

# A Review of Fonterra's Pricing of Regulated Milk in the Dairy Processing Industry

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22 February 2012

## Executive Summary

Fonterra sets its farm-gate milk price based on a notional, fully-efficient, Fonterra, which produces only milk powders and their by-products, and uses efficient plants to do so. The raw milk price is determined by the residual left when notional costs are deducted from notional revenues, with revenues being determined by reference to actual product prices. The farm-gate milk price plus ten cents is the price of regulated milk supplied under regulations imposed by DIRA.

It is likely that the notional model overstates revenues and understates costs, and therefore overstates the value attributable to raw milk, the price of which in consequence is likely to be overstated. Revenues are likely to be overstated because the expansion of Fonterra's actual milk powder production from 70% of output to a notional one of 100% makes no allowance for the fall in international prices that would be likely to follow. Additionally, revenues are likely to be overstated because Fonterra could, but does not, use its actual product-mix (excluding value-added products) to set its revenues. Its actual product-mix so defined could generate lower revenues/margins than the narrower, notional product-mix used.

Fonterra's costs are likely to be understated because they are based on notional production facilities that embody efficient-sized plants using modern technology, rather than on Fonterra's actual production facilities and costs.

The notional models used by the MPM appear to be complicated, and to involve the use of judgments to determine the values of a large number of parameters. This creates the possibility – or at least the perception – of partiality on Fonterra's part, when it is both regulator and regulated firm. The conflict of interest appears stark.

Fonterra is likely to be constrained in the extent to which the farm-gate milk price is overstated by using the notional Fonterra, because its actual residual of revenues over costs must be sufficient to make the milk payments required by the notional residual. Hence, its ability to set an overly high regulated milk price may be constrained to some degree. Nonetheless, I note that Deloitte has estimated that the price elevation could be in the range of 33 to 50 cents per kgMS, which, I understand, is a significant amount in the context of the industry.

The analysis and evidence suggests that there is scope for Fonterra to manipulate the farm-gate milk price up and the dividend payment down, within its overall payout. This is made possible because both prices are set administratively, and because the built-in constraint in DIRA to prevent this happening – that it would cause a flood of inefficient milk as farmers switch to Fonterra – does not seem to be an effective deterrent to such behaviour. This pricing pattern would deter entry, as investor-owned competitors would find it difficult both to match the high farm-gate milk price and to sustain low dividend policies – in short, it would appear to amount to a barrier to entry.

The regulation of an industry such as the dairy processing industry that is potentially competitive should focus on promoting competitors, rather than implicitly on treating Fonterra as if it were a natural monopoly, and regulating its raw milk price at the long-run, notionally efficient, level. This would, in my view, require a milk price based on the actual Fonterra, rather than on the notional, fully-efficient Fonterra.

The notionally efficient milk price serves at best only to promote productive efficiency, and it is questionable how successful it is in achieving that goal, in terms of encouraging management effort. It ignores the adverse impacts on allocative efficiency (caused by market power), and dynamic efficiency (caused by a lack of innovation), from having too few competitors in the market. All forms of efficiency would be promoted if Fonterra were to face effective competition from independent processors. A workably competitive market would appear to be consistent with the intention of DIRA.

## 1. Introduction

The purpose of this memorandum is to review the report by Compass Lexecon (CL), the economic expert retained by Fonterra.<sup>1</sup> CL argues that the approach used by Fonterra in its *Milk Price Manual* (MPM) for the setting of the raw milk price is appropriate, in that it promotes efficient competition from new dairy processors, as required by the *Dairy Industry Restructuring Act 2001* (DIRA).<sup>2</sup>

The MPM sets out the methodology that Fonterra uses to price the raw milk it receives from its farmer suppliers. In essence, the raw milk price – what Fonterra calls its “farm-gate milk price” – is the residual left after Fonterra has deducted all of its other costs from its revenue, divided by the quantity of milk supplied.<sup>3</sup> This price (plus 10 cents for the so-called “square curve” supply requirement – see below) is also the price of the regulated milk that it is required to supply to its competitors under the DIRA.<sup>4</sup> As Fonterra processes about 90% of the country’s raw milk, the price it sets using the MPM methodology effectively becomes the de facto market price for raw milk throughout the country.

I start by explaining that the Efficient Component Pricing Rule (ECPR) introduced by CL was not designed for setting an access price in the context of an industry like the New Zealand dairy processing industry. CL seems to agree with this proposition, but in assessing Fonterra’s MPM it nonetheless applies the ECPR in modified form because of its property of promoting productive economic efficiency.

Two key concerns have arisen in connection with the application of the MPM to set the raw milk price. The first concerns the use by Fonterra of notional, fully-efficient plants to determine its costs, rather than using its actual costs; and the second relates to Fonterra’s

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<sup>1</sup> Robert D. Willig, Meg Guerin-Calvert and Andres V. Lerner, *The Effectiveness of DIRA in Fostering Competition and Economic Efficiency in New Zealand Dairy Markets*, Compass Lexecon, 20 July 2011.

<sup>2</sup> The purpose of subpart 5 of the Act, which sets out the regulatory scheme for the dairy industry, is “to promote the efficient operation of dairy markets in New Zealand.”

<sup>3</sup> Fonterra Co-operative Group Ltd., *Farmgate Milk Price Manual*, 21 September 2011 (this is a revised version of that first produced in July 2009).

<sup>4</sup> CL refers to this “regulated milk” as “DIRA milk”. The two terms are synonymous.

use of a limited range of its products to determine the final product prices, and hence its notional revenues, rather than its actual revenues. In short, a hypothetical Fonterra rather than the actual Fonterra is used to set the farm-gate milk price. My analysis suggests that the use of notional, fully-efficient plants to determine costs is both questionable in principle, especially in light of the DIRA's objectives, and may be impractical given how Fonterra's raw milk payment to its farmers actually works. The final product price used depends upon the opportunities available within Fonterra for how the 500 million litres of regulated milk might be used. It seems likely that the milk could be drawn from different alternative uses at different times in the season, which would support the use of a broader range of products in the mix.

A further complexity is that the residual arrived at by deducting Fonterra's costs from its revenue is used both to pay its farmers for the raw milk that they have supplied, and to pay them a dividend on the shares in the co-operative that they are required to own. Fonterra has attempted to separate out these two components in what, in the industry, used to be a single "payout" sum per unit of milk supplied. CL discusses the concerns that have been expressed over Fonterra's alleged ability to discourage independent processors by raising the raw milk price and reducing the dividend within the overall payout sum. CL provides two reasons why it thinks Fonterra would be constrained by DIRA from behaving in this way. I question whether these constraints are as binding as portrayed by CL. Even a relatively small increase in the raw milk price could have a significant impact on independent processors, given the low margins on which I understand they operate.

## 2. The Efficient Component Pricing Rule

The Efficient Component Pricing Rule (ECPR) (sometimes known as the Baumol-Willig Rule, after its inventors) was developed to address the interconnection (or access) pricing issue. This issue arises when there is a vertically-integrated incumbent firm that is the only supplier of an input or component, such as access to a natural monopoly network. For example, the incumbent might be a railway operator that owns the only railway track between two cities. It may not be economic for other firms wishing to supply rail passenger or freight services between the two cities to build their own tracks, and so to become

providers of rail track services themselves. Their only practical option may be to run their trains on the incumbent's tracks (i.e., they would be non-vertically-integrated competitors in the downstream rail transport services markets). The question then (assuming that access must be provided by the incumbent) is what the price of access should be.

The problem facing the incumbent is that if the entrant takes away customers that it would have supplied itself, it loses the revenues that would have included a contribution to meeting the fixed and overhead costs associated with its investment in the railway track. Even in an imaginary competitive market, where hypothetically there would be competing suppliers of the access service, it would charge both the direct costs of supplying the access service, plus the opportunity cost in the form of the foregone contribution to fixed costs and profits.

To give a simple example, suppose that the cost of transporting a tonne of freight over the line comprises \$5 for variable costs and \$4 for interest charges and depreciation, and the price is \$12, so that the profit per tonne is \$3 ( $= \$12 - \$5 - \$4$ ). The ECPR access price – the price that would leave the incumbent indifferent as to whether it or the access-seeker supplies the service – would be \$7, comprising compensation for the foregone \$4 of interest and depreciation, and \$3 for the foregone profit.<sup>5</sup> At this price only an equally or more efficient competitor – one who could supply the service at a cost of no more than \$5 – would be able to enter the market profitably. Hence, proponents of the ECPR argue that its application ensures that only efficient entry would be permitted.

The key feature required for the ECPR to be appropriate is that there is an incumbent firm that is vertically-integrated across different stages of the production process, and that it has an unchallengeable monopoly position in one of them. This means that other, non-vertically-integrated, firms wishing to compete with it in vertically-related contestable markets either upstream or downstream are unable to do so without being able to access the incumbent's monopoly facility or component. The question, then, is whether dairy

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<sup>5</sup> This assumes that the incumbent incurs no additional costs in providing access. If there were, these would be added to the access charge.

processing in New Zealand could be characterised as having a natural monopoly – or what CL calls a “bottleneck” – facility or component at one of its vertical stages of production.

The most obvious candidate is raw milk, the essential component in dairy processing. When Fonterra was allowed to form by merger it had 96% of the raw milk produced in New Zealand. As entry was thought to be difficult because of the “chicken and egg” problem – farmers would not switch to an entrant that had no processing plant, and banks would not lend funds to the entrant to build a plant if it had no suppliers – Fonterra was required by regulation under the DIRA to supply a certain amount of raw milk (now increased to a maximum of 600 million litres per year) to competitors at a regulated price (“regulated milk”). This encouraged a number of firms to enter into dairy processing (the so-called “independent processors”),<sup>6</sup> and these have also gained their own supplies of raw milk by signing up their own farmer suppliers. Fonterra’s share of the total milk supply has in consequence reduced to 90%, although its volume has still increased because of the overall expansion of the supply. In the present circumstances it is difficult to maintain that raw milk constitutes a natural monopoly component, given the large size of the dairy industry relative to the economy, the regulations compelling Fonterra to continue to supply regulated milk, and the significant share, and independent milk supplies, of the independent processors.<sup>7</sup>

Nor can it be claimed that if the incumbent (Fonterra) loses raw milk, it has to recoup the cost of a fixed network or facility from the smaller volume remaining, as its network is not a natural monopoly one that is fixed in size, like the railway track referred to above. Rather, it can simply scale down the size of its production facilities to match reduced raw milk volumes, should that be required, just as happens in a competitive market experiencing

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<sup>6</sup> The newcomers (all investor-owned) are Miraka, New Zealand Dairy, Open Country Dairy and Synlait. They joined two small co-operative dairy companies – Tatua and Westland – that chose to remain outside of the large merger that led to the formation of Fonterra. These six comprise the independent processors. Regulated milk is also acquired by two large food manufacturing companies – Goodman Fielder and Cadbury – and by a number of very small firms.

<sup>7</sup> The ‘chicken and egg problem’ might be thought to have a bottleneck-like characteristic, but unlike a true bottleneck, the problem is not permanent in nature. Rather, it appears to be more like a credibility issue that can eventually be overcome once the new processor has become established and has developed a credible track record.

entry.<sup>8</sup> Strengthening this perspective is the fact that Fonterra is losing raw milk through some of its farmers choosing to switch their supplies to independent processors, yet it cannot charge the entrants for this milk that, in their absence, it would have processed.

Given the above, it is not surprising that CL, although considering the possibility, concludes that the ECPR is not appropriate for setting the regulated milk price (p. 25):

We assume for purposes of this discussion [regarding the application of the ECPR to dairy processing] that Fonterra is a bottleneck provider of an essential input into dairy processing – the supply of raw milk. As we discuss below, the facts that large independent processors have been able to compete successfully for the supply of raw milk from farmers and that the DIRA milk supply from Fonterra makes up a small share of their total raw milk purchases, indicate that Fonterra is not a bottleneck provider of an essential input.

Nonetheless, CL goes on to argue that the raw milk price-setting process used by Fonterra in its MPM is consistent with the ECPR framework (p. 26):

In principle, Fonterra’s Milk Price Manual methodology is broadly consistent with the ECPR framework. As we describe above the ECPR price can be derived as the price of the final product (e.g., the global price of commodity milk products) minus the costs of processing the raw milk and selling the final dairy products. Similarly, the Milk Price Manual takes the revenues that a notional processor could make from selling commodity dairy products in the global market and subtracts operating costs (including interest and depreciation) and a normal rate of return on investments.

CL applies the ECPR on the grounds (p. 25) that “the attributes of an economically efficient price” can be calculated by assuming Fonterra to be “a bottleneck provider of raw milk.” It is important to note that the “efficiency” here refers only to productive efficiency. The application of the ECPR sets an access price that allows the entry of an equally or more efficient firm, meaning a firm whose unit production cost is no higher than that of the incumbent. It ignores the two other possible economic efficiency benefits from entry, namely allocative efficiency (i.e., competition preventing monopoly pricing) and dynamic efficiency (i.e., entrants bringing innovative products and production processes).<sup>9</sup> Both of these dimensions of efficiency could suffer if the access price, by deterring entry, were to preserve the dominant position of the incumbent.

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<sup>8</sup> Not that this has been necessary, as Fonterra’s raw milk supply has continued to increase, despite entry. Out of the last ten seasons, milk processed by Fonterra fell only twice on a year-on-year basis, and one of those was the 2007/08 drought year.

<sup>9</sup> See: N. Economides and L. J. White, “Access and Interconnection Pricing: How Efficient is the ‘Efficient Component Pricing Rule?’” *Antitrust Bulletin*, vol. XL, no. 3, fall 1995, pp. 557-79. The application of the ECPR is not necessarily straightforward - see: Mark Armstrong, Chris Doyle and John Vickers, “The Access Pricing Problem: A Synthesis”, *Journal of Industrial Economics*, vol, XLIV, no. 2, June 1996, pp.

### 3. The Milk Price Manual (MPM)

The MPM sets out the methodology that Fonterra uses to set its “farm-gate milk price” – the price that it pays its farmers for their raw milk – and also (with 10 cents added) the price that the independent processors pay to acquire regulated milk supplied by Fonterra under the DIRA. This pricing solution has ECPR-like qualities, in that independent processors, by having to pay essentially the same price as Fonterra for their raw milk supplies, would be able to produce dairy products profitably in competition with Fonterra only if they are at least as efficient as Fonterra.<sup>10</sup>

However, the MPM calculates the “farm-gate milk price” by deducting *all* costs – including an imputed return on capital invested, but not the raw milk cost – from revenue, leaving a residual that is available to pay for, and hence represents the cost of, the raw milk used. Unlike in the conventional application of the ECPR, the MPM treats all costs, including any opportunity costs – such as the compensation for any foregone contribution to overheads and profits – as being deductible, and hence not forming part of the access price, as they normally would in the conventional application of the ECPR. In short, the ECPR has been adjusted substantially to allow for the fact that there is no bottleneck facility or component in the dairy processing industry.

In these circumstances, the ECPR might be considered to be no longer relevant as a means of setting the regulated raw milk price. However, it can be used here to provide a framework for discussing the access pricing question at issue. The rule has been adjusted to reflect the specific circumstances of the dairy industry, and any inherent limitations in the rule and its application here can be considered.

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<sup>10</sup> The premium of 10 cents on the farm-gate milk price is to compensate Fonterra for the requirement for it to supply regulated milk on an even monthly basis throughout the nine month season, even though its raw milk supply has a strong seasonal peak in October-November. Fonterra must have sufficient processing capacity to process “peak milk”, whereas independent processors can take advantage of the more even supply of regulated milk (although their own milk supplies will have a similar seasonal profile to Fonterra’s).



A key question is how this adjusted form of the ECPR has actually been implemented in the MPM. As mentioned above, concerns have been expressed about the calculation of Fonterra's farm-gate milk price on the basis of the notional costs and revenues of a hypothetical Fonterra, rather than using the actual costs and revenues of the actual Fonterra. In particular, the MPM methodology has raised concerns over: (a) the use of notional, fully-efficient plants to determine Fonterra's costs, rather than using its actual costs; and (b) the use of a more limited range of products than Fonterra's actual product range to determine the final products, their prices and hence the company's revenues. Both of these could have significant impacts on the calculation of the farm-gate milk price, and through that on the regulated milk price (the access price paid by independent processors). Critically, the regulated milk price underpins the price that independent processors must pay to secure supplies of raw milk direct from their own farmers.<sup>11</sup> Direct supply is needed by the larger independent processors to fill their processing plants (the maximum volume of regulated milk allowed to each is 50 million litres per year, which is well below what a modern dairy plant needs).

I have previously conducted a review of the details of the price-setting processes used by the MPM.<sup>12</sup> The conclusions reached there were as follows:

(a) Rather than deriving its raw milk price from the revenues and costs of its actual operations, Fonterra has chosen instead to base the price on a hypothetical Fonterra that produces only what it calls "commodity products", a sub-set of its full product range, comprising milk powders and their by-products. Constructing this hypothetical company involves using models that require a large number of assumptions and judgment calls to be made. In some instances the wording of the MPM appears to build-in discretion over the choices allowed.

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<sup>11</sup> The regulated price (farm-gate milk price plus ten cents) "underpins" (rather than "sets") the own-supply price, in that a premium of around 20 cents is generally needed. I consider this could be an entry barrier, and discuss it further below.

<sup>12</sup> See my memorandum: *Review of Fonterra's "Milk Price Manual, 2011"*, 20 October 2011.

(b) Although the MPM claims that the models and parameter settings should be grounded in Fonterra's actual operating experience, there are clear instances where this is not the case. Perhaps the most important concern the choice of plant sizes and technology: the standard plants used for each product have capacities equal to the Fonterra average capacities, and embody very recent technology. This may give them lower unit costs than its actual mix of plants.

(c) Overall, the process allows Fonterra what appears to be a large amount of discretion in its price setting. Although the company has introduced various independent checks and audits on the process, the complexities of the models used, and the need for independent reviewers to have great familiarity with dairy processing, suggest that these controls could be weak.

(d) Fonterra has been put in the situation of regulating itself, which is not consistent with good regulatory practice, and is liable to raise perceptions – whether unfounded or not – that its price-setting is self-serving.

#### 4. Competitive Dairy Markets

CL bases its analysis on what would happen in a dairy market that is fully competitive at all vertical levels, including in international dairy product markets, where Fonterra is said to be a price-taker (pp. 16-17). The latter assumption is important as nearly all of Fonterra's production is exported.<sup>13</sup>

Suppose that the raw milk price were initially too low. Dairy processors would make relatively large margins between the export price and production (including raw milk) costs. Profits would be above normal levels. This would encourage both the expansion of existing dairy processors and the entry of new ones in the long-run, which would increase competition for raw milk at the farm gate, thereby forcing up the price. This expansion

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<sup>13</sup> I do not discuss whether the price-taker assumption is appropriate, though there is room for doubt given the fragmented nature of the international market because of the protection of domestic dairy industries in many countries, and because of Fonterra's large share of some internationally traded dairy commodities (see below).

would cease once the price of raw milk had increased to the point where processors were earning only normal returns.<sup>14</sup>

Alternatively, if the raw milk price were initially too high, processors would be earning sub-normal returns, causing them to reduce production and some to exit the industry in the long-run. This reduction in the demand for raw milk would lower its price, thereby restoring the profitability of the remaining processors.<sup>15</sup>

I agree that this broadly is how one would expect to see a competitive dairy industry adjust to variations in international dairy product prices, but subject to the proviso that short-term price fluctuations may mean that participants have to take good years with the bad, and that the fundamental supply adjustments discussed here would only occur in response to sustained price changes in international markets over the long-term. It is likely that the industry at any particular time would be adjusting towards an equilibrium that itself would be gradually changing, and hence never be actually reached.

## 5. Application of the ECPR

In applying the ECPR to establish the farm-gate milk price, CL considers that it is the marginal plant, rather than Fonterra's entire production, that is relevant. Its argument can be summarised as follows (pp. 26-30):

(a) The total amount of regulated milk supplied by Fonterra in 2010/11 was approximately 500 million litres, of which about 250 million litres went to Goodman Fielder. Fonterra processes about 14 billion litres of raw milk per year, and its average-sized plant processes

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<sup>14</sup> As part of this adjustment process, competition between farmers for good dairying land would force up its price too, so that farmers at the margin would be earning only a normal return on their raw milk production activity. Rising dairy land prices would likely also encourage other farmers to switch into dairying, augmenting the supply of raw milk.

<sup>15</sup> Part of this adjustment process may involve farmers switching out of dairying, thereby lowering the supply of raw milk – the reverse of the process described in the previous footnote.

300 million litres. Therefore, the regulated milk supplied to other than Goodman Fielder is roughly the amount processed by a typical Fonterra plant.<sup>16</sup>

(b) In applying the ECPR to set the price of regulated milk, the relevant quantity is the marginal quantity of 250 million litres. The pricing of this milk should reflect the efficiency of the relevant Fonterra marginal plant, not the efficiency of Fonterra as a whole. The milk should go to an independent processor only if it is at least as efficient as the relevant Fonterra plant in processing the milk.

(c) In the South Island, where the supply of raw milk has been expanding rapidly, the diversion of some milk from Fonterra to independent processors would slow Fonterra's expansion in milk powder production. The "marginal plant" for judging efficiency could therefore reasonably be taken to be the new, very large, low-cost milk powder drier at Edendale.

(d) In the North Island, where the expansion of the raw milk supply has been limited, the relevant plant might be taken to be the more efficient ones (CL seems to argue that all plants, old and new, are more or less equally efficient), also in milk powder production.

(e) As any regulated milk diverted from Fonterra to the independent processors would very likely have been used by Fonterra to make milk powders for export, and this is what the main independents largely use it for, the relevant products to use to value Fonterra's lost sales are milk powders.

The balance of this memorandum is concerned with evaluating these propositions, and in particular with whether it is possible for Fonterra to inflate the price of raw milk in order to

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<sup>16</sup> I understand that Goodman Fielder takes about 220 million litres of regulated milk per year, which is rather less than its full entitlement of 250 million litres. This company receives special treatment under DIRA because it is the main competitor to Fonterra for the supply of dairy products to the domestic market.

discourage the entry and expansion of independent processors. An important consideration is which plant is the relevant “marginal” one. In points (c), (d) and (e), CL in effect considers that the most efficient milk powder plants in each of the Islands ought to be used as the basis for setting the costs and prices in the application of the ECPR. As the recently completed 29 tonne/hour drier at Edendale (which I understand is far larger than any other in the industry) is likely to be more efficient than the most efficient drier in the North Island, it is not clear which should be used to set the single regulated milk price. CL does not advocate setting a different price in each Island.<sup>17</sup> Another concern is that the 250 million litres of regulated milk is split both between six main independent processors, and between the two Islands, so it is not available to be used by a single plant, as CL conjecture. Also, the focus on milk powder ignores the other dairy products that Fonterra produces. I understand that in the North Island, eleven of the eighteen Fonterra plants produce no milk powders.

We now discuss in turn each of the two concerns about the methodology for the calculation of the farm-gate milk price set out in the MPM, namely: the use of notional, fully-efficient plants to determine Fonterra’s costs, rather than using its actual costs; and the use of a more limited range of products than Fonterra’s actual product range to determine the final product prices and hence its revenues.

## 6. Fonterra’s Costs

The MPM is said by CL to be based on the notion of a “Hypothetically Efficient Competitor” (HEC), i.e., it uses the costs of a set of efficiently designed and operated plants, rather than the costs of Fonterra’s actual plants. Others have commented that if Fonterra’s actual costs were higher than the assumed HEC’s costs, as seems a real possibility, the use of the HEC’s costs would lead to the raw milk residual value being higher than it would be if the actual costs were used. Fonterra would pay a farm-gate milk price that would be higher than is profitable, given its actual costs. A higher farm-gate price would disadvantage independent processors in two ways: it would lead directly to a higher regulated price, and indirectly to a

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<sup>17</sup> Both prior competition analysis and the regulatory framework in DIRA treat the North and South Islands as constituting separate geographic markets for raw milk, because little raw milk is transported between them. The exceptions occur during the peak, and occasionally when there are plant breakdowns.

higher price that these processors would have to pay to compete for the raw milk from their own suppliers. Implicit in this argument is that Fonterra would have to, and (as a co-operative) could, scale down the size of its dividend payment accordingly, whereas the independent processors – who are mainly investor-owned companies – could not.

CL raises two main arguments against this contention. Firstly, it considers (p. 18) that the use of the HEC is consistent with the competitive equilibrium described above. It is not Fonterra's average processing costs that would determine the raw milk price, but rather the costs of the marginal efficient plants introduced both by entrants and by Fonterra in recent years to produce milk powders. Secondly, CL argues that Fonterra is constrained from raising the farm-gate milk price at the expense of its dividend as this would distort its share price, leading to a supply of inefficient milk, and in any case, independent processors would not be disadvantaged. I review each of these arguments in turn.

## 6.1 HEC Consistent with Competitive Equilibrium

To examine the contention that the use of the HEC is consistent with the competitive equilibrium, consider Figure 1. This presents a simplified and stylised view of the dairy processing industry.

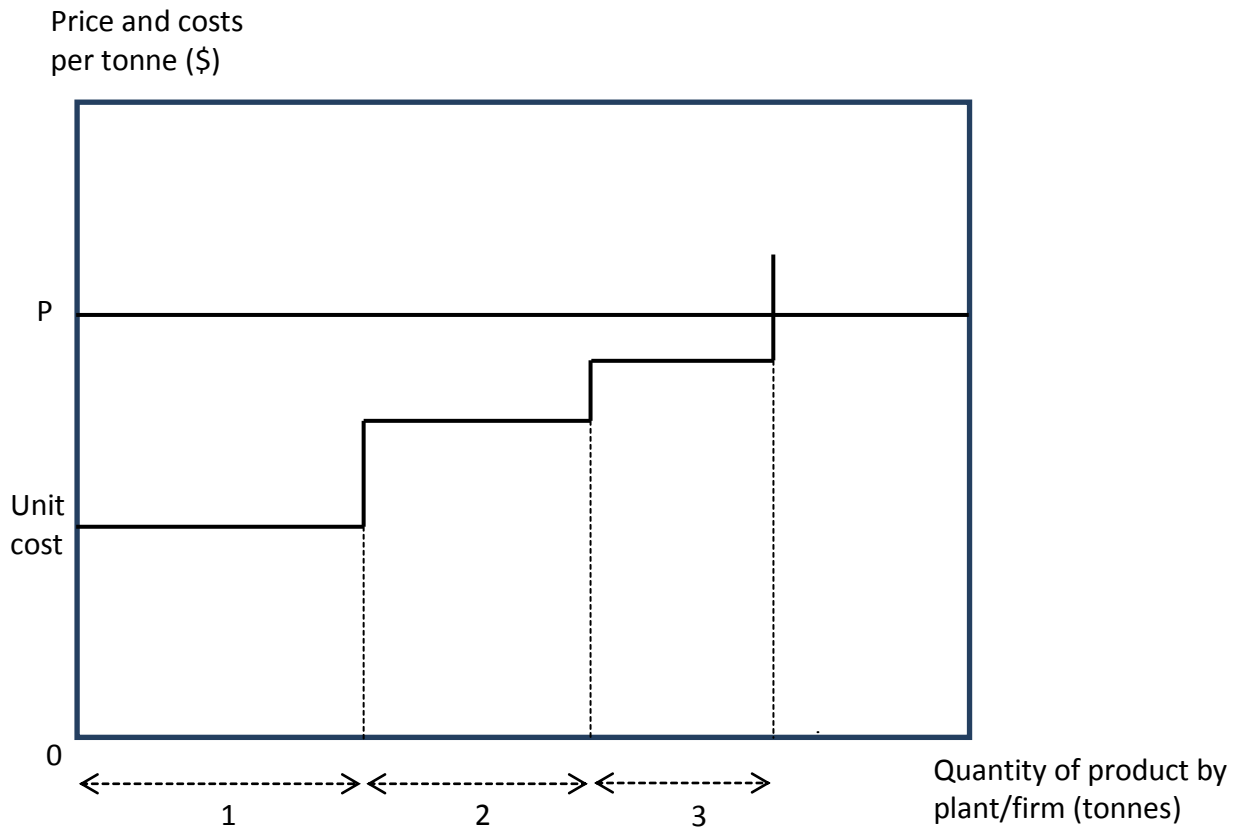
The industry is assumed to produce a single, uniform product, for which it is a price-taker on the international market, and hence it faces a horizontal demand curve at price  $P$ . The industry comprises three firms, all investor-owned (as opposed to being co-operatives). Each firm operates a single plant, whose output volumes are labelled 1, 2 and 3. The stepped industry supply curve shows that each has different, but constant, unit production costs, arranged from left to right in ascending order. These costs include a normal return on capital, but exclude raw milk costs. Thus, firm 1 is more efficient, and therefore has lower unit costs, than firm 2, which in turn is more efficient and has lower unit costs than firm 3.<sup>18</sup>

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<sup>18</sup> Since the major factor influencing plant efficiency is probably economies of scale, Figure 1 has been drawn so that the lowest cost plant has the largest output, and the highest cost plant the smallest output. CL argues that as Fonterra continues to operate older plants, this must be because they are still economically more efficient than modern new plants, for otherwise they would replace them with new. An alternative explanation could be that they are kept because they are "peaking" plants that are used to produce lower margin products like cheese and casein when milk is particularly abundant.

Consequently, firm 3 makes a smaller margin (the vertical distance between price and unit costs) than does firm 1. The total supply of product is the sum of the outputs of the three firms, and this uses up the supply of raw milk.

FIGURE 1



In the circumstances of this industry, the price of the raw milk would be determined by the maximum amount that the marginal (i.e., least efficient firm) could afford to pay. The unit price of raw milk is shown by the vertical distance between the price of the final product and firm 3's unit production costs. The other two firms, having higher margins, could afford to pay more, but they have no need to do so, as they can secure the raw milk they require by offering the same price as firm 3.<sup>19</sup> Hence, firms 1 and 2 make larger profits than firm 3. This represents a market equilibrium in the short-run, which is a period not long enough to allow firms to adjust the amount of fixed capital they employ. Here it is the marginal firm, meaning the least efficient, that determines the price of raw milk, not the most efficient firm as CL maintain.<sup>20</sup> From a resource allocation perspective, the marginal firm is the one that would first become unprofitable were the final product price to fall.

CL (p. 18) justifies its position on what constitutes the marginal firm by emphasising the nature of the adjustments made in the dairy processing industry in recent years. It mentions the various investments by Fonterra to build new plants, and to refurbish old ones, and the entry of new processors with allegedly efficient plants. Most of this investment has been directed towards the production of milk powder products. Fonterra and the independent processors are competing for raw milk to make these products using modern plants, and so in this sense the marginal value of raw milk is its value when used for this purpose.

This view does not seem to accord with conventional economic theory. Suppose that a new plant, even larger and more efficient than plant 1 in Figure 1, were to be built. Adding this additional new supply step to Figure 1 would cause the existing stepped supply curve to shift rightwards, but the existing, least efficient, plant 3 would still determine the price of the raw milk.

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<sup>19</sup> If the firms were co-operatives rather than being investor-owned, their payouts would reflect their different margins – Firm 1 would be able to pay the most, and firm 3 the least. But prior industry experience suggests that the industry structure would be unstable – farmers able to do so would want to switch supply to Firm 1, which would undermine the viability of Firms 2 and 3.

<sup>20</sup> The same principle applies in the electricity wholesale market, where prices for each half hour are set on the basis of a supply curve constructed on a similar basis to that in Figure 1. The highest cost generator to be despatched determines the price received by all, and lower cost infra-marginal bidders receive larger margins at that price.



CL appears to be using a long-run perspective, in which the firm (or firms) with the lowest unit production costs would win out at the expense of higher cost rivals, as they could afford to pay the highest price for raw milk. In terms of Figure 1, and assuming an unchanging global price for simplicity, one would expect that if firm 1 could expand production at the same unit cost, it would be able to outbid firms 2 and 3 for the raw milk that they use. Also, other firms might enter if their unit production costs were sufficiently low to allow them to be competitive. The upshot could be that firms 3, 2 and even 1 might be displaced by new firms with lower production costs in the long-run.

On this basis, using the HEC to determine costs in the MPM might be appropriate, and also might be consistent with the efficient outcome expected with an access price set by the ECPR.<sup>21</sup> It would also put the greatest pressure on Fonterra to be efficient, and to maximise the payout to its farmer-suppliers. However, this, it seems to me, raises a fundamental question about how the dairy industry is to be regulated.

Regulation, including the use of the ECPR to set access prices, is normally applied to natural monopolies, such as electricity lines and gas pipelines businesses, where there can be no competition. It tries to mimic the outcome in a hypothetical competitive market, by constraining the price of the service close to the costs of an efficient firm in the long-run. The regulated firm is thereby forced to operate efficiently in order to make profits. But the dairy processing industry is not an industry that is prone to monopolisation, and therefore to require regulation. Fonterra was created by a merger that received special authorisation to by-pass normal regulatory controls, with the quid pro quo that the merged co-operative would then be subjected to regulation to encourage new independent competitors to emerge. In a potentially competitive market like dairy processing, where ensuring access to raw milk from the incumbent would allow competition to develop, as required by the DIRA, it is arguably not appropriate to think of competition as some hypothetical equilibrium situation in the long-run.

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<sup>21</sup> As noted above, efficiency under the ECPR is limited to productive efficiency. CL does not raise any concern over potential market power problems, and associated loss of allocative efficiency, nor does it mention dynamic efficiency, which might suffer as well (e.g., fewer firms might generate fewer improvements).

DIRA appears to be quite clear as to its purpose, namely, to promote efficient dairy markets by ensuring that dairy markets are contestable. Contestability requires that firms are able to enter and compete by vying to gain market share and increase profits, and farmers are able to switch from and back to Fonterra without significant impediment. Setting the raw milk access price to reflect the possible outcome in the notional long-run, after competition has run its course, merely allows the incumbent to set the milk price on the basis of an optimised version of its actual operations, and so potentially to remove (or, at least, seriously to diminish) the scope for competitive activity by entrants. Yet in practice the incumbent's actual operations may reflect all sorts of inefficiencies – both in terms of product-mix and in plant configurations, vintages and locations – that in a truly competitive market provide openings for newcomers to enter and to take business from it by offering superior alternatives.

The use of the HEC concept and the apparent long-run focus by CL also overlooks practical considerations. Suppose Figure 1 represents the position of Fonterra, operating three plants with the differing levels of unit production costs depicted, i.e., plant 1 is more efficient than plant 2, which is more efficient than plant 3. This seems a plausible characterisation, as Fonterra is a multi-plant operator, and statements by CL and by Fonterra itself suggest that its plants are likely to vary in efficiency. As a cooperative, Fonterra tends to include all of its surplus of revenue over costs in its payout to its farmer suppliers for the raw milk supplied.<sup>22</sup> In Figure 1 the total size of this payment for raw milk is represented by the area between the price line and the stepped unit cost curve. The price per unit of milk supplied is therefore a weighted average of the 'large' surplus of plant 1, the 'medium' surplus of plant 2, and the 'low' surplus of plant 3.

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<sup>22</sup> As mentioned above, the actual payout by Fonterra to farmers is a mix of milk price for milk supplied and a dividend payment for capital invested. In the analysis here we assume that the dividend payment (the return on capital) is included as a production cost, so that the surplus of revenues over production costs represents what is potentially available for payment for raw milk. Note that Fonterra may retain a portion of this in order to increase its reserves.

If the approach recommended by CL based on the HEC were to be followed, the price of raw milk would be set not as the weighted average just described, but at a higher level, represented at a minimum by the surplus between price and the unit cost for plant 1 across *all* of Fonterra's output (this is the minimum total raw milk payment as the HEC plant could not have a unit cost higher than the actual plant 1, but it could be lower). However, this would be incompatible with Fonterra covering all of its costs out of revenues. As the mix of actual plants assumed is a significantly less efficient combination than a notional mix based on HEC ones, then Fonterra's actual residual would not be enough to make the milk payments required by the notional residual, at least without a large drop in dividend payments (and hence in the share price). The company's only recourse would be to draw on previous retentions and/or pay a smaller dividend, leading to an imbalance between raw milk payment and dividend, an outcome that CL argues the company would never contemplate (see below). In short, there seems to be an inconsistency between the implications of using the HEC (the notionally efficient firm in the long-run) to set costs and what Fonterra can practically do given its actual costs.<sup>23</sup>

The difficulty described in the previous paragraph stemming from CL's characterisation of what the MPM requires may, in fact, be more apparent than real. The MPM's farm-gate pricing model does not mention, nor make use of, the term HEC. Fonterra's notional costs are based not on the HEC's costs, but on the costs of a plant of (approximately) average size (the exact specification of the plant size used is discussed below).<sup>24</sup> A standard cost model of a plant of this size that embodies 2008 technology is used to generate the notional cost of milk powder production. Such a plant is considered to be more efficient than the small powder plants that Fonterra actually uses, but less efficient than its two newest and very large powder plants (one built, the other being built).<sup>25</sup>

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<sup>23</sup> This is another reason for not using the long-run focus as the basis for setting Fonterra's farm-gate milk price.

<sup>24</sup> This apparent confusion on CL's part may have arisen because it states that it has not actually "conducted a detailed assessment" of the MPM. See: Willig et al., footnote 2, page 4.

<sup>25</sup> See: "Fonterra's Milk Price – the Facts", undated broadsheet, pp. 3-4.

If we imagine that Figure 1 now represents Fonterra's powder production from three plants of differing efficiencies, the standard plant might be based on plant 2, since it is closest to the average size of the three actually used. As can be seen, a farm-gate milk price based on the costs of this plant is more likely to be able to be met out of Fonterra's revenues, as the smaller margin on plant 3 would be counter-balanced by the larger margin on plant 1.

We now consider the implications of the plant costs used in the MPM for the setting of the farm-gate milk price. CL seems to argue that new processors, because of their recent entry, will have built relatively efficient plants, implying that they will be able to cope with a high raw milk price. CL even goes so far as to suggest that efficient entrants might be the price setters (p. 18): "Even if Fonterra (and other processors) have higher average variable costs of processing, the farm gate milk price will be bid up by competitors utilizing efficient plants." However, it seems likely that the sizes of the plants built by entrants have been limited by the quantities of milk they could hope to attract, which could have a significant impact on their unit production costs in an industry where process plants tend to be subject to significant economies of scale.<sup>26</sup>

To illustrate this point, suppose an independent processor's plant has unit production costs the same as Fonterra's plant 2 in Figure 1. The surplus it would earn between final product price and unit costs would be insufficient to allow it to compete, if the price of raw milk were set on the HEC basis using plant 1's margin. This raises the possibility that the MPM could result in the regulated milk price being set at an anti-competitively high level. However, as explained above, the MPM is based on a plant of roughly average size, not the HEC plant adopted by CL. It is not clear how the average-sized plant compares with those of the independent processors, nor whether the assumption of 2008 technology disadvantages them.

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<sup>26</sup> I understand that independent processors have typically built 8 tonne per hour driers, whereas Fonterra's latest plant at Edendale has a 29 tonne capacity. It appears that Synlait wanted to build a bigger plant, but lacked the milk to do so. Moreover, because of the sizing of ancillary plant required (e.g., bagging plants), the optimal drier plant sizes are roughly limited to eight, 15 and 29 tonnes per hour, meaning that a large increase in milk supply is needed for a firm to move from an eight to a 15 tonne drier. No-one but Fonterra has the milk to build a 29 tonne plant, which processes more milk than the four plants combined of Open Country Dairy.

The setting in the MPM of the size of the standard plant to roughly equal the processing capacity of Fonterra's average plants used in powder production has to be qualified. The MPM defines the size of the standard plant in four different places, as follows:<sup>27</sup>

The third key assumption is that the average processing capacity of Standard Plants of Fonterra is greater than the average processing plant capacity of Fonterra's efficient near-term competitors. If this assumption is incorrect, the average processing capacity of the Standard Plants used in the Milk Price Methodology should be reconsidered. (p. 4)

A Standard Plant will have . . . daily processing capacity materially consistent with the average daily processing capacity of Fonterra plants used to manufacture Reference Commodity Products. (p. 6)

The Milk Price Methodology . . . assumes that the average processing capacity of the Standard Plants of Fonterra is greater than (or at least equal to) the average processing plant capacity of Fonterra's efficient near-term competitors. If this assumption is incorrect, the processing capacity of those Standard Plants used in the Milk Pricing Methodology should be reviewed. (p. 15)

Initially, determine the number of manufacturing plants Fonterra would require if . . . each Standard Plant configuration had a capacity that was materially equivalent to Fonterra's actual average capacity for plant used in the manufacture of the Reference Commodity Products. (p. 24)

The second and fourth definitions define the standard plant's size as being "materially consistent with" or "materially equivalent to" the actual average capacity of Fonterra's milk powder plants. However, the first and the third definitions go further, by adding that the standard plant's size should be greater than (or at least equal to) the average processing plant capacity of Fonterra's efficient near-term competitors, in both cases adding that if this assumption were incorrect, these assumed processing capacities are to be reviewed. These specifications would ensure that the hypothetical Fonterra could at least match, if not better, its competitors in terms of plant scale economies, and that it reserves the right to effectively change the rules to preserve this advantage. As such economies appear to be significant for dairy processing plants, it would ensure that Fonterra would have a persistent cost advantage over its rivals. I lack the information needed to test how significant this advantage might be.

## 6.2 Fonterra Constrained to Set a Competitive Raw Milk Price

CL believes that Fonterra is constrained from setting a regulated milk price at an inefficiently high level. To engineer a 'high' price for regulated milk, the MPM would have to set a 'high' farm-gate milk price, meaning that any inefficiency in the level of the regulated price would

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<sup>27</sup> The "Reference Commodity Products" comprise the milk powders and by-products that the hypothetical Fonterra is assumed to produce.

be magnified many times over when applied to the farm-gate price. Further, any increase in the price of raw milk would, in the context of a given payout, require a corresponding, and non-sustainable, decrease in Fonterra's dividend payment. In short, setting the farm-gate milk price on the basis of a notional Fonterra's revenues and costs cannot result in a price that the actual Fonterra would find financially unsustainable.

CL uses the example of a payout of \$5, split between \$4 per unit of raw milk and \$1 for the dividend. Farmer-suppliers of Fonterra are required to buy one share for every kilogramme of milk solids produced (although the holding of up to a further 20% of so-called "dry shares" is permitted). If Fonterra were to increase the milk payment to \$4.99, the dividend would have to fall to \$0.01. Critics have claimed that equally-efficient (investor-owned) entrants would not be able to compete by matching this 'high' price for raw milk, because their investors would find a \$0.01 dividend unacceptable. They would not be able to afford either to buy regulated milk at \$5.09 (i.e., the farm-gate milk price plus ten cents), or to pay their own farmer-suppliers a matching price.

CL argues that this pricing approach would be unsustainable for Fonterra, for two reasons. Firstly, an investor-owned company could still compete by continuing to offer to pay \$4 per unit for raw milk from its own suppliers, either because a new entrant dairy farmer might not have the capital to meet Fonterra's requirement to invest in its shares,<sup>28</sup> or because a farmer switching from Fonterra could invest the capital released from his Fonterra shares in other investments yielding a return equivalent to \$1 per share at a similar level of risk (in which case, he would continue to earn \$5 per unit of raw milk). However, at its strongest, this argument applies only to own-supply milk; regulated milk would be priced out of reach of either existing, or potential new, independent processors.

The argument also seems to be based on the assumption of frictionless, perfectly informed markets. In a more realistic market setting, one might expect there to be some 'give', in the sense that Fonterra might be able to get away with some degree of reallocation of the payout from dividend payments to milk. For example, the returns on alternative

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<sup>28</sup> I understand that this argument is not a strong one as banks will happily debt fund the purchase of Fonterra shares by farmer suppliers.

investments to Fonterra shares are uncertain, and farmers may lack the information or confidence to invest outside of the dairy industry.<sup>29</sup> Hence, a small lowering of the dividend might not have much impact.

Secondly, CL point out that the much reduced dividend payment would greatly reduce Fonterra's share price. The combination of 'high' raw milk price and 'low' share price would encourage farmers to switch to Fonterra, but the additional funding that incoming farmers would provide through their share purchases would not be sufficient to fund the company's expansion in plant capacity needed to process their additional milk. As the acquisition of this additional raw milk supply would not be profitable for Fonterra, and under the DIRA regulations it would not be able to turn away new farmers, it would be discouraged from pricing in this way.

The preceding numerical example uses a very stark change in Fonterra's raw milk pricing and dividend policies, with the dividend being reduced from one dollar to one cent. I understand that even a relatively small increase in the farm-gate milk price could have a significant impact on the viability of the independent dairy processors, as typically they operate on low margins. Suppose, for example, that the payout-split above of \$4/\$1 were changed to, say, \$4.20/\$0.80.<sup>30</sup> This relatively small drop in dividend payments might not be sufficient to induce farmers to react in the way that CL supposes, but the corresponding increase in the raw milk price would likely have a significant impact on the ability of independent processors to compete.

To put these numbers in context, I understand that an eight tonne/hour milk drier processes 19 million kilogrammes of milk solids per year (kgMS/year), and costs about \$90 million to build. The capital cost per unit of production is therefore \$4.74 (i.e., \$90m/19m = \$4.74). Fonterra's "restricted value" share price is set at \$4.52 (more on this below). On these

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<sup>29</sup> Farmers could invest in expanding their own farms, as I understand some who have left Fonterra have done.

<sup>30</sup> Note that these numbers are not representative of what I understand the proportional split in raw milk and dividend payments to have been in recent times. Fonterra states that while a few cents may be a small proportion of the total farm-gate milk price, it is a much greater proportion of earnings. For example, a 5 cents higher milk price is less than 1% of a price of \$7.50, but is around 15% of Fonterra's recent normalised underlying operating earnings of 30-35 cents per share.

numbers, additional milk would be largely self-funding – \$4.52 of each \$4.74 of investment, or 95.4%, would be paid for by farmers’ supply shares – meaning that minimal debt would be required. It seems likely that this percentage would be even higher with a larger plant that would benefit from superior scale economies, and hence would have lower construction cost per kgMS/year. This suggests that a lowered share price (combined with a higher farm-gate milk price), which would encourage farmers to switch to supplying Fonterra, would (contrary to CL’s contention) not unduly hinder Fonterra’s ability to fund the additional processing capacity required. If correct, the discipline built-in to the DIRA that is designed to deter Fonterra from over-pricing raw milk would be ineffective.

A key issue here is how the share price is set, and how the setting of the share price meshes with the setting of the farm-gate milk price. Both prices are set by administrative processes operated by Fonterra (as opposed to being set in competitive markets), and the two processes must be interdependent, at least in a financial sense. This is because the dividend that underpins the share price comes from the same residual of revenues less costs that are used to make the raw milk payments. With a given pool of funds available, one component cannot be set without impacting on the setting of the other. Thus, for example, the higher the payment for milk, the lower the balance available to fund the dividend, and hence, the lower the share price must be. Many permutations seem possible, although a degree of constraint must ultimately be provided by the need to satisfy farmer suppliers with the percentage return provided by the dividend on the sum invested.

One possibility is that the MPM is used to break the circularity evident in the two processes, in that by setting the farm-gate milk price, it is also indirectly setting the dividend stream. Under the MPM methodology based on the hypothetical Fonterra, the funds *actually available* to pay the dividend would presumably roughly equal the following:

- the WACC return built into notional costs
- + an adjustment (either positive or negative) measuring the extent to which the actual revenues differ from the notional revenues (e.g., caused by price differences between the powder products in the notional product range and the prices of the broader range of products actually produced)



- + an adjustment (either positive or negative) measuring the extent to which the actual costs differ from the notional costs (e.g., again reflecting the costs of the different product-mixes of notional and actual production)
- retentions.

The adjustments to the notional revenues and costs must be needed, as in the end the dividend can only be paid out of the difference between actual revenues and costs. The adjustments arising from differences between notionals and actuals might be expected to result in significant fluctuations in dividend payments from year to year, all else being the same. I understand there to have been substantial fluctuations in the milk and dividend payments over the last ten years (i.e., dating back to well before the present system was introduced).

An important question is what scope the administrative nature of the price-setting might provide for the relative levels of dividend and milk payments to be manipulated. Fonterra's approach to share valuation is based on expected future earnings. Robb contended that estimates of future earnings are inherently uncertain, and by implication lead to dubious share valuations. He advocated the use of net asset backing instead.<sup>31</sup> The change in Fonterra's share valuation methodology from "fair value" to "restricted value" also suggests that a significant degree of flexibility exists. The change was based on a change in the assumption about the trading status of Fonterra's shares, from one where they were assumed to be freely traded, to one where they are assumed to be traded only amongst farmers (neither actually applies). This had the effect of reducing the administratively-set share price from \$4.52 to \$3.80, compared to an increase to about \$5.10 had the methodology stayed unchanged, effectively a discount of \$1.30 (i.e., \$5.10 - \$3.80 = \$1.30). In the event, Fonterra cushioned the impact on the share price by setting a price floor of \$4.52. The share price will remain at \$4.52 until the price estimated under the "restricted value" methodology rises above \$4.52. At this point, the corresponding former "fair value" valuation would likely be \$1.30 higher at around \$5.82.

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<sup>31</sup> Alan J. Robb, "Fonterra fair value share change needed", *NZ Farmers Weekly*, August 25, 2004, p. 15. Robb at the time was a senior lecturer in accountancy at the University of Canterbury.

Having a floor price of \$4.52 per share when the 'true' value ranges between \$4.52 and \$3.80 (and potentially even lower) seems to illustrate the flexibility in the link between earnings and share value. For example, a future predicted dividend stream that would justify a share price of only \$3.80 did not prevent a share price of \$4.52 being set. It seems to be possible to, in effect, lower the dividend stream without lowering the share value. This mismatch between dividend stream and share price runs counter to CL's argument based on the two being closely linked. Recall that CL argued that a reduced dividend payment would reduce Fonterra's share price, and hence that the combination of a 'high' raw milk price and 'low' share price would not be sustainable because additional milk would not be accompanied with sufficient extra capital to process it. But if the dividend can be reduced (and the raw milk price correspondingly increased) without the share price being affected, then the constraint suggested by CL would fail completely.<sup>32</sup>

I conclude that the evidence suggests that it would be possible for relative changes in the farm-gate milk price and dividend payment to be made, such that Fonterra could practically raise the former and lower the latter, so as to disadvantage the independent processors, without giving rise to a flow of milk that it would find uneconomic to process, and without causing protests from farmer-shareholders.

CL argues that this approach to pricing by Fonterra would be an example of "predatory overbidding", where a dominant firm tries to drive out rivals, or to discourage rivals from entering, by raising the component (raw milk) price above the efficient or profit-maximising level. It argues that this strategy would be unprofitable, because it could not hope to recoup lost profits during the initial period of predation by earning higher profits later after the entrants have exited (either by raising the final product price or by reducing costs). However, the argument CL gives against Fonterra behaving in this manner is not so much

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<sup>32</sup> Even if the link between dividend and share price were closer, there still might be scope to manipulate the dividend/milk price split. Over time the growth of Fonterra would be expected to increase the dividend stream and hence the share price. Yet under the administrative price setting processes used, it is conceivable that the share price growth could be held back by not increasing the dividends, thereby allowing the increase in the residual to be concentrated on the milk price. This would be a way of eroding the relative share price over time, without causing it to fall absolutely.

about profits; rather, the constraints it relies on are the ones just discussed, relating to the ineffectual nature of raising the raw milk component and reducing the dividend component of the payout. Hence, it seems that the notion of predatory overbidding does not introduce any new insights on Fonterra's likely pricing behaviour. Moreover, Professor Rey provides theoretical arguments that to why Fonterra might benefit from an increase in the raw milk price.<sup>33</sup>

The extent of entry and competition from independent processors would likely be harmed if the price of raw milk were distorted upwards in the manner discussed. CL argues in mitigation that the major independent processors now have little reliance on regulated milk because they have recruited their own farmer suppliers. However, in order to retain these suppliers, the independent processors must offer a price for raw milk that is comparable with Fonterra's benchmark farm-gate milk price, or else risk losing them to Fonterra. In fact, it appears that the independent processors have to do more than this – they have to pay a premium over Fonterra's farm-gate milk price to induce farmers to supply them. This premium is presumably a risk premium. Farmers require to be compensated for the risk they perceive to be associated with supplying an untried entrant that inevitably lacks a track record and established credibility, relative to the long-established incumbent, with whom the entrant has to compete. For example, as milk is a perishable product, it is imperative that collections are made every day without fail.<sup>34</sup>

I understand that this risk premium could be of the order of 20 cents/kgMS, and that it may diminish gradually over time. As a regulated milk supply under the DIRA of 50 million litres per year falls well short of what is needed to feed a modern dairy processing plant, entrants must recruit their own farmer suppliers. The fact that they must pay a premium on the farm-gate milk price to do so appears to amount to a cost disadvantage, or entry barrier, that they suffer compared to Fonterra. If this were accepted, it would mean that entrants

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<sup>33</sup> Patrick Rey, "Review of the Milk Pricing Methodology of Fonterra", February 2012.

<sup>34</sup> An alternative explanation may be that Fonterra has an advantage that a new processor generally cannot match, in that milk can be diverted to another plant in the case of a plant break-down. However, I understand that the independents are able to switch milk from one to another when plant breakdowns occur. Another factor may be that entrants target nearby farmers, or farmers with large herds, to save on collection costs, and share the savings with the suppliers.

face an extra cost that the incumbent did not, and does not, face. It would mean that an equally efficient entrant could not compete, even if the farm-gate milk price were set at an efficient level, because it would have to pay the premium for the milk from its own suppliers. This disadvantage could be especially significant given that the farm-gate milk price has been set so as to reflect efficient production costs in the long-run (i.e., using largish plants that embody recent technology). The likely presence of this entry barrier also undermines CL's view that Fonterra's farm-gate milk price-setting has little impact on the ability of the independent processors to compete.<sup>35</sup>

### 6.3 The HEC and Management Efficiency

In its report, Castalia characterised the raw milk price that emerges from the application of the *Milk Price Manual* and the notionally efficient Fonterra concept as a "transfer price", or an internal "tolling price", the primary purpose of which is to enforce internal efficiency.<sup>36</sup> This pricing approach is designed "to impose internal discipline within Fonterra on its collection and processing costs . . . In other words, the raw milk price derived from the *Milk Price Manual* is best seen as a transfer price that regulates the returns to Fonterra's manufacturing and processing business (like a tolling charge) to a level that would be consistent with" reasonably efficient revenues and hypothetically efficient costs (p. ii). Presumably, this is the mechanism through which it is thought that productive efficiency would be promoted.

I have a number of doubts over the effectiveness of this pricing approach in encouraging managerial effort, and through that of promoting Fonterra's productive efficiency. Firstly, the hypothetical Fonterra is assumed to make only the Reference Commodity Products. Products outside of this group, such as cheese and casein, which make up about 30% of Fonterra's actual production, are not part of the HEC. Hence, their revenues and costs

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<sup>35</sup> CL argues that even without extensive entry, Fonterra would be constrained by the threat of entry. Given the risk premium, and the "chicken and egg" problem that regulated milk is designed to resolve, it is difficult to accept CL's contention that the raw milk market is contestable absent the intervention of the DIRA. CL points to the evidence of actual entry and expansion, but many of the measures it uses are backward-looking and largely pre-date the MPM. Also, the presence of the premium is another reason why pricing based on long-run considerations is arguably inappropriate. In the long-run the premium will disappear, but we live in a "short-run" world where the premium does exist and is paid.

<sup>36</sup> Castalia, "The 'Hypothetical Efficient Competitor' and Fonterra's Farm-gate Milk Price", Report to the Ministry and Agriculture and Forestry, July 2011, especially pages ii, 22 and 26.

presumably have not been modelled, and so the managers of the plants producing these products will not be subject to the same oversight as the managers of the plants producing the Reference Commodity Products.

Secondly, even for the Reference Commodity Products, it is not clear how the plants in the hypothetical Fonterra could easily be used to benchmark the performance of the company's actual plants. For example, some of the actual plants produce more than one product, whereas it seems likely that the hypothetical "standard" plants produce only one. In addition, Fonterra's dairy processing sites typically include more than one processing plant, each often producing different products, and all sharing common facilities like raw milk reception and storage, warehousing and utilities. The cost of a plant will then reflect its allocation of the costs of the shared facilities. These may not match closely those assumed for the hypothetical Fonterra.

Thirdly, a feature of dairy processing industry technology is that it is subject to significant economies of scale. I understand that the size of the standard plant used to model powder production by the HEC is 15 tonnes/hour.<sup>37</sup> I also understand that this size is larger than most of Fonterra's actual powder plants. Further, many of Fonterra's actual plants embody older, and therefore less efficient and higher cost, technology than the HEC's plants, which are assumed to be of May 2008 vintage. For example, older plants tend to be less energy-efficient. It follows that many production managers will have a ready and reasonable explanation as to why their plants' unit costs are higher than those of the HEC's hypothetical plants: they are smaller, older, and embody less efficient technology.

Fourthly, for the reasons discussed above, it seems unlikely that, in aggregate terms, the actual Fonterra can match the efficiency of the hypothetical one. The residual of revenues over costs available to pay for the raw milk is likely to be smaller in the actual Fonterra than in the hypothetical. In this case, the implication is that Fonterra's management is 'set up to fail'. In order for the actual Fonterra to be able to make the milk price payments determined by the ability of the hypothetical Fonterra to pay, it must draw on other funds,

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<sup>37</sup> Castalia (p. 21) refers to the standard plant using 1.9million litres of milk/day, which I understand equates with the requirements of a plant producing 15 tonnes/hour.

presumably those that would normally go to dividends. Dividend payments are said by the company to reflect the shareholders' investment in developing value-added products and branded goods. Dividends are based on the price premiums that these products attract. These premiums accrue to the actual Fonterra, but not to the hypothetical one, because it produces only commodity products. Moreover, dividends are the return on the capital invested by shareholders, and such investments would include those made in all parts of the business, not just those relating to one relatively small product group. Using this narrow view of dividends must release funds that can be used to sustain the milk price. An imputed, WACC-based, return on investment is built into the costs of the standard plants, and is therefore not part of the milk payment residual. The actual Fonterra must expect to earn such a return, this providing funding to sustain milk payments.

This analysis suggests that, in the end, management are effectively 'bailed out' by the company. This would seem likely to undermine the incentive on management to perform, as they would know that this bailing out mechanism exists.

Finally, Castalia (p. 26) suggests that the DIRA requirement for raw milk to be provided by Fonterra to third parties could lead to a dual milk pricing system, in which the 'high' price is used for internal management purposes, and a 'low' price is set for default milk. I cannot see that dual pricing would be consistent with workable competition, as the quantity of DIRA milk by itself would not be sufficient to meet the needs of a modern powder plant, and rivals would be forced to pay the 'high' price to acquire their own milk direct from farmers in competition with Fonterra, which they could not afford to do.

## 7. The Determination of Fonterra's Hypothetical Revenues<sup>38</sup>

The second major concern raised by the methodology in the MPM is the choice of the mix of final products that are used to determine Fonterra's notional revenues. CL (pp. 19, 28-29) asserts that Fonterra's approach is consistent with the competitive market equilibrium. It

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<sup>38</sup> I assume here that Fonterra no longer has the discretion to allocate windfall gains and losses to the residual available for the farm-gate milk payment. For example, when Fonterra sold National Foods several years ago, I understand that this caused the raw milk price to increase by 16 cents in the year of the sale.

argues that as most of the investment by Fonterra and entrants since DIRA's enactment has been in milk powder production for overseas sale, export milk powder is the relevant marginal product. Also, CL suggests that if Fonterra were to supply more regulated milk, this would be done at the expense of its milk powder production.

The difficulty with using the notional product-mix is that it may artificially inflate revenues, and hence the price of farm-gate and regulated milk. The prices used to value the hypothetical output are intended to reflect the actual prices realised by Fonterra in selling the relevant products. But the actual prices are based on actual output, when only 70% of Fonterra's raw milk is converted into milk powder and their by-products, not on the hypothetical situation where 100% of its raw milk is converted into these products. Even in an international context, this notional expansion of powder products might be expected to cause some fall in prices. CL (pp. 52-53) found that although Fonterra had a very small share of world dairy production in 2010, it was responsible for 52% of the international trade in whole-milk powder, 28% of skim-milk powder, and 56% of butter. I understand that if Fonterra were to devote another 30% of its raw milk to powder production, on top of its already substantial shares, international prices would be likely to fall. The MPM should acknowledge this reality and adjust its revenue and regulated milk price calculations accordingly.

Critics have argued that rather than using the narrow range of milk powder products and their by-products, the MPM should be based on Fonterra's actual product-mix. I understand that the former products are not particularly high-margin products. Also included in Fonterra's actual product-mix are both "value-added products" (e.g., speciality milk powders) that have higher margins, and cheese and casein that have lower margins.

CL claims that using a representative basket of Fonterra's products could result in revenue and margins (and hence the farm-gate milk price) actually being higher. The relevant passage states (p. 27):

Moreover, if one determines an ECPR price based on the processing costs of Fonterra's overall production of dairy products, rather than the volumes of raw milk required by DIRA, it would be appropriate to also base the ECPR calculation on Fonterra's entire product mix.

Because Fonterra manufactures value-added products and commodity products that yield higher returns than the commodity dairy products used in the Milk Price Model, the DIRA milk price based on Fonterra as a whole may be higher, not lower. It would be inconsistent and incorrect to calculate an ECPR price based on Fonterra's operating costs averaged across their entire operation, but not on the products supplied by Fonterra.

I agree that an alternative approach of setting the raw milk price based on the revenues and costs of Fonterra's entire operation would obviously involve Fonterra's full product-mix. However, the claim that this approach could lead to a higher raw milk price is questionable. The basis for the claim lies in the inclusion of the higher prices/margins on value-added products. But CL appears not to acknowledge the impact of including cheese and casein, which I understand have lower prices/margins, and so would serve to lower the raw milk price. Furthermore, Fonterra's position is that the higher prices/margins for the value-added products reflect the company's investment in developing these products, and that their higher returns should be treated as premium on the dividend, not on the milk price. The MPM (p. 6) states:

The Farmgate Milk Price Methodology excludes Fonterra's returns from value-add products (such as infant formula and specialised protein products) and branded products. These products yield premiums that are attributable to significant investment by Fonterra shareholders. It is therefore appropriate that these premiums are reflected in Fonterra's earnings rather than in a higher Farmgate Milk Price.

Hence, basing the raw milk price on the full product range other than the value-added products would be more likely to lower the raw milk price than to raise it.<sup>39</sup>

## 8. Concluding Comments

My analysis to this point suggests that Fonterra's HEC-based milk pricing methodology is likely to overstate revenues, and understate the costs, compared to the actual Fonterra.

The Castalia report (p. ii) seems to share this view:

The problem with this approach is that when the internal transfer price designed for management purposes is used as an access price for third parties, it sets an artificially high benchmark: the internal transfer price is designed to be high to drive the actual costs of the business to the hypothetically efficient costs. But it also means that only super-efficient new entrants—processors that are more efficient than the optimised HEC model, rather than actually more efficient than Fonterra—can enter the market.

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<sup>39</sup> The MPM seems to support this view when it states (p. 9) that "the Farmgate Milk Price should not be artificially (and unsustainably) inflated by returns from specialised value-add business activities."



I have not attempted to quantify the difference in the milk price that the hypothetical Fonterra could pay compared to the actual Fonterra. However, I note that the study by Deloitte puts the figure (subject to certain qualifications) in the range of 33 cents to 50 cents per kgMS.<sup>40</sup> I understand that a price elevation of this magnitude would be likely to seriously impair the ability of independent processors to compete for raw milk. This suggests that Fonterra's current approach to pricing raw milk is incompatible with what one would expect to see in a workably competitive market.

According to conventional economic theory, an economically rational, profit-maximising firm would be expected to allocate additional milk to its highest-value use, and to withdraw milk from its lowest value use. It is not clear how successfully Fonterra does this, and whether it is constrained to some extent by various rigidities in its operations. CL mentions long-term supply contracts for products like cheese; Fonterra itself seems to admit that some of its plants are small, old and relatively inefficient; and I understand that cheese and casein have always generated low margins, but that Fonterra has to offer these products to its customers as part of its product range.<sup>41</sup>

If, for whatever reason, Fonterra's operations were to include a range of plants with a range of operating efficiencies and margins, as seems likely, one could argue that the lowest margin plants ought to be used as the basis for the setting of the farm-gate milk price, on the basis that any loss of milk to Fonterra should be deemed to be taken from them. This would be consistent with profit-maximising behaviour. I also understand that this is what Fonterra may actually tend to do. As a broad generalisation, because of the large seasonal variation in the supply of raw milk, priority is given to using the milk to keep the large powder plants working at full capacity. Surplus milk at the 'peak' is typically used to produce lower margin products like cheese and casein. If this were a fair characterisation, regulated milk could be diverted by Fonterra from various products – from cheese and

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<sup>40</sup> Deloitte, "Review of Fonterra's Milk Price Calculation", draft, 21 February 2012, p. 7.

<sup>41</sup> Having capacity to make cheese and casein may also make sense in two other ways: firstly, as a way of managing the seasonal peak flow across the network; and secondly, having the benefit of the low cost option value of idle plant available should casein prices suddenly increase.

casein at the peak season, and from milk powder at the ‘shoulders’ part of the season on either side of the peak. It would indicate that ‘marginal milk’ – the regulated milk – would displace a range of products, and not just milk powders as Fonterra and CL assert. This in turn would suggest that the price of farm-gate milk should be based on a broader product-mix than just milk powders and their by-products.<sup>42</sup>

A broad-based regulated milk price would reflect Fonterra’s actual pricing practice. The farm-gate milk price is actually an average price, not a marginal one; it is used primarily as the basis for setting the payout for Fonterra’s farmer-suppliers, and all farmers (with limited exceptions) receive the same payout per kilogram of milk solids, regardless of what products their milk is actually used to produce. Fonterra is also obligated by its constitution to generate the largest possible price of raw milk for its suppliers, and as a co-operative it uses the surpluses generated by all its plants, rather than scaling the surplus generated by its least efficient marginal plant across all output, to achieve this.

The independent processors have to compete with Fonterra for the same farmer suppliers, and to do so must offer a price for their raw milk that is competitive with Fonterra’s farm-gate milk price. Moreover, the independent processors will also have to compete for a share of the expected large additions to the total milk supply over the next ten years. It may be that the international demand for powder products might not increase fast enough to match the potential for milk powder growth over this period, so that powder prices might fall, making the product less attractive to produce.

In all these circumstances, a reasonable and pro-competitive approach would be to base the calculation of the farm-gate milk price on Fonterra’s full product-mix other than value-added products, even though the independent processors tend to specialise in milk powders. There are two ‘business models’ competing here – Fonterra’s broad-based

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<sup>42</sup> One indication of how Fonterra might respond is provided by how it is dealing with the large raw milk volumes this spring: “The wave of milk around the country is the result of some of the best weather and growing conditions Fonterra had seen in years . . . Fonterra has said some of the increased volumes will have to go into less profitable products in order for the cooperative to cope with the processing load.” Andrea Fox, “Fonterra gets help to deal with milk wave”, *Stuff*, 13 October 2011.

product range and the more specialised independents – and competition between them should ensure that milk is allocated to its most valued use (allocative efficiency), and encourage producers to be productively and dynamically efficient.