There is no scope to pass back price changes to raw material suppliers.

D.3.22. Kerry

Key features

- Irish-based diverse multinational nutritional products, flavourings and specialised ingredients group, servicing food, beverage and pharmaceutical sectors, as well as processing and marketing meat, meal solutions and dairy consumer products for the UK and Irish markets.

- Earnings are stable and have trended stronger over the past 5 years.



Source: Freshagenda

Key risks

- Strong global competition in the ingredients and flavourings markets.
- Exposure to market conditions, consumer sentiment and preferences in the mature developed markets, and to economic conditions and political risks in a number of developing market regions.
- Currency fluctuations against Euro.
- Fluctuations in ingredient prices across various categories.
- Competition in the prepared meals category and in meat and dairy categories in the UK and Ireland.

Commodity exposures

- Milk, dairy commodities and meat are a relatively small percentage of overall COGS, as the food business is less than 20% of group activity.
- The group sources a small volume of raw milk, as well as commodities in dairy, horticulture, grains, sugar.

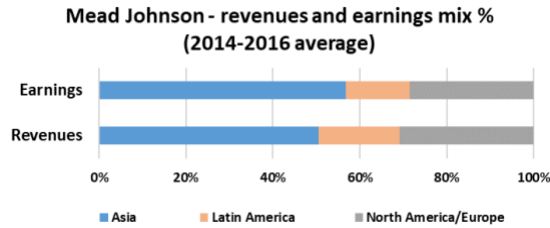
Scope for pass back

- The group sources dairy commodities, and directly sources some of its raw milk from farms in Ireland.
- It follows market conditions in that market, is not in a position to pass changes in overall market prices back to supplying producers.

D.3.23. Mead Johnson

Key features

- US-based child nutrition drink and food products group with global distribution.
- Earnings are relatively stable over time but declined in 2016 with slowing volumes and stronger discounting in the Chinese market for infant and nutritional products market.
- The company was taken over in 2017 by Reckitt-Benckiser.



Source: Freshagenda

Key risks

- Strong competition in the nutritional products sectors against other branded lines.
- Exposure to economic conditions and political risks in a number of developing regions.
- Exposure to the Chinese market which faces changing regulations and sensitive consumer attitudes to infant products.
- Currency fluctuations against US\$.
- Fluctuations in dairy commodity prices.

Commodity exposures

- Dairy and other category ingredient commodities are a significant percentage of COGS.
- The groups sources commodities mostly in dairy such as milk powders.

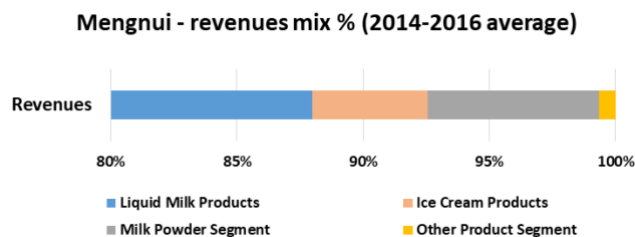
Scope for pass back

- The group sources inputs mostly as dairy commodities, but does not directly source raw milk into the business.
- It is not in a position to pass changes in market prices back to supplying producers.

D.3.24. Mengniu

Key features

- Chinese dairy group mostly focused on drinks (UHT and fresh), yogurts, infant formula and other dairy products.
- Products are marketed across key Chinese regions from a network of sites, largely focused on the north, but with almost national reach.
- Earnings are relatively stable over time, falling in 2016 due to an exposure to the fall in milk powder prices, as well as poor performance in subsidiaries, despite lower milk prices.



Source: Freshagenda

Key risks

- Strong competition in the milk drinks market against other branded lines (including imported UHT brands).
- Exposure to the Chinese brand reputational risk as a fall-out from food safety scandals.
- Fluctuations in milk powder commodity prices.
- Exposure to economic conditions in major Chinese regions.
- Fluctuations in farmgate milk prices.

Commodity exposures

- The groups sources raw milk from Chinese farms as well as dairy commodities from both internal and overseas sources.
- Raw commodities are a significant percentage of COGS.
- The group increased its sourcing from large-scale Chinese farms to 100% over the period of analysis.

Scope for pass back

- The group is in a position to pass some changes in product prices to its large-scale milk producers in monthly milk price adjustments, but that can be moderated depending on competitive conditions as it must compete in some cases with other processors for milk.

D.3.25. Murray Goulburn

Key features

- Australian dairy foods and drinks group, farmer-owned through a cooperative model.
- Traded units are in a listed investment trust which for which earnings are derived based on an income formula which is linked to MG's milk price performance.
- Earnings volatile due to dairy market fluctuations and MG's execution – earnings adjusted for significant write-offs in 2017.
- Earnings weaker in 2017 due to loss of milk volumes.

Key risks

- Fluctuations in commodity prices across categories.
- Strong competition in the milk, cheese and spreads categories against branded and private label lines.
- Currency fluctuations against A\$.
- Exposure to market and economic conditions in key developing regions such as China.

Commodity exposures

- Raw milk and other dairy commodities are a significant percentage of COGS.

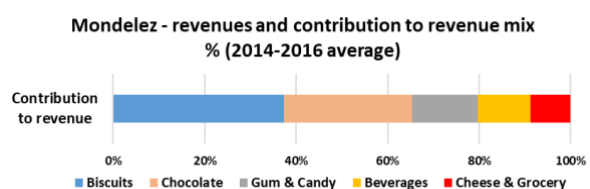
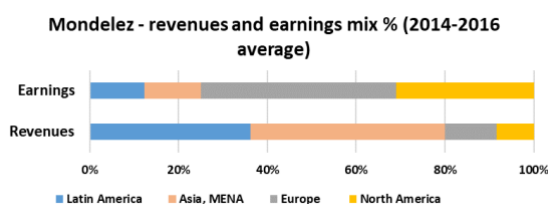
Scope for pass back

- The group sources milk from farms in a number of southern Australian regions.
- Milk prices are set in annual pricing arrangements. Prices are generally increased from a season opening price, but incidences have occurred with step-downs in price with sudden market turns.
- It competes against a number of other milk buyers in each region, in a tensely competitive farmgate market, due to ongoing processor requirements in a growing dairy market, while Australian milk production has not grown significantly in more than a decade.

D.3.26. Mondelez

Key features

- Diversified multinational FMCG group, product of demerger of Kraft, Inc.
- There are significant differences in relative profitability across segment regions.
- Earnings are stable but has trended weaker since demerger, after adjusting for sale of major coffee business in 2015.
- Earnings stronger in recent periods due to lower commodity prices.



Source: Freshagenda

Key risks

- Strong competition in the meal, beverage and snacking sectors against branded and private label lines.

- Exposure to economic conditions and political risks in a number of developing regions.
- Exposure to economic conditions and consumer sentiment in key western markets.
- Currency fluctuations against US\$.
- Fluctuations in commodity prices across categories.

Commodity exposures

- Raw commodities are a significant percentage of COGS.
- The group sources commodities in dairy, wheat, cocoa, sugar, corn and oilseeds.

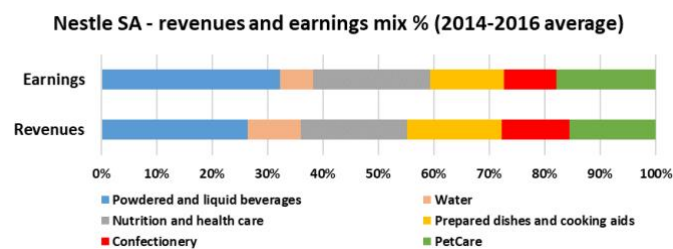
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets and under supplier agreements each operating region.
- The group sources some dairy commodities, but does not directly source raw milk into the business.
- It is not in a position to pass changes in market prices back to supplying producers.

D.3.27. Nestle

Key features

- Diversified FMCG group, with a wide geographic coverage across a number of major food categories.
- Earnings are stable but weaker in 2014 with the hike in the cost of dairy ingredients which impacted its nutritional and beverages units.



Source: Freshagenda

Key risks

- Strong competition in the meal, beverage, nutrition and snacking sectors against branded and private label lines.
- Success in achieving leverage through brand management.
- Exposure to consumer sentiment and preferences in mature market regions.
- Exposure to economic conditions and political risks in a number of developing regions.

- Currency fluctuations against Swiss Franc.
- Fluctuations in commodity prices across categories.

Commodity exposures

- Bulk commodities are a small portion of COGS.
- The groups sources commodities in dairy, grain, cocoa, sugar, corn and oilseeds.

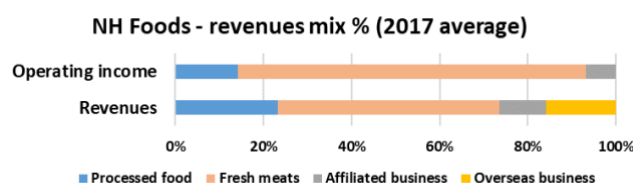
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets and under supplier agreements each operating region.
- The group sources some dairy commodities, and in some specific regions, directly sources raw milk into its business operations.
- It is not understood to be in a position to pass changes in market prices back to supplying producers.

D.3.28. NH Foods

Key features

- Japanese vertically-integrated processed meat (pork, beef and other proteins) and other packaged foods group.
- The group is expanding its geographic reach to reduce its exposure to the Japanese market.
- Earnings are relatively stable over time, varying mostly in recent times with changes in commodity input prices.



Source: Freshagenda

Key risks

- Strong competition in the meat and processed food categories.
- The impact of the aging demographic of the Japanese population.
- Fluctuations in livestock prices across categories and sourcing regions.
- Exposure to economic conditions and political risks in a number of developing market regions.
- Currency fluctuations against Yen.

Commodity exposures

- Raw meat purchases – beef, poultry, pork and seafood – make up a significant percentage of COGS.

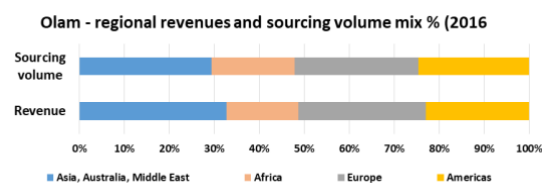
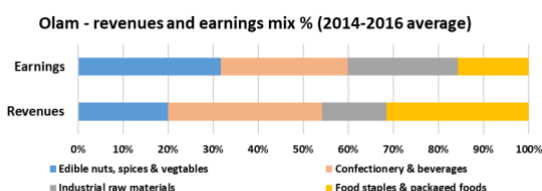
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets and under supplier agreements in its various operating regions.
- It owns meat processing facilities in a number of countries, which are partially supplied by NH's own farms.
- There is hence little of scope to pass back overall market returns or margins changes to 3rd party raw material suppliers.

D.3.29. Olam International

Key features

- Multinational Singapore-based bulk commodity trading, processing and distribution group, sourcing in a number of commodities and geographies.
- Major trader and processor of nuts and spices, cocoa, coffee, sugar, grains, cotton, and oilseeds.
- Earnings are stable but have been affected largely by changes in trading volumes.



Source: Freshagenda

Key risks

- The quality of arbitrage skills in managing the fluctuations in commodity prices across categories.
- Strong competition in the origination of commodities and market-making with customers.
- Exposure to economic conditions and political risks in a number of developing regions.
- Currency fluctuations against Singapore dollar.

Commodity exposures

- Raw commodities are a significant percentage of COGS.

- The groups sources a wide range of commodities for trading and processing across global production regions, varying in their geographic focus by category.

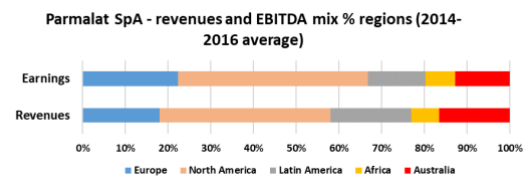
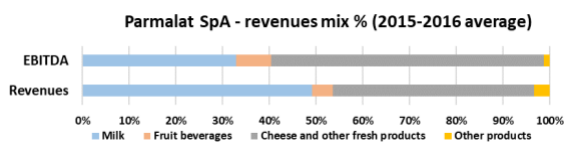
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets at many origination points.
- Despite large positions in many of the commodities in which it operates, Olam does not appear to have any significant scope to make ex-post adjustments to prices based on market or processing outcomes.

D.3.30. Parmalat

Key features

- Multinational milk and dairy products group, based in Italy, but with significant operations outside Europe in the US, Canada, Russia, Brazil and Australia.
- The group is majority owned (~90%) by the Lactalis (Besnier) group.
- Earnings are variable over time, but weaker in recent periods due to exposures to turbulent economies, weaker sales volumes and asset write-downs.



Source: Freshagenda

Key risks

- Strong competition in the milk, yogurt and cheese categories in each dairy market against branded and private label lines.
- Fluctuations in milk and dairy commodity prices across categories.
- Exposure to economic conditions and consumer sentiment in mature dairy markets in US, Europe and Australia.
- Exposure to economic conditions and political risks in a number of developing regions.
- Currency fluctuations against the Euro.

Commodity exposures

- Raw milk and other dairy ingredients commodities are a significant percentage of COGS.

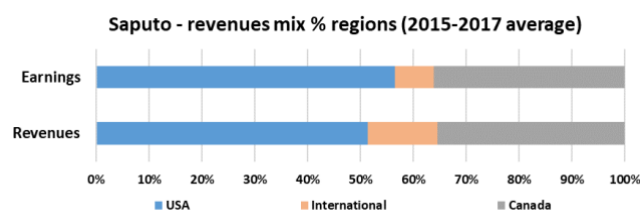
Scope for pass back

- The groups sources raw milk in various regions in which it operates. The length and formality of these sourcing and milk pricing agreements vary.
- In many regions, the group is in a position to pass changes in product prices to milk producers in monthly milk price adjustments. This excludes US and Canada where regulated pricing exists.
- In Australia, the company generally sets full year prices, which are generally not varied within each year unless there are strong farmgate price shifts in the local market.

D.3.31. Saputo

Key features

- Major milk and dairy products group, based in Canada, but with significant operations outside the US, Argentina and Australia.
- Earnings are stable and have trended stronger due to growth in the business through acquisition.



Source: Freshagenda

Key risks

- Strong competition in the milk and cheese categories against branded and private label lines.
- Fluctuations in milk and commodity cheese prices in global and US markets.
- Exposure to economic conditions and political risks in a South America.
- Currency fluctuations against \$Can.

Commodity exposures

- Raw milk and dairy commodities are a significant percentage of COGS. Certain manufactured cheese, milk powder and butterfat products are also sold into commodity markets.

Scope for pass back

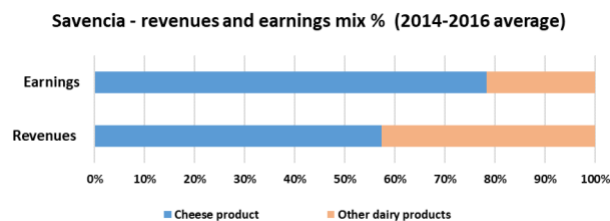
- Sources milk at the farmgate in several each of the major countries in which it operates.
- The group is not in a position to pass changes in market prices back to supplying producers in the US and Canada due to the existence of regulated milk prices.

- Milk prices in Australia are set in annual pricing arrangements. Prices are generally increased from a season opening price, but incidences have occurred with step-downs in price with sudden market turns. It competes against a number of other milk buyers in each region, in a tensely competitive farmgate market.

D.3.32. Savencia

Key features

- French consumer packaged cheese and dairy products group.
- The business has 30% of sales in France, 40% in the rest of Europe and the remainder in the Americas, Asia and Africa.
- Earnings have been variable but have strengthened in recent years with improved product mix despite slowing sales volumes, and with lower milk prices in 2016.



Source: Freshagenda

Key risks

- Strong competition in the cheese markets against other branded and private label lines.
- Exposure to economic conditions and consumer sentiment in mature dairy markets in Europe and the US.
- Exposure to economic conditions and political risks in key developing regions of Latin America, Africa and Asia.
- Currency fluctuations against Euro.
- Fluctuations in milk input costs and commodity cheese prices.

Commodity exposures

- Raw milk and other dairy commodity costs are a significant percentage of COGS.

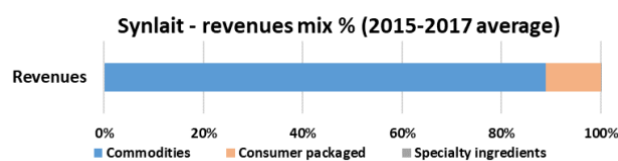
Scope for pass back

- The group is in a position to pass changes in product prices to milk producers in regular milk price adjustments in France.
- The French market is however moderated by agreements with farm unions that provide farmers with some protection from direct responses to market movements compared to other parts of Europe.

D.3.33. Synlait

Key features

- Ingredient and nutritional products manufacturer based in NZ.
- Earnings have been variable but have strengthened in recent years with higher processing throughput, and improvements in dairy commodity prices which benefitted achieved prices for powders and creams.
- The group has been expanding its presence in consumer-packaged nutritional products.
- Earns income in processing for 3rd parties such as A2 Milk.



Source: Freshagenda

Key risks

- Fluctuations in dairy commodity and farmgate milk prices.
- Exposure to economic conditions and regulatory/political risks in key developing regions such as China and other parts of Asia.
- Continued delivery on key processing alliances
- Currency fluctuations against NZ\$

Commodity exposures

- Raw milk costs are a significant percentage of COGS. The majority of the products sold are dairy ingredients which are exposed to commodity conditions.

Scope for pass back

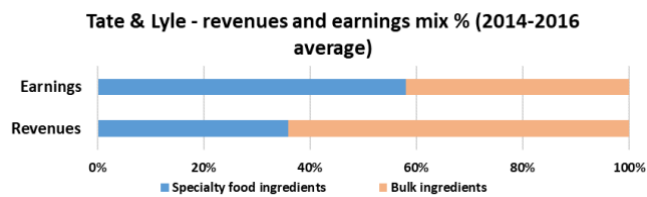
- The group sources milk under supply agreements with NZ farmers.
- Prices are offered based on annual price estimates which may vary through the year depending on market and company performance.
- The company is capable of making post-season adjustments under these, but competes for milk against Fonterra and other small processors.

D.3.34. Tate & Lyle

Key features

- UK-based sugar and ingredients business with operations across a number of regions.

- Earnings have varied over time, mostly due to the variability in sugar prices.
- The group has recently grown the contribution from its specialised ingredients unit, which earns a significantly higher margin than the commodity sugar unit.



Source: Freshagenda

Key risks

- Fluctuations in commodity sugar prices.
- Strong competition in the functional ingredients market against a large number of undifferentiated competitors.
- Exposure to consumer trends and preferences driving ingredient choice mature food markets in Europe and the US.
- Currency fluctuations against UK pound.

Commodity exposures

- Raw sugar commodities are a significant percentage of COGS.

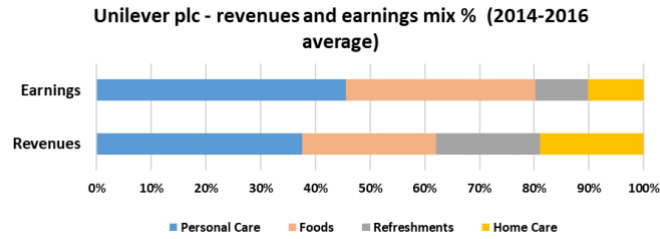
Scope for pass back

- The group sources raw materials and ingredients in commodity markets at origination points.
- Sugar is processed (mostly) from beet, under supply agreement with growers, which include minimum price conditions.
- Adjustments (upward only in the UK market) are paid ex-post based on market price performance.

D.3.35. Unilever

Key features

- Diversified multinational FMCG group operating in a number of food and non-food categories.
- There are significant differences in relative profitability across segment regions.
- Earnings are stable but has trended weaker since demerger, after adjusting for sale of major coffee business in 2015.
- Earnings weaker in recent periods due to a stronger US dollar and weaker demand in US and Europe.



Source: Freshagenda

Key risks

- Strong competition in the meal, beverage and snacking sectors against branded and private label lines.
- Exposure to global economic conditions, consumer sentiment and preferences.
- Success in brand and portfolio management in the face of changing consumer trends.
- Exposure to economic conditions and political risks in developing regions.
- Sustainability and climate change.

Commodity exposures

- Raw commodity costs are a material percentage of COGS for the food business, but overall has a less significant role given the diversity of the business.
- The groups sources food commodities in dairy, flour, cocoa, sugar, corn and oilseeds.

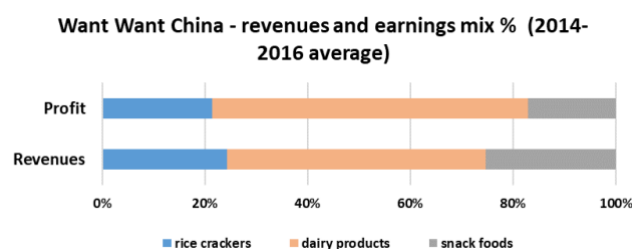
Scope for pass back

- The group sources raw materials and ingredients in transparent commodity markets and under supplier agreements in various regions where it operates.
- There is no scope to pass back price changes to raw material suppliers.

D.3.36. Want Want

Key features

- Chinese-based dairy and packaged snack food products group with operations across mainland China and Taiwan.
- Earnings are relatively stable but has trended weaker since 2013, as sales revenues have slowed.



Source: Freshagenda

Key risks

- Strong competition in the dairy and packaged food segments of markets across Chinese regions.
- Exposure to economic conditions, consumer sentiment and preferences for dairy and snack food products in Chinese regions.
- Fluctuations in dairy, rice and flour commodity prices.

Commodity exposures

- Raw commodity costs are a significant percentage of COGS.
- The group sources commodities in dairy, rice, flour, and plant extracts.

Scope for pass back

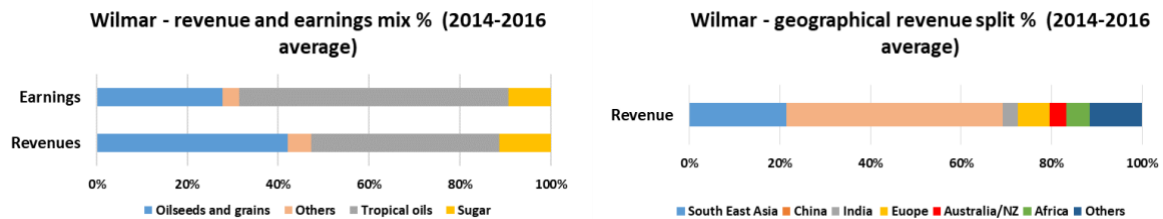
- The group sources raw materials from farms for certain inputs and ingredients in transparent commodity markets and under supplier agreements each operating region.
- The group sources some dairy commodities, but does not directly source raw milk into its operations.
- The group is not in a position to pass changes in market prices back to supplying producers

D.3.37. Wilmar

Key features

- Multinational Singapore-based bulk commodity processing and distribution group, with global operations, sourcing in a number of commodities and geographies. The focus is predominantly in the Asian region.
- There are significant differences in relative profitability across segment categories, and between 2015 and 2016, the contribution to profits by tropical oils and oilseeds and grains varied substantially.
- Earnings are variable but have trended stronger since 2014 as commodity prices for oils and sugar have improved.

- The group has attempted to stabilise the earnings based with a stronger investment in packaged consumer goods.



Source: Freshagenda

Key risks

- Fluctuations in commodity prices.
- Exposure to economic conditions and political risks in key market regions, especially given the major exposure to China.
- Exchange rate variation against the Singapore and US\$.

Commodity exposures

- Raw commodities are a significant percentage of COGS.
- The group sources commodities in grains, oilseeds, rice and sugar.

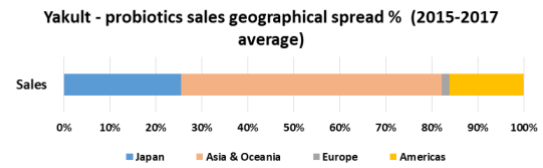
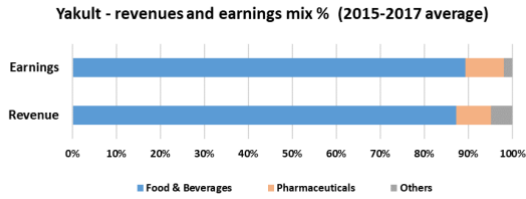
Scope for pass back

- The group sources raw materials from sugar farms and palm oil plantations, as well as ingredients in transparent commodity markets at many origination points.
- Wilmar does not appear to operate with significant scope to make ex-post adjustments to prices based on market or processing outcomes.

D.3.38. Yakult

Key features

- A Japanese processor and marketer of probiotic dairy drinks and foods into food and pharmaceutical markets, into global markets.
- Japan now represents about a quarter of sales, with China, Korea, South East Asia, The Americas and Europe.
- Earnings are relatively stable over time on the back of steady volume growth, but the decline in 2017 was due to currency movements.



Source: Freshagenda

Key risks

- Competition in the health foods sector from a range of solutions.
- Exposure to economic conditions and political risks in a number of developing Asian market regions.
- The effectiveness of tailoring marketing efforts into each region.
- Currency fluctuations against the Yen.

Commodity exposures

- The group has little or no commodity exposure in the purchase of inputs and sale of products.

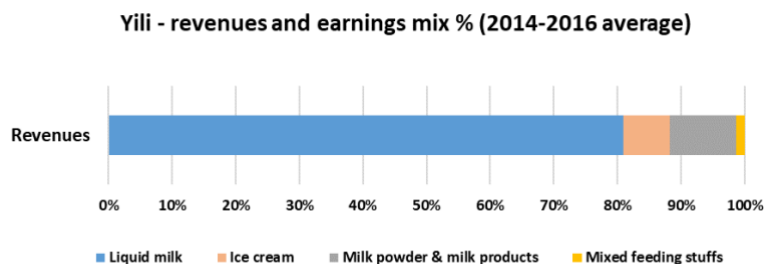
Scope for pass back

- The group is not in a position to pass changes in market prices back to supplying producers.

D.3.39. Yili

Key features

- Chinese dairy group, with leadership in the milk sector, mostly focused on drinks (UHT and fresh), ice cream, infant formula and other dairy products.
- Products are marketed across key Chinese regions from a network of sites, largely focused on the north, but with almost national reach.
- Earnings are stable growing with the expansion in size of the company as it has steadily increased milk volumes. Lower milk prices in 2016 helped improve volumes.



Source: Freshagenda

Key risks

- Strong competition in the fresh and UHT milk market in regional China including from imported European UHT products.
- Exposure to the Chinese brand reputational risk as a fall-out from food safety scandals
- Fluctuations in milk powder commodity prices.
- Exposure to economic conditions in major Chinese regions.
- Fluctuations in farmgate milk prices.

Commodity exposures

- Raw milk costs are a significant percentage of COGS.
- The group is in a position to pass some changes in product prices to milk producers in monthly milk price adjustments, but that can be moderated depending on competitive conditions as it must compete in some cases with other processors for milk.

ANNEX E COMPARATOR EQUITY AND ASSET BETAS

For each of our comparators we set out the latest raw equity betas and the asset beta for the two latest five-year periods. We present this information using the approach set out in Section 3 of the main report.

E.1. Asset beta by company, 15 January 2018

Table E.1: Asset beta estimates by company, by price data frequency, five years to 15 January 2018

Company	Daily	Weekly	4-weekly
Archer-Daniels-Midland	0.87	0.74	1.02
ABF	0.87	0.81	0.81
Bega	0.70	0.79	0.85
BRF	0.45	0.42	0.39
Bright	0.97	0.80	0.70
Bunge	0.49	0.39	0.63
China Mengniu	0.84	0.81	1.00
Chr Hansen	0.59	0.48	0.55
Conagra	0.49	0.34	0.34
Dairy Crest	0.43	0.51	0.62
Danone	0.60	0.52	0.59
Dean Foods	0.55	0.41	0.54
Emmi	0.42	0.48	0.44
General Mills	0.54	0.38	0.50
Glanbia	0.43	0.40	0.48
GrainCorp	0.42	0.42	0.45
Grupo Lala	0.67	0.55	0.57
Hershey	0.59	0.41	0.46
Ingredion Inc	0.71	0.58	0.59
Yili	0.86	0.74	0.63
JBS	0.40	0.29	0.28
Kellogg	0.47	0.33	0.34
Kerry	0.48	0.46	0.53
Kraft Heinz Co	0.70	0.25	0.20
Mead Johnson Nutrition	0.83	0.68	1.11
Mondelez International	0.80	0.62	0.79
Murray Goulburn Co-op	0.23	0.14	-0.15

Company	Daily	Weekly	4-weekly
Nestle	0.77	0.72	0.71
NH Foods	0.64	0.42	0.45
Olam International	0.24	0.26	0.27
Parmalat	0.09	0.14	0.24
Saputo	0.60	0.58	0.67
Savencia	0.06	0.08	0.15
Synlait	0.57	0.38	0.61
Tate & Lyle	0.52	0.54	0.69
Unilever	0.77	0.76	0.91
Want Want China	0.70	0.65	0.66
Wilmar International	0.47	0.46	0.48
Yakult Honsha	0.96	0.83	0.87

Source: Bloomberg, CEPA analysis

E.2. Asset beta by company, 15 January 2013

Table E.2: Asset beta estimates by company, by price data frequency, five years to 15 January 2013

Company	Daily	Weekly	4-weekly
Archer-Daniels-Midland	0.76	0.66	0.45
ABF	0.50	0.45	0.54
Bega	0.21	0.00	0.01
BRF	0.53	0.52	0.50
Bright	1.10	0.94	1.00
Bunge	0.71	0.84	0.90
China Mengniu	0.77	0.72	1.12
Chr Hansen	0.36	0.10	0.09
Conagra	0.33	0.36	0.54
Dairy Crest	0.29	0.42	0.43
Danone	0.46	0.36	0.41
Dean Foods	0.29	0.28	0.30
Emmi	0.19	0.26	0.33
General Mills	0.30	0.25	0.17
Glanbia	0.28	0.39	0.53
GrainCorp	0.36	0.50	0.68
Grupo Lala			

Company	Daily	Weekly	4-weekly
Hershey	0.45	0.41	0.34
Ingredion Inc	0.77	0.81	0.95
Yili	0.82	0.66	0.82
JBS	0.66	0.59	0.74
Kellogg	0.37	0.32	0.33
Kerry	0.30	0.26	0.23
Kraft Heinz Co			
Mead Johnson Nutrition	0.51	0.26	0.21
Mondelez International	0.53	0.01	0.01
Murray Goulburn Co-op			
Nestle	0.61	0.53	0.57
NH Foods	0.49	0.45	0.49
Olam International	0.80	0.72	0.71
Parmalat	0.47	0.45	0.50
Saputo	0.31	0.32	0.29
Savencia	0.16	0.26	0.32
Synlait			
Tate & Lyle	0.43	0.43	0.59
Unilever	0.53	0.41	0.54
Want Want China	0.44	0.30	0.29
Wilmar International	0.89	0.81	0.81
Yakult Honsha	0.57	0.58	0.53

Source: Bloomberg, CEPA analysis