

CONFIDENTIAL

REPORT TO THE NEW ZEALAND TREASURY

**THE ECONOMIC PERFORMANCE
OF
FIVE STATE OWNED ENTERPRISES
1989 TO 1998**

Prepared by The NZ Institute for the Study of Competition and Regulation
March 2000

Index

| | |
|--------------------------------------------------------|-----------|
| Acknowledgement..... | 3 |
| Introduction and Overview..... | 4 |
| Approach to the Analysis..... | 7 |
| Summary of Results..... | 8 |
| Individual Results..... | 13 |
| Vehicle Testing New Zealand Limited..... | 13 |
| Vehicle Testing - Market Structure..... | 14 |
| Vehicle Testing - Economic Profit..... | 14 |
| Vehicle Testing - Market Changes..... | 15 |
| Vehicle Testing - Productivity Changes..... | 16 |
| Television New Zealand Limited..... | 18 |
| Television New Zealand - Market Structure..... | 19 |
| Television New Zealand - Economic Profit..... | 20 |
| Television New Zealand - Market Changes..... | 22 |
| Television New Zealand - Productivity Changes..... | 23 |
| Airways Corporation of New Zealand Limited..... | 25 |
| Airways Corporation - Market Structure..... | 26 |
| Airways Corporation - Economic Profit..... | 26 |
| Airways Corporation - Market Changes..... | 28 |
| Airways Corporation - Productivity Changes..... | 28 |
| Landcorp Farming New Zealand Limited..... | 31 |
| Landcorp Farming - Market Structure..... | 32 |
| Landcorp Farming – Economic Profit..... | 33 |
| Landcorp Farming - Market Changes..... | 36 |
| Landcorp Farming - Productivity Changes..... | 38 |
| Comparison with NZ Farming..... | 42 |
| New Zealand Post Limited..... | 43 |
| New Zealand Post - Market Structure..... | 44 |
| New Zealand Post – Economic Profit..... | 45 |
| New Zealand Post - Market Changes..... | 46 |
| New Zealand Post - Productivity Changes..... | 47 |

Acknowledgements

We acknowledge very considerable assistance from the five State Owned Enterprises in conducting this study.

In particular we thank

Airways Corporation Limited: Craig Sinclair (Chief Executive Officer) and John Bole (Chief Financial Officer).

New Zealand Post Limited: Elmar Toime (Chief Executive Officer), Nazir Awan (Chief Financial Officer), Richard Dore and Antony Moss.

Television New Zealand Limited: Stewart McKenzie (Chief Financial Officer), Rodney Parker and Jenny Brown.

Landcorp Farming Limited: Neil Pritchard (Chief Executive Officer), Tony Johnston (Chief Accountant).

Vehicle Testing New Zealand Limited: Allan Criglington (Chief Executive Officer), David Ballantyne (Business Development Manager) and Greg O'Connor (Finance).

Introduction and Overview

This report describes the process and results of the evaluation of five State Owned Enterprises (SOEs). It incorporates a comparison of their performance with that of NZ Rail. The SOE study taken as a whole is useful in establishing the performance of NZ Rail following privatisation. It is also of significant value in its own right for the examination of the operation of the SOE model and ownership more generally.

The NZ Institute for the Study of Competition and Regulation (ISCR) has completed a detailed cost benefit analysis of the privatisation of NZ Rail on behalf of the NZ Treasury. The project measured the economic performance of NZ Rail in accordance with a methodology that takes account of financial performance, organisational and resource efficiencies as well as an assessment of dynamic changes during the 1983 to 1997 period. The results have been compared to a small set of counterfactual scenarios to estimate the welfare changes that have resulted from the privatisation. This study of the SOE's augments those counterfactuals.

These studies contribute to our understanding of privatisation and the workings of the SOE model. The SOE model places state-owned businesses in probably the best environment this century to operate efficiently. In evaluating SOE performance and privatisation individual case studies are useful, but not as valuable as collections of studies. In drawing comparisons, counterfactuals are required, and individual cases can have outturns that reflect circumstances beyond the control of the business and that affect the counterfactual relative to the business. Further, any company, private or public, may vary over time in its productivity growth as a result of internal dynamics and external shocks.

Thus, evaluating different forms of ownership requires gathering evidence from a group of studies. In addition, ownership change has often taken place at the same time as de-regulation and thus confounded the separation of the two effects on measured performance (see McFetridge, 1997, *The Economics of Privatisation*, CD Howe Institute Benefactors Lecture, Toronto.). Situations where either the regulatory environment or ownership does not change are required to attribute measured performance differences to causal factors. In railways, deregulation took place well before privatisation, and with the SOEs there have been identifiable episodes of regulatory changes. These facilitate attributing measured performance changes to de-regulation or ownership change.

Finally, the quality of the investment decisions taken is a critical component of the dynamic efficiency of firms. Dynamic efficiency is likely to be the dominant determinant of the relative social performance of different ownership and management structures. Assessing this element of performance requires a variety of case studies conducted over time, as well as other evidence.

In its period of public ownership, New Zealand railways underwent five corporate-like restructuring episodes that attempted to place business at arms-length from political control of operations, and to establish sharper business objectives: the first commencing in 1888. From historical gross revenue and operating expense data it seems that there was a financial improvement around the beginning of each of these episodes and deterioration towards the end. This suggests the hypothesis that corporate forms of governance in public ownership yield only short-lived improvements in productivity.

The State-Owned Enterprise model established under the 1986 SOE Act, arguably represents the best attempt to have efficient public businesses. The SOE model has a number of characteristics that suggest SOE business performance will not exceed that of

privately-owned firms. (For a general review of these issues see, "State-Owned Enterprise Reform in New Zealand", by Stephen Jennings and Rob Cameron, ch.7 of *Economic Liberalisation in New Zealand*, Alan Bollard and Robert Buckle, eds. 1987, and Evans 1998, *The Theory and Practice of Privatisation*, NZ Institute for the Study of Competition and Regulation). It is of interest to examine whether the performance of these firms exhibited gains in productivity and, if so, whether the gains have been maintained. At the time the SOE's were formed other substantial restructuring took place. For a review of these changes and indicators of changes of performance see: Ian Duncan, 1996, "Public Enterprises", ch 12 of *A Study of Economic Reform: The Case of New Zealand*, contributions to economic analysis series 236, North Holland, and the references cited therein. The establishment of the SOEs is analysed by Stephen, Jennings and Rob Cameron *op cit.*.

Our study of five SOE's suggests that as a group their productivity has shown the same improvement and subsequent decline that we observed with NZ Rail as a government owned entity. However, this pattern masks considerable variation: One SOE has shown steady productive gains that are very good by any standard, and it is closely followed by a second SOE that performed very well until 1996 when productivity dropped. The other three SOEs have not produced good productivity growth. If we construct an average by weighting their performances together according to their share of value added, we find that the average productivity exhibits a pattern of productivity growth that is increasing to 1996 and then decreasing, in the following two years. It is noteworthy that the productivity of Tranz Rail also slowed for 1996, but it experienced considerably higher productivity growth over the period. The SOEs, and Tranz Rail, had lower productivity growth than did Telecom NZ (Boles de Boer and Evans 1996, "The Economic Efficiency of Telecommunications in a Deregulated Market:: The Case of New Zealand, *Economic Record* 72), between 1987 and 1994, but this may be expected given that technological change is likely to have affected telecommunications relatively more.

We consider that there is much to be gained from an examination of these firms with respect to links between performance and their organisational forms, employee policies and contracts, their market strategies and their owner-management relationships. While we have gained information about these issues, it has not been systematically evaluated. One or two points can be made, however. The best performing SOEs had pro-active personnel policies of different sorts: each seemed to have continuing staff turnover at all levels. For this sample of SOEs, it is not those that are currently in the most competitive industries that have shown the greatest gains in productivity, although both of the top two performers have faced the threat of imminent de-regulation over the period, and for one of these full competition has become a reality. But the productivity of the other three SOEs, arguably in the most competitive markets, has not been high. Note however that one of these, Landcorp Farming Limited, faces little or no domestic competition.

It was also noticeable that the introduction of competition carried with it productivity costs to the SOE. As could be expected, in anticipation of the onset of competition, certain of the SOEs focussed on engendering customer satisfaction and thereby customer loyalty. While these efforts no doubt improved the quality of the product for many customers, they were costly. And because they did not increase output in anywhere near the same proportion to costs there was a fall in measured productivity. These value added services have many elements that are not measurable and the fact that they do not appear in measured output simply reflects, to a large degree, the standard problem that intangible value added services are extremely difficult to measure. This is a central problem of performance measurement, especially where de-regulation takes place, because it is typically in value added services where competition is most vigorous. A similar situation occurred with Telecom NZ. It targeted customer satisfaction and in addition, on becoming

an SOE, it embarked upon a programme of high investment. Although some investment was to upgrade an inadequate network to a required standard, this was no doubt hastened by the anticipation of future competition. It was not until after the company had been privatised that expenditure seemed to come under sharper control. In addition, targeting customers in the telecommunications environment of competition has also entailed resource use that may not appear as contributing to measured physical outputs. Some of this investment in the customer, with the onset of competition, may represent an adjustment cost to a more competitive environment. While it will require resources on an ongoing basis, it will appear to require extra resources for any level of output at the time competition is introduced.

In this report we next review the process adopted to study productivity. We then review the performances of the SOEs as a group before describing their individual performances in more detail.

Approach to the Analysis

The ISCR approach to this analysis is similar to that undertaken for NZ Rail and Telecom NZ (Boles de Boer and Evans, 1996). A significant problem with the SOE analysis is that a number of them do not operate in contestable markets, with the result that their economic performance reflects not only their organisational performance but also their market power. The analysis therefore needs to account for changes to input and output prices as well as the impacts of macro economic changes and business cycles.

The ISCR devised an approach that takes account of these issues that it applied to this review of SOE's.¹ The methodology dis-aggregates proportional changes in economic surplus (economic profit) broadly as being explained by proportional changes in input and output prices, and market volumes and productivity growth. In general terms

$$\text{growth of profit} = \text{total factor productivity growth} + \text{growth in output prices} \\ - \text{growth in input prices}$$

and

$$\text{total factor productivity growth} = \text{growth in total output} - \text{growth in total input}$$

Total factor productivity is an estimate of the impact on costs, and hence profits, of internal organisational efficiency (productivity) and technological change. It will also reflect economies of scale where there are significant changes in output.

Economic profit was also analysed. Here it is defined as gross revenue minus all operating, labour and capital expenses. Capital expense is calculated as the replacement value of capital assets, annualised on the basis of the company's real pre-tax weighted average cost of capital (WACC). Off-balance sheet items, such as leased equipment, were converted to replacement capital and included as an item of replacement capital wherever possible. It was not possible to do this for components of long term labour contracts or TELEVISION NEW ZEALAND's programme options. Adjustment costs, such as redundancy expenditure and investment are not included as expenses, and hence economic profit in any year should be viewed as a check on whether the company in that year could maintain its assets and remain viable. Economic profit is reported in constant 1998 prices. The conversion from nominal to real profit was carried out by applying Statistics New Zealand's CPI, PPI and WRI. It should be noted that this is not quite the same as applying the CPI to the nominal economic profit of each year although we expect that the quantitative effect will be similar.

The data for this study was supplied, almost entirely, by the SOEs. The information was generally readily available and of sufficient quality to enable a useful analysis of productivity to be undertaken. It was not available in enough detail for an examination of company divisions, and hence the analysis is solely on a company-wide basis. For the productivity estimates a measure of physical output was used in all occasions. This was preferable to the estimation of real output changes from sales revenues as, in many cases, the correct price indices for revenue-item-specific deflation did not exist. Where real revenue from output was available and compared to physical output, the measures were close.

¹ It subsequently learned of a similar approach espoused in Waters II, W.G. and John Street, 1998, "Monitoring the Performance of Government Trading Enterprises", [The Australian Economic Review](#), 31(4), 357-71.

As is apparent from the formulae above, market structure is critically important in the determination of firm performance. Although the degree of competition exerts subtle effects on the incentives and behaviour of the SOEs, their ability to raise prices unchallenged has a more direct effect on the firms ability to generate profits. In this respect the SOEs varied widely. Airways Corporation and New Zealand Post (until 1998) were, because of statutory restrictions, unchallenged in the bulk of their core markets. This was dealt with by committing to fixed prices or even lowering prices, over long periods of time. The price series show that real output prices declined for these SOEs. Television New Zealand and Landcorp Farming find themselves in competitive markets, albeit with quite different characteristics, and their real output prices have not increased. Finally, Vehicle Testing average price performance also showed a decline in real terms, capturing the impact of a larger volume of low value WoF transactions, but disguising price increases for other services.

Summary of Results

The SOEs have each performed differently, they operate in different markets and are subject to a wide range of different environment and competitive forces. For example

- Airways Corporation is almost the sole provider of a safety related service. It is regulated but negotiates solutions with its customers against commitments to fixed prices.
- Vehicle Testing activities are also affected by safety regulation. It was a sole provider of traditional services that are now competitive. It has entered a very competitive WoF market in an attempt to exploit what it perceives to be economies of scale and scope.
- Television New Zealand is competitive in all its business areas, although it is heavily dependent on supplier relationships, including long term programming contracts and has successfully maintained market share. It is challenged by new technology with its concomitant opportunities and risks.
 - New Zealand Post was a sole provider of an essential service to 1998. It has performed against commitments to output prices that are fixed over periods of time. It is also challenged by new technology and the concomitant opportunities and risks.
- Landcorp Farming is a corporate farmer that competes in the same markets as other New Zealand farmers (NZ Farming Inc) but, while subject to commodity markets, it has no domestic competition.

The figure below depicts the average total factor productivity of the five SOEs. The average is calculated by weighting each of the individual SOEs' productivity together, where the weights reflect the SOE share in real total value added:

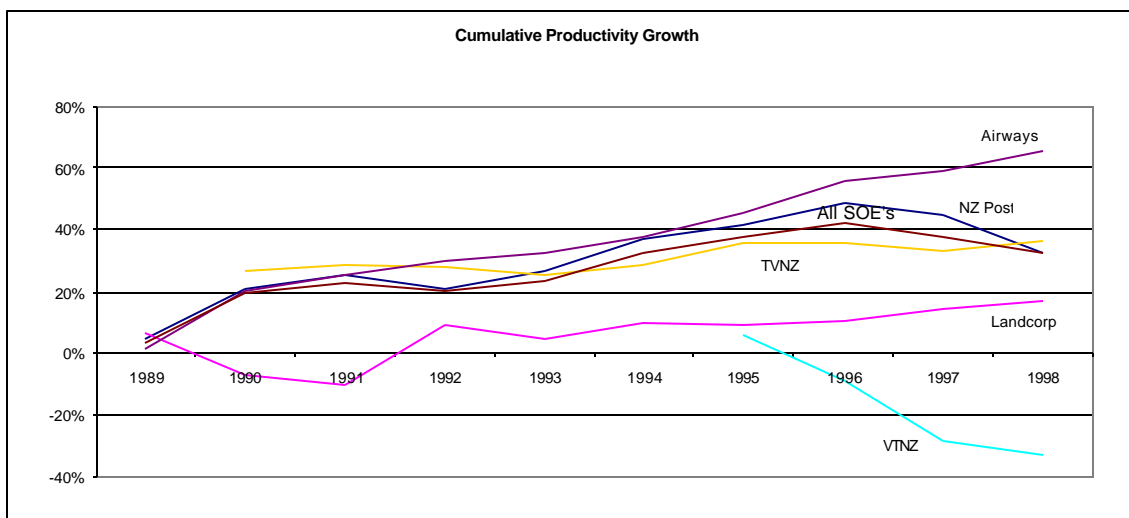
$$\text{Value Added} = \text{Gross Revenue} - \text{Materials Costs}$$

Value added is the amount generated by the firm that can be allocated to its in-house capital and labour (including payments to contracted labour). Value added is not directly comparable across industries, but it is useful for making comparisons within an industry. In our sample it is only possible to do this in farming. Note that value added must, by

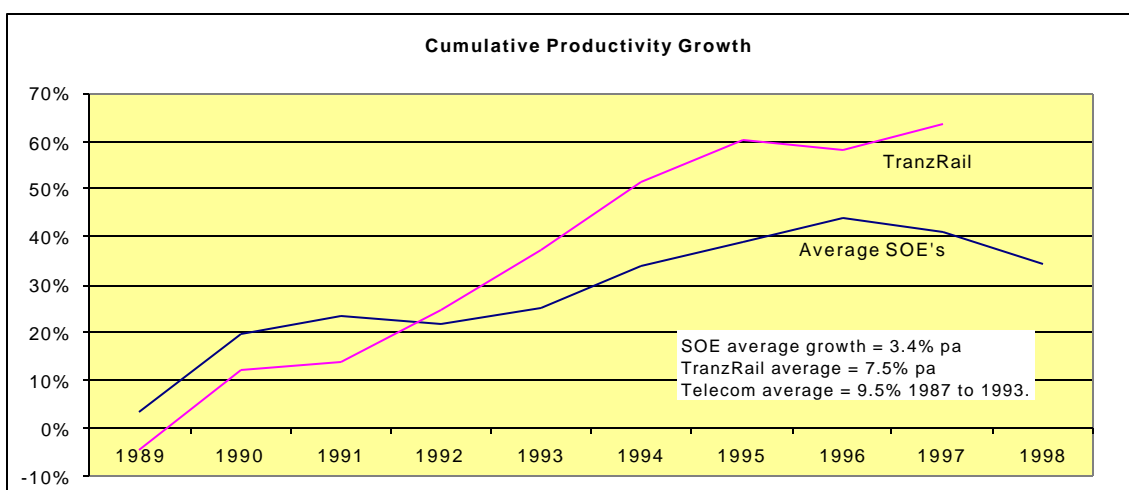
definition, be positive. In determining the aggregate productivity generated by this group of SOEs, the share of each SOE in total real value added generated by this group of SOEs was used to weight each SOE's contribution. Thus the figures are dominated by New Zealand Post because of that company's large relative contribution to value added.

SOE Productivity

| | Share of Value Add in 1995 | Cumulative Productivity | Average Productivity | Period of Analysis |
|---------------------|----------------------------|-------------------------|----------------------|--------------------|
| Airways Corporation | 10% | +65.7% | +6.6% | 1988 – 1998 |
| Landcorp Farming | 3% | +16.0% | +1.4% | 1988 – 1998 |
| TVNZ | 20% | +36.3% | +3.5% | 1989 – 1998 |
| Vehicle Testing | 1% | -33.1% | -6.6% | 1994 – 1998 |
| New Zealand Post | 66% | +32.3% | +3.23% | 1988 – 1998 |
| TranzRail | | +68.0% | +7.0% | 1989 – 1998 |
| Telecom NZ | | +63.0% | +9.0% | 1987 – 1993 |



The data reveals considerable variation in SOE productivity performance. It tends to support the proposition that total factor productivity did improve and then decline. It should be noted that the "average SOE" pattern will reflect to some degree the high weighting of New Zealand Post in the value-added shares.



This chart illustrates the performance of Telecom (SOE until 1990) and NZ Rail against the weighted average SOEs. Telecom's performance is likely to be influenced by productivity gains from that industry's rate of technological advance.

Although we have calculated the economic profit of each SOE, we do not compare them directly. This is because of the different markets in which they operate, their different approaches to pricing and because of legitimate debates about their WACCs.

Vehicle Testing New Zealand

The productivity estimates for Vehicle Testing suggest an average total factor productivity (tfp) growth rate of -6.6% pa over the period 1994-1998. This decline has been caused in part by pressure from the Land Transport Safety Authority to meet its specifications, especially the capital required to fund roller brake machines, and also by the additional expenses required to fund Vehicle Testing moves into the WoF market. These issues are captured in the 50% input growth rate versus growth of only 19% for outputs.

Its investments in land and buildings and in plant, such as roller brake machines, has encouraged Vehicle Testing to expand its business and enter the Warrant of Fitness and Driver Licence markets. The WoF market offered more transaction growth and possible economies of scope, but in a low margin product. The move to 12-month warrants changes this somewhat. Profitability may improve as a result, though this is not evident in the 1997 and 1998 years.

Organisational performance, represented by overall economic profit has been variable throughout the period, with a small improvement in the 1999 year. This year was not included in the analysis in part because of the appearance of one-off revenue items.

Television New Zealand

The productivity estimates for Television New Zealand suggest an average tfp growth rate of 3.5% pa over the period 1989-1998. This average rate of growth masks a slightly erratic productivity path over time. The overriding impact on its productivity has been the sustained increase in aggregate inputs during the 1990's which have served to limit the productivity gains from the (mostly) consistent growth in the volumes of outputs and the growth in other than core business activity. For Television New Zealand this growth was very important for its financial performance.

Our estimates of Television New Zealand economic profit show a sustained improvement in the level of profit over the period. It has moved from negative real profit in the early 1990's to show a strong positive result since 1994. The profit growth has been derived from steady growth in "other revenues", which include all sources except advertising and NZ on Air revenue. Television new Zealand has incurred expenses in driving this revenue growth but the rate of expense growth is well below that of revenues.

The physical outputs that are behind this additional revenue cannot be identified as price independent and thereby be included in the output index. They are not included in the productivity analysis, though the productivity results would not however be materially affected by their absence.

Airways Corporation

The productivity estimates for Airways Corporation suggest an average tfp growth rate of 6.6% pa over the period 1989-1998. This rate of growth is significant and compares well with other firms. The growth rate of 6.6% may be very close to that of Telecom between 1987 and 1993, given that Telecom may have had the benefit of more widespread technological advance. Technological change is important in Airway's core business as well. Productivity growth in NZ Rail for this period was aggregate of 68% and an average of 7% though it too experienced a slow down in 1996 and 1997.

In real terms Airways Corporation has failed to produce a positive economic profit despite its strong productivity performance. This should not be a surprise as it had a self imposed price regulation dating from 1996 and targeted at producing a near zero economic outcome using the EVA model as the measurement tool. It has however disaggregated EVA internally since it restructured the organisation into separate business units. Its management incentives have been split into specific business unit targets, mostly individual drivers of EVA, and the overall economic profit for the firm. Pricing is still regulated by the EVA model.

This analysis does not attempt to reconcile the economic profit calculations with the EVA model that is used by Airways Corporation. Although this analysis of economic performance is similar in concept to the EVA model there are fundamental differences between the objectives and the methodology of the two approaches, especially in the estimation of the value of capital employed and in the cost of capital used. We use replacement value of capital in this analysis and a real pre-tax WACC. If the range of conceptually-required adjustments are made, Airways Corporation nominal EVA and our real economic profit are comparable.

Landcorp Farming

The analysis of Landcorp Farming has been vastly complicated by its sortie into downstream processing. To 1998 this has produced measured cumulative productivity gain of 61%, but the company is not continuing with this activity. These productivity results are questionable because they reflect the effect on indices of rapid product changes.

Landcorp Farming as a farming entity showed a productivity gain of 16% over the 10 year period, or a 1.4% compound rate per year. We are not certain about the data for the later years when making this calculation and so the results should be treated most circumspectly. It is the productivity as a farming entity that we include in the average SOE productivity graph.

Our estimates of Landcorp Farming economic profit show that in real terms it was negative at the start of the period and declined steadily through the 1990's. While revenues fell as much as 30% from their 1990 levels, it is the 70% increase in shared costs, including a return on capital employed, that has driven the deterioration.

New Zealand Post

The productivity estimates suggest an average tfp growth rate of 3.2% pa over the period 1989-1998. While this rate of growth is quite respectable it masks the excellent growth

rate of 5.9% achieved between 1989 and 1995, and a reversal in the last two years when productivity fell 8.0% per year. This pattern is revealed in the output and input growth rates over the period. These results suggest that over the full period, aggregate productivity of New Zealand Post improved by 33%. A range of initiatives, targeted at improving the quality of service, was implemented in the period 1996-1998. While the cost of these improvements appears as increases in the level of inputs, they are value added customer services that do not necessarily affect measured output. To the extent that they produce unmeasured value added services, tfp will be under estimated.

Economic profit estimates for New Zealand Post show a very steady positive growth path from 1989 to 1993 when profit peaked. Profit drifted down a little through to 1996 and has fallen steeply since then. A strong growth in output volumes was blunted by declining real prices. A contributor to the 1993-1998 profit decline has been increasing expenses.

Individual Results
Vehicle Testing New Zealand Limited

Vehicle Testing New Zealand - Market Structure

Vehicle Testing is in the business of vehicle safety compliance and operates in a mix of recently deregulated markets and markets that have been competitive for some time. Its services include Certificates of Fitness (CoF), Warrants of Fitness (WoF) and Vehicle Identification Numbers (VIN), plus a range of other motor vehicle services. Its core revenues (85% of total revenue) come from the issuing of various compliance certificates. Its core market is regulated by the Land Transport Safety Authority (LTSA). The regulation specifies requirements and affects inputs and quality rather than price controls.

The former vehicle safety inspection organisation, the Ministry of Transport, had a statutory monopoly on the issuing of CoFs, that was removed when Vehicle Testing was established in 1994. Its market share for CoFs is now about 85%. The markets for WoFs and VIN's have been competitive for quite some time. In fact Vehicle Testing has a much smaller market share in those market areas, about 6% in WoF's and 50% in VINs.

Vehicle Testing now generates 15% of its revenues from the provision of other services that are related to vehicles or its drivers, especially registrations, re-licensing, road user charges and driver licenses.

Vehicle Testing is free of regulatory interference to set prices as it sees fit and it moved quickly away from the established regime of averaged prices in 1994. It has prices that are service and location specific, depending on whether inspection is in-house or at "out-sites". Recent reviews of the WoF and CoF markets by the LTSA, the market regulator, have led to changes to the quality and frequencies of vehicle inspections, in turn affecting costs and prices. Increases in per transaction revenue from 1997 to 1998 are visible in the financial analysis in this study.

Prior to 1994 the quality of vehicle inspections was an issue due to the absence of roller brake machines in NZ. To comply with LTSA requirements, Vehicle Testing imported 15 used machines from the UK at that time and have continually developed the quality of its services since then. In the last few years it has invested in extensive training of its people, again to meet LTSA requirements. It is certified to ISO9002 standards and has a very low claim rate on its professional indemnity insurance.

At product market level Vehicle Testing is regulated by the LTSA as to what services are offered and how it should deliver service. In effect its products only exist because of regulatory requirements and much of its cost structure is directly affected by the regulator.

Vehicle Testing New Zealand - Economic Profit

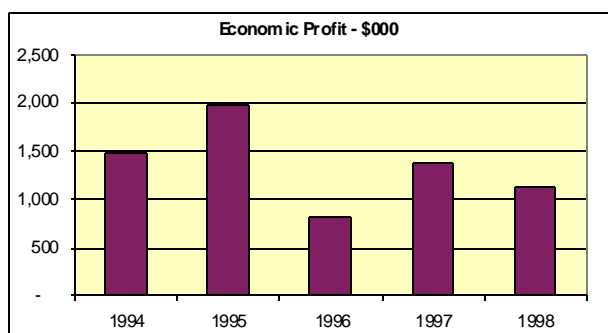
Here we estimate the economic profit or producer's surplus that Vehicle Testing has been able to generate since it was corporatised in 1994. By economic profit we mean the real economic surplus that remains after all costs (capital at its replacement cost is included on an annualised basis) are deducted from the real revenue stream. As the data from Vehicle Testing did not allow this calculation to be carried out at a business segment level, we have completed the work at the aggregate company level. Note also that results are presented in levels of contribution and as cumulative growth over the period, the latter being an easy to understand method of showing both short and long term changes. The data were provided by Vehicle Testing.

The economic surplus was calculated the following way. All revenues and costs have been converted to constant 1998\$ using the appropriate deflator (CPI, PPI and WRI). Capital cost in each year has been estimated using the book value of assets and a pre-tax WACC of 12% real. The book value has been compared with a replacement valuation and we are satisfied that any mis-estimation that results will be small. In this regard it should be noted that capital costs are only 10% of total Vehicle Testing costs in any year. Book depreciation is probably an adequate indicator of economic depreciation simply because the bulk of the assets are on average only four years old.

Table 1 – Vehicle Testing: Producer’s Surplus

(In constant 1998 \$m)

| | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------------------------------|-------|-------|-------|-------|-------|
| Revenues per Accounts | 16.39 | 16.75 | 17.95 | 21.5 | 22.14 |
| less: | | | | | |
| Variable costs | 10.30 | 10.34 | 11.72 | 13.96 | 13.55 |
| Contribution to Shared Costs | 6.08 | 6.41 | 6.23 | 7.52 | 8.60 |
| Shared Costs (Inc charge on capital employed) | 4.60 | 4.41 | 5.42 | 6.14 | 7.46 |
| Economic Profit in Constant \$ | 1.48 | 2.0 | 0.81 | 1.38 | 1.14 |



Calculated Vehicle Testing profit is small in magnitude and hence any change to revenues or direct costs may cause significant changes in growth rates. This effect shows up in figure 1, though it should be noted that despite the fluctuations overall growth has been positive over the 5 years. Aggregate economic profit is +\$6.8m.

Figure 1

Vehicle Testing New Zealand Ltd - Market Changes

Output data of compliance transactions processed is not available for the entire period. We have used actuals for 1996 to 1998 and an estimate from Vehicle Testing for 1994. Data points for 1995 were extrapolated to the actuals. We cross checked the growth rate from this data with revenue growth in constant dollar terms and the results were in agreement, given the price rises that have been implemented by Vehicle Testing throughout the period. The individual outputs are weighted by their share of revenue to give the following growth rate:

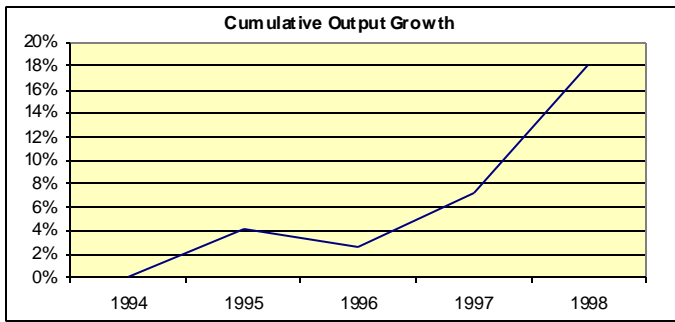


Figure 2

Figure 2 above shows that output growth averaging 4.5% per year, and an aggregate of a little more than 18% growth over the period, are a feature of Vehicle Testing's performance.

Vehicle Testing New Zealand Ltd - Productivity Changes

The total factor productivity of Vehicle Testing is described in Figure 3 below, in cumulative form.

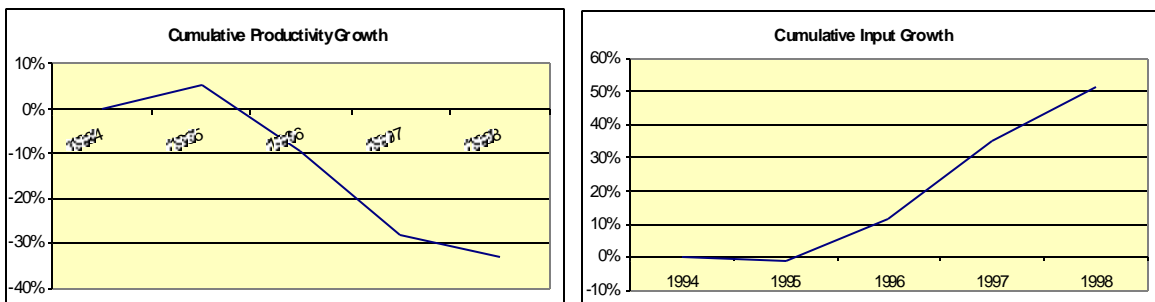


Figure 3

Figure 4

In aggregate, productivity for Vehicle Testing has declined by more than 30% over the period, at an average of -6.6% p.a. The one-off improvement in productivity in 1995 was a result of a small decline in input however since the 50% increase in aggregate input simply out-weighed the growth in output of figure 2.

The individual input changes are described below.

Labour cost accounts for about 60% of Vehicle Testing's costs and is therefore a major influence on productivity. Staff numbers have increased from 200 in 1994 to more than 350 in 1998. The employee productivity described in Figure 6 captures the impact of the increasing volume of labour inputs, especially from 1995 to 1997 when quality improvements and an expansive approach to the WoF market were implemented.

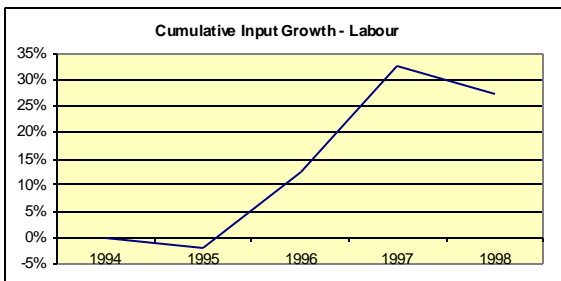


Figure 5



Figure 6

The amount spent on the combination of other material inputs, (accommodation, direct non-people costs, marketing costs, overheads etc) makes up about 34% of total costs, having risen from approximately 30% in 1994. The consumption of these inputs has grown 50% in aggregate over the period.

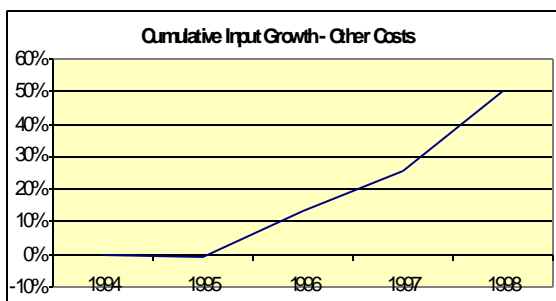


Figure 7

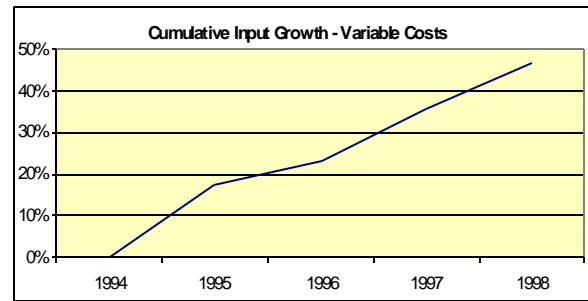


Figure 8

Figure 7 highlights the sustained increase in material inputs, while Figure 8 shows that on an aggregate cost basis, direct variable costs account for a large portion of the increase in material costs. The variable costs are direct costs of sales, and are a subset of material costs in Figure 7.

Capital costs are very small by comparison to labour and materials, typically making up less than 10% of Vehicle Testing's total costs. The overall book value of assets is as described above.

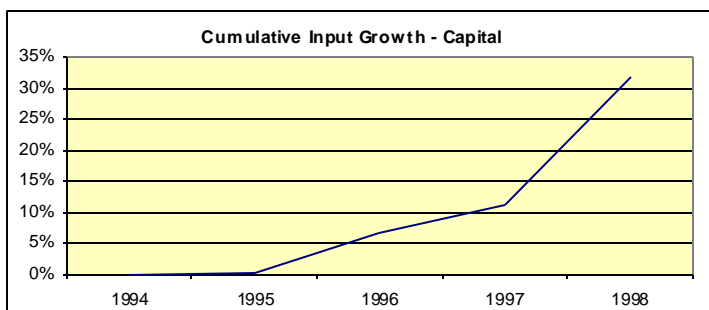


Figure 10

Figure 10 shows the growth over time using this approach. Note the sharp increase from 1997 caused by an increased capital expenditure in 1998.

Individual Results

Television New Zealand Limited

Television New Zealand - Market Structure

For a penetrating review of the progress of Television New Zealand as an SOE and of its strategies see Barry Spicer, Michael Powell and David Emanuel, *The Remaking of Television New Zealand 1982–1992*, Auckland University Press, 1996.

The core business of Television New Zealand is television production and broadcasting. It provides end to end capability, in that it has two free-to-air television channels, production facilities and a transmission network and competes in each segment. Each segment is effectively a separate business group, operating in different output markets. Television New Zealand has one major free-to-air competitor who also broadcasts 2 channels, as well as a number of smaller regional broadcast firms who hold a small market share. Television New Zealand does not offer pay television services.

Its “core” revenues (64% of total revenue) come from advertising fees and in real \$ terms this revenue stream has not grown significantly in the last 5 years. The revenue share from other market segments, especially from studio productions has grown from 20% of total in 1994 to 30% in 1998. Television New Zealand also receives a portion of the fees collected by NZ on Air to fund both production and broadcasting. Its network company generates revenue from use of its partially digital transmission facilities by external customers, for both broadcast and telecommunications services. It also markets extensive design and build expertise in electronic communications to other firms wishing to establish networks in NZ and overseas.

Television New Zealand has maintained a major market share of the broadcast television market, as described by the following prime time audience shares.

| % | | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999/1 |
|-------|--|------|------|------|------|------|------|--------|
| TV3 | | 18 | 19 | 19 | 22 | 23 | 20 | 20 |
| TV4 | | - | - | - | - | 4 | 4 | 3 |
| TV1 | | 43 | 41 | 40 | 37 | 35 | 38 | 36 |
| TV2 | | 37 | 37 | 36 | 32 | 32 | 28 | 30 |
| Other | | 1 | 1 | 6 | 9 | 9 | 10 | 12 |

(Note that these are TVNZ supplied data. 1999/1 = 1st half 1999)

Sky Television also broadcasts a number of television channels. These are all subscriber pays channels. It has recently introduced a digital wireless service via satellite. Sky Television’s market share is not recorded against the free-to-air providers.

Television New Zealand’s cost structure is dominated by “other material” costs, especially programme costs, which account for 70% of total costs, with labour at 20% and capital costs 10% of total. This is representative of broadcast television where the two significant entry requirements are access to spectrum for transmission and programming for the audience to watch.

Major studios and distributors all have contracts with established media in NZ. Television New Zealand purchases programming and “holds” them in its balance sheet as current stock, expensing it as it is put to air. It also has programme rights that do not appear on the balance sheet and are not included here. Other capital assets are physical, mainly land and buildings and transmission network assets and studio equipment.

Television New Zealand is regulated by a number of agencies, for example the broadcasting standards authority and advertising standards board, but its key market, investment and pricing decisions are all the responsibility of management and/or its board of directors. Its major revenue streams of advertising and studio production are all competitive and as such pricing is subject to market forces. Advertising competes with other media as well as with other television companies. Studio productions are also competitive.

Clearly, technology has a major influence on Television New Zealand. In the last 5 years it has spent \$150m, much of it invested in upgrading its assets, especially its transmission network which is now mostly digital, and there has also been significant investment in studio production plant. It has been appraising entry to the digital broadcast market for a time now and has been active in rationalising its involvement in non-core businesses. A number of these businesses have been sold.

Television New Zealand - Economic Profit

Here we estimate the economic profit or producer's surplus that Television New Zealand has been able to generate since it was corporatised in 1987. By economic profit we mean the real economic surplus that remains after all costs (capital valued at replacement cost is included on an annualised basis) are deducted from the real revenue stream. As the data from Television New Zealand did not allow this calculation to be carried out at a segment level, we have completed the work at the aggregate Television New Zealand level. Note also that results are presented in levels of contribution (revenues less variable costs) and as cumulative growth over the period, the latter being an easy to understand method of showing both short and long term changes. The data were provided by Television New Zealand.

The economic surplus was calculated the following way. All revenues and costs have been converted to constant 1998 \$ using the appropriate deflator (CPI, PPI and WRI). Capital cost in each year has been estimated using the book value of assets and a pre-tax WACC of 12% real.

The book value has been compared with a replacement valuation undertaken in 1998 and we are satisfied that any mis-estimation that results will be small. In this regard it should be noted that capital costs are less than 10% of total Television New Zealand costs in any year. Book depreciation is probably an adequate indicator of economic depreciation simply because the bulk of the assets are buildings that are revalued to market regularly. The plant/equipment assets (that make up the majority of remaining asset value) are on average significantly less than 10 years old.

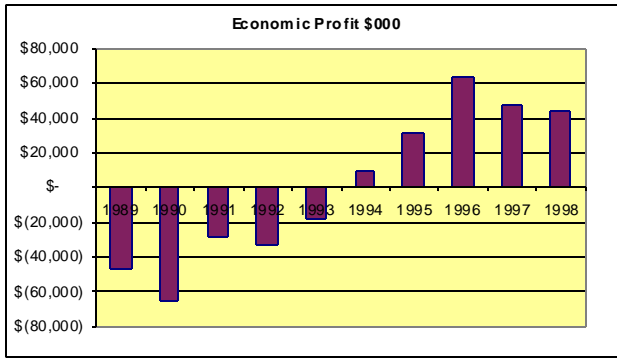
It should be noted that reducing the WACC by 2% has a negligible impact on productivity and reduces the shared cost line in table 1 by less than 5%. Again note that programme rights held by Television New Zealand are not part of measured capital.

Table 1 – Television New Zealand Producer's Surplus

(In constant 1998\$m)

| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|--------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Core advertising revenue | | 252.5 | 218.9 | 229.5 | 236.2 | 250.3 | 267.2 | 283.0 | 296.0 | 271.4 | 270.6 |
| NZ on Air | | 15.6 | 17.1 | 15.8 | 20.0 | 17.4 | 19.6 | 24.5 | 23.7 | 21.3 | 14.6 |
| Other revenues | | 29.0 | 46.6 | 56.7 | 73.7 | 87.7 | 87.9 | 110.8 | 142.2 | 160.0 | 140.5 |
| | | 297.1 | 282.6 | 302.0 | 329.9 | 355.4 | 374.7 | 418.3 | 461.9 | 452.7 | 425.7 |
| less: | | | | | | | | | | | |

| | | | | | | | | | | |
|-----------------------------------------------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|
| Variable costs | 233.4 | 239.4 | 222.4 | 233.2 | 220.9 | 229.0 | 246.2 | 240.0 | 238.9 | 230.8 |
| Contribution to Shared Costs | 63.7 | 43.2 | 79.6 | 96.7 | 134.5 | 145.7 | 172.1 | 221.8 | 213.8 | 194.8 |
| Shared Costs (Inc charge on capital employed) | 110.5 | 108.8 | 107.8 | 129.9 | 152.3 | 135.8 | 141.0 | 158.3 | 167.0 | 151.2 |
| Economic Profit in Constant \$ | (46.8) | (65.6) | (28.2) | (33.2) | (17.8) | 9.9 | 31.1 | 63.5 | 46.8 | 43.6 |



The path of Television New Zealand's improvement in economic profit is the result of it being able to limit increases to costs relative to the growth it achieved with revenues. Its non-advertising revenues grew especially strongly from 1993 (increasing by \$56m) while costs actually fell in real terms, giving rise to the big profit improvement in that year. Capital employed remained reasonably flat

through the same period.

Figure 1

Television New Zealand - Market Changes

The market share table shown earlier describes how Television New Zealand has been able to arrest the slide in its prime time audience share that had been visible throughout the 1990s. This prime time audience share, in combination with the total overall hours of programming broadcast, is our measure of the output market of the core business. This overall output market has grown at an average rate of about 8% and Television New Zealand average growth has been 4%. In total business we include 'other activities' with output measured as xxx other revenue. The other revenue and input is largely produced by contract construction by BCL. We have used the PPI for deflation. It lies between the wage rate index and the capital goods price index, elements of both being relevant to deflation of other revenue over this period.

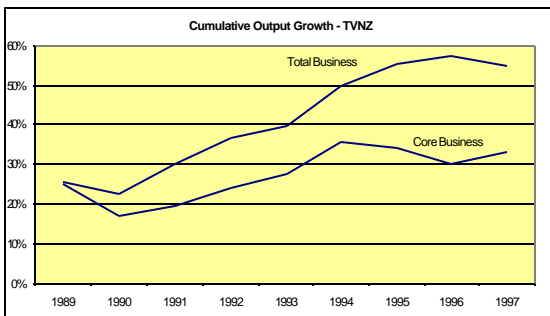


Figure 2

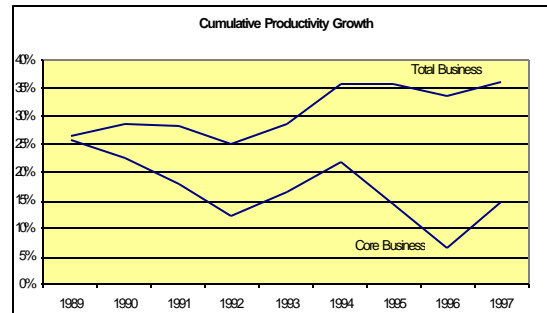


Figure 3

The core business data in figure 2 shows the impact that TV3 had when it began transmission in 1990 (plus perhaps the effects of the low economic growth of that time) as well as the strong growth through to 1995. The negative growth in 1996 and 1997 is simply the impacts of TV3 improving its market share, partly as a consequence of brand confusion between TV1 and TV2², that was reversed in 1998. It is interesting to note that while the effective market price declined in 1990, as would be expected from market entry and share loss, it continued to increase a little through to 1996 after which a small drop is visible. Growth from 1994 is likely to reflect the introduction of 24-hour programming.

² TV1 is directed towards the middle and older aged television viewer and TV2 towards younger persons. Between the two stations TVNZ seeks to span the interests of the population, and to target its audiences.

The growth in other revenues that, in 1998, made up about 30% of Television New Zealand total revenue can be factored directly into the price free analysis of outputs only approximately because we cannot identify separately the appropriate price indices and obtain a volume indicator that is independent of price. Nevertheless, because of the importance of these activities to Television New Zealand we include an estimate of output in the total business output. The bulk of other revenue is from the design and build activities of BCL which has been growing at an average 20% per year since 1990 measured in nominal \$ terms. Excluding this other revenue, real revenue grew an average 4.2% per year over the period.

Television New Zealand - Productivity Changes

The total factor productivity of Television New Zealand is described in Figure 4 below, in cumulative form.

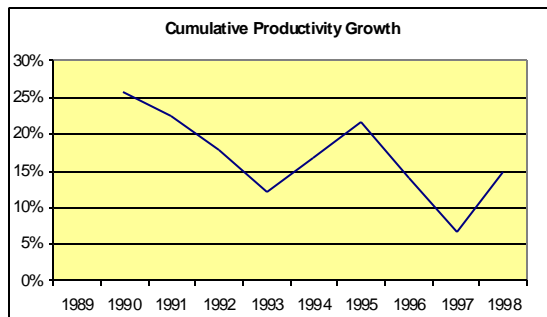


Figure 5

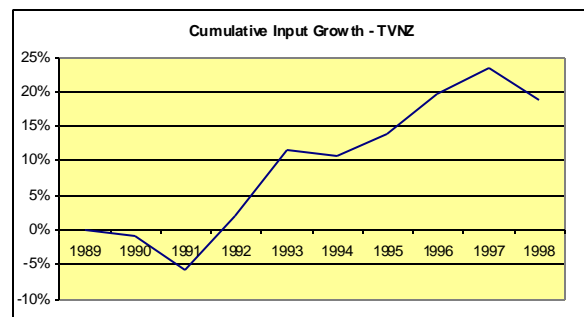


Figure 4

In aggregate Television New Zealand productivity improved by 36.3% over the period at an average of 3.5% per annum. The growth of “other revenues” is an important factor in productivity growth and is used as an indicator of BCL output growth. The productivity improvement was a result of the strong growth in output volumes, noted in figure 2, however a 19% increase in aggregate inputs blunted the gain from output growth.

This productivity result includes a small data inconsistency. In 1996/7/8 labour costs include a portion of the *people* costs that should rightly be classed as overhead costs, and because of system difficulties in Television New Zealand, the data could not be allocated to its correct category. Corrections to the base labour cost data were advised by Television New Zealand, who re-allocated a small portion of labour to material/overhead expenses. (If this adjustment is not carried out aggregate productivity growth would be incorrectly stated as being higher.) The individual inputs are reviewed below.

Labour is not a large input for Television New Zealand, accounting for about 20% of its costs. It shows a decline of 33% over the period. Declining staff numbers in the early 1990’s were followed by increases from 1994, though the upward trend was reversed between 1995 and 1998. In real terms the unit cost per FTE labour unit fell during the early 1990’s but has grown from 1995.

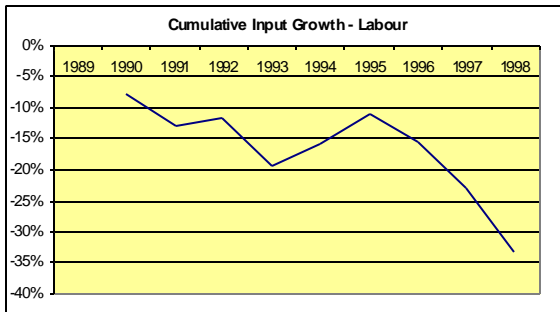


Figure 6

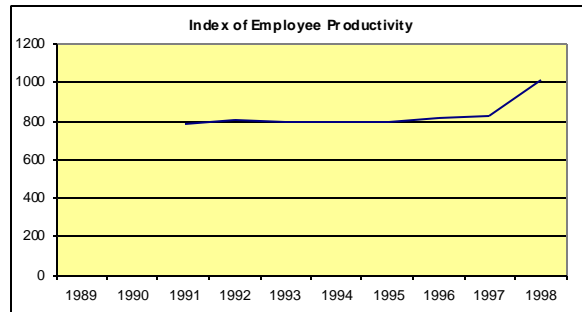


Figure 7

Labour input growth was affected by a large jump in the real cost per FTE between 1994 and 1995, as well as the additional 140 FTE's that were hired in that year. The employee productivity described in Figure 7 contains a number of compounding effects but reflects the fact that TELEVISION NEW ZEALAND's output volumes are less sensitive to labour inputs than to other costs. The amount spent on the combination of other material inputs, (accommodation, programming costs, marketing costs, overheads etc) makes up more than 70% of total costs and the single most important input here is programming costs, accounting for two thirds of the total. The consumption of these inputs has steadily grown over the period, totaling a little over 11% in aggregate.

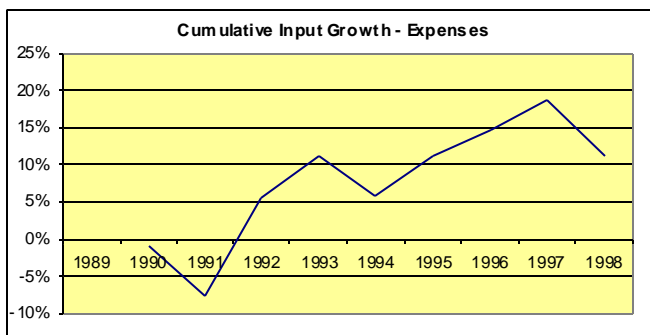


Figure 8

A price/volume analysis on aggregate material inputs revealed that while input prices increased early in the period, they were generally falling and the cumulative price effect was negative 23% over the whole period. Television New Zealand is simply using more of these inputs, especially programming.

Capital costs are very small by comparison to labour and materials, making up less than 10% of total costs in 1998. The overall book value of assets is as described before but Television New Zealand has made a determined effort to reduce its involvement in non-core business and recently disposed of two of its production facilities. This is reflected in the reductions in capital from 1996.

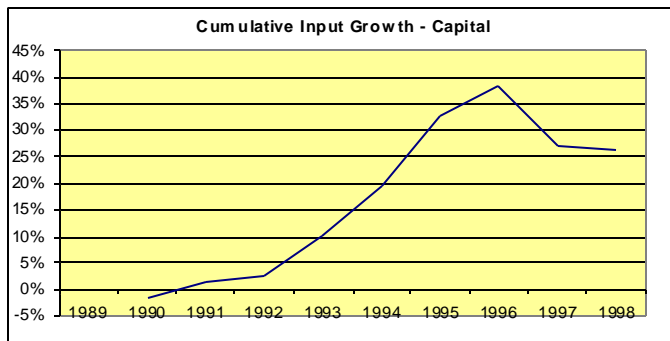


Figure 10

Figure 10 shows the growth over time using this approach but note the values here are book.

Note also that this factor of production shows the largest growth, though its small weight in the cost function means that it has a small impact on the aggregate input equation. Capital growth came from a combination of increases in investment in transmission equipment and programming stock.

Individual Results

Airways Corporation of New Zealand Limited

Airways Corporation - Market Structure

Airways Corporation is almost the sole provider of navigation services (ANS) to aircraft in or around New Zealand and operates under industry specific regulation, especially section 9(a) of the CAA regulations. It manages the movement of aircraft whilst in the air between centres in NZ and on route to international centres. It also manages aircraft when they are approaching or leaving airfields in NZ and when they are moving between terminal and runway. This latter aerodrome service has been recently deregulated, allowing others (potentially airport companies) to offer ground services.

Its core revenues (more than 90% of total revenue) come from providing navigation services and Airways Corporation has almost 100% market share in NZ. Market entry by competitors into air navigation services is dependent on that portion of its market being deregulated. Its cost structure is dominated by people costs, which account for 70% of total costs, with materials at 20% and capital costs 10% of total. Although its labour costs are sensitive to output volumes, much of its staff costs are fixed due to the nature of the industry. Employees are highly trained in specialist skills that have limited alternative uses and are thereby expensive (averaging \$78,000 per head in 1998). Its assets are also industry specific and built to standards specified in regulation.

Airways Corporation has developed a growing revenue stream from providing consulting services, especially internationally. Most of this work has been in the Asia-Pacific region though some work has recently been undertaken in Africa.

Because it is the sole provider of services that are “mission critical” to its customers, Airways Corporation is required by both customers and the regulators to carefully manage its supply chain relationships and provide customers with a very high level of service assurance. It is in a unique position to affect the efficiency of the airlines whose plane movements it manages, the airport companies whose facilities it directly and indirectly uses, as well as costs to the travelling public.

Airways Corporation is free to set prices. However the largely fixed nature of its cost structure and the price averaging policy that it has followed means that price setting has been, and continues to be, an issue with customers and the industry regulators. The increase in ANS transactions that occurred after 1992 fed directly through into increased returns for Airways Corporation, an outcome that caused customer dissatisfaction and led to its board adopting, for a while, a price cap mechanism based on nominal EVA=0 for all services. In response to the deregulation of aerodrome services, location specific pricing was introduced in 1997

Clearly, technology has a major influence on Airways Corporation. Since 1992 when its technology modernisation programme began it has invested more than \$70m (in constant 1998\$) on air traffic management and navigational technology, infrastructural support systems for airport companies and its Oceanic Control System that uses satellites to manage long haul international aircraft by gps. Much of its consulting revenues are derived from the sale of the intellectual property associated with the use of technology.

Airways Corporation - Economic Profit

Here we estimate the economic profit or producer's surplus that Airways Corporation has been able to generate since it was corporatised in 1987. By economic profit we mean the real economic surplus that remains after all costs (capital valued at replacement cost is

included on an annualised basis) are deducted from the real revenue stream. As the data from Airways Corporation did not allow this calculation to be carried out at a segment level, we have completed the work at the aggregate Airways Corporation level. Note also that results are presented in levels of contribution and as cumulative growth over the period, the latter being an easy to understand method of showing both short and long term changes. The data were provided by Airways Corporation.

The economic surplus was calculated the following way. All revenues and costs have been converted to constant 1998 \$ using the appropriate deflator (CPI, PPI and WRI). Capital cost in each year has been estimated using the book value of assets and a pre-tax WACC of 12% real. The book value has been compared with SOE's annual replacement valuation and we are satisfied that any mis-estimation that results from the use of book value will be small. In this regard it should be noted that capital costs are only 10% of total Airways Corporation cost in any year. Book depreciation is probably an adequate indicator of economic depreciation simply because Airways Corporation reassesses the economic life of each asset class in each year. Note that these results are not sensitive to changes in WACC, a 10% cost of capital improves aggregate productivity by less than 5% while economic profit remains negative throughout the period.

Table 1 – Airways Corporation Producer's Surplus

(In constant 1998\$m)

| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------------------------------|-------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| Core Revenue | 112.5 | 87.9 | 77.7 | 78.4 | 77.7 | 81.5 | 80.1 | 86.9 | 86.5 | 87.0 | 87.5 |
| Other Revenue | 1.4 | 2.8 | 5.0 | 4.0 | 4.2 | 5.3 | 5.4 | 6.7 | 6.3 | 7.8 | 6.5 |
| Total Revenue | 113.9 | 90.7 | 82.7 | 82.4 | 81.9 | 86.8 | 85.5 | 93.6 | 92.8 | 94.8 | 94.0 |
| less: | | | | | | | | | | | |
| Variable costs | 106.6 | 86.6 | 74.1 | 72.0 | 67.1 | 69.2 | 68.0 | 71.1 | 76.3 | 78.0 | 75.9 |
| Contribution to Shared Costs | 7.3 | 4.1 | 8.6 | 10.4 | 14.8 | 17.6 | 17.5 | 22.5 | 16.5 | 16.8 | 18.1 |
| Shared Costs (Inc charge on capital employed) | 16.6 | 23.1 | 28.0 | 26.9 | 29.0 | 26.1 | 25.0 | 25.7 | 25.7 | 23.4 | 21.2 |
| Economic Profit in Constant \$ | (9.3) | (19.0) | (19.4) | (16.5) | (14.2) | (8.5) | (7.5) | (3.2) | (9.2) | (6.6) | (3.1) |

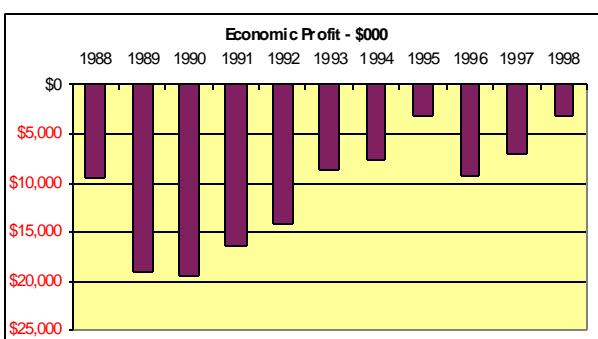


Figure 1

Although the absolute profit of Airways Corporation has been negative through the period it has had a positive growth path, except for 1996 when variable costs jumped. From the initial decline between 1988 and 1989, the period to 1995 saw a steady improvement in profit to almost breakeven in that year. The sharp decline in 1996 was caused by an increase in material costs.

The economic profit of figure 1 should not be compared directly to any nominal EVA data. A number of adjustments – including the use of a different WACC and the application of the price deflation processes – are required to make them at all comparable. Implementing these adjustments largely explains the differences.³

Airways Corporation - Market Changes

Since 1996, Airways Corporation has been carefully reducing its prices for trunk and regional services to ensure it maintains a balance between profitability and customer perceptions. As noted above it also introduced location specific pricing for regional ANS services and has been reviewing costs and services at specific aerodromes. After specific consultation with operators it has withdrawn services at one aerodrome. It has a strong focus on the success of its customers' businesses and has restructured the organisation into market focused business units that are serviced by technology and support groups.

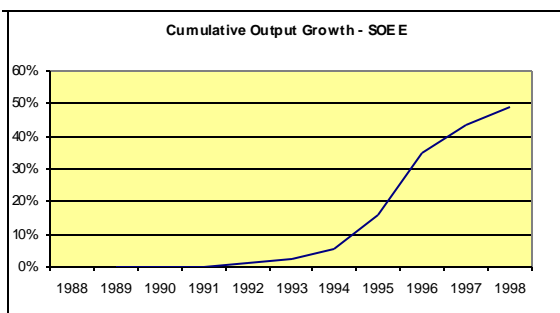


Figure 2

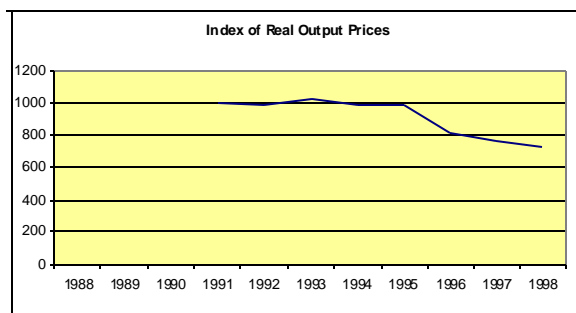


Figure 3

The aircraft movement data in figure 2 above is only available from 1991. It shows strong growth in this measure of output volumes, averaging 6% per year, and an aggregate of nearly 50% over the period. Volume growth has been particularly strong since 1995 but the positive impact on revenue has been blunted a little by the reduction in real prices that is evident in figure 3. In constant \$ terms ANS revenue grew by only 11.5% over the period.

The growth in other (consulting) revenues that make up about 7% of total revenue cannot be factored directly into the analysis of outputs because we cannot identify separately the appropriate price indices. The data suggests that even if the other outputs that yielded this revenue were included, aggregate output growth for Airways Corporation would not be materially affected.

Airways Corporation - Productivity Changes

The total factor productivity of Airways Corporation is described in Figure 4 below, in cumulative form.

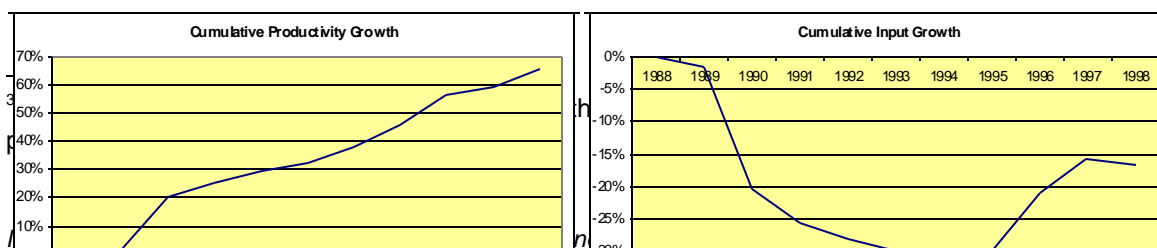


Figure 4

Figure 5

In aggregate, Airways Corporation productivity has improved by about 66% over the period at an average of 6.6% p.a and, like economic surplus, has had a strong and steady growth path. The majority of the productivity improvement was a result of the strong growth in output volumes, noted in figure 2, but a 13% decline in aggregate inputs also contributed to the improvement. In aggregate, inputs declined steeply in the period prior to 1995 but in step with the growth in ANS transactions have increased since then. The individual inputs are reviewed below.

Labour is the largest input for Airways Corporation accounting for more than 70% of its costs and it is obviously a major influence on productivity. Declining staff numbers in the early 1990's were followed by increases from 1994 in step with increasing ANS transactions. In real terms the unit cost per FTE labour unit has been stable since 1991.

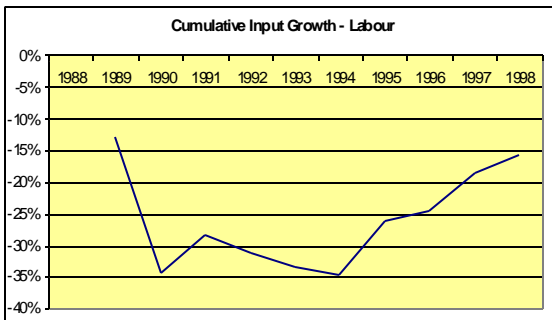


Figure 6

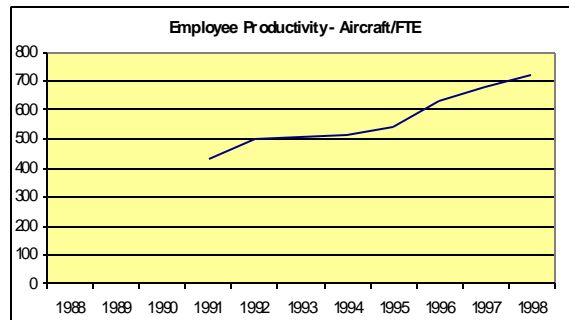


Figure 7

The employee productivity described in Figure 7 captures the combined impact of output growth growing strongly from 1995 and the small increase in FTE numbers. Employee productivity nearly doubled between 1991 and 1998.

The amount spent on the combination of other material inputs, (accommodation, direct non-people costs, marketing costs, overheads etc) makes up less than 20% of total costs, having fallen from approximately 33% in 1990. The consumption of these inputs has fallen 61% in aggregate over the period.

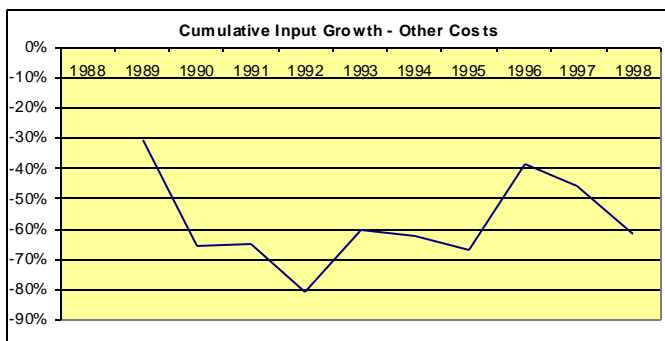


Figure 8

A price/volume analysis on aggregate material inputs revealed that while input prices moved up early in the period they were generally falling and the cumulative price effect was -43% over the period. Otherwise Airways Corporation is simply using fewer of these inputs.

Capital costs are very small by comparison to labour and materials, making up about 10% of total costs in 1998. Measurement of capital is described above. The capital stock at estimated replacement value has been declining over time despite modernisation. This is generally the case with industries whose capital includes much communications and electronic equipment.

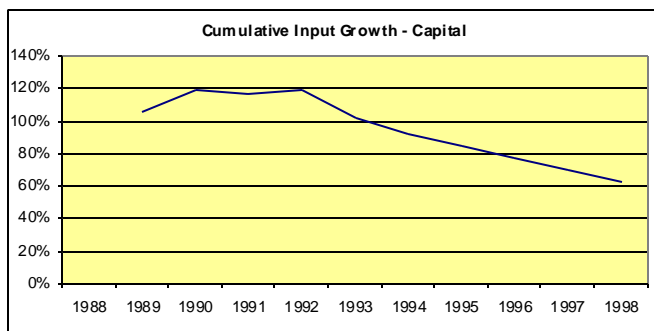


Figure 9

Figure 9 shows the growth over time using this approach with the values here at book.

Individual Results

Landcorp Farming New Zealand Limited

Landcorp Farming - Market Structure

Landcorp Farming is in the farming business and operates in a range of output markets. It is the largest farmer and one of the few corporate farmers in NZ. At 11,200 stock units per farm it operates on a per farm scale that is three times larger than the average of all other NZ sheep and beef farms (NZ Farming Inc data based on NZ Meat and Wool Board's Economic Service information). Comparisons on an average farm basis with NZ Farming Inc must therefore be interpreted carefully, but useful specific benchmark comparisons can be made. Landcorp Farming has a wide range of outputs, including sheep, cattle, dairy, wool, timber, goats, crops and, from 1995 processed meat, though it has now withdrawn from that market.

The comparisons with NZ Farming Inc are based on the NZ Meat and Wool Board's Economic Service (NZMWBES) data for sheep and beef farms. Landcorp Farming has a mix of farms, ranging from intensive flat land farms to high country runs. This broad range means that variation across farms held by Landcorp Farming will be large and it raises the issue of which NZMWBES class of farm most closely matches Landcorp Farming. Because of this wide variation in Landcorp Farming farms we have compared it to the average of all NZMWBES farm classes. At the suggestion of Landcorp Farming we have also compared it to the NZMWBES "North Island Hill Country" class. The qualitative findings were unaffected.

The presence of Molesworth skews the figures for Landcorp Farming because it has low stock numbers in relation to its vast area. Molesworth represents 46% of the land area. In 1998 Landcorp Farming carried 3.6 stock units (equivalent to 1 adult sheep) per hectare as compared to NZ Farming Inc's 6.8. If Molesworth is removed from the data set the stocking rate of Landcorp Farming rises above that of NZ Farming Inc to 7.4 su/hectare.

The farm product business is competitive at both local and international levels. The international marketing of certain farm products is centrally managed by a number of producer boards that operate under specific regulations. These are not applicable to sheep and beef exporters who generally compete individually. The domestic market is not specifically regulated though international market activities quite clearly affect the local scene.

From the perspective of market entry and exit, it is relatively easy to move from one output market to the next. Recently there have been significant conversions of sheep and cattle farms to forestry, as well as farmers changing from sheep and cattle, because of low output market prices, to dairy where output prices have been higher.

The mix of revenue generated by Landcorp Farming has changed only a little since it was corporatised in 1987. If the in-house processing of sheep and cattle into meat is set aside (its involvement in that business was only short lived) then its revenue mix in constant 1998\$ is as follows:

Landcorp Farming – Revenue Share

| | 1988 | 1991 | 1994 | 1995 | 1996 | 1997 | 1998 | 1998 \$000 |
|--------|------|------|------|------|------|------|------|---------------|
| Sheep | 21% | 25% | 28% | 24% | 23% | 20% | 11% | 10,566 |
| Cattle | 34% | 48% | 36% | 29% | 28% | 24% | 21% | 20,243 |
| Wool | 33% | 19% | 13% | 18% | 17% | 13% | 10% | 9,594 |
| Milk | 3% | 3% | 4% | 9% | 10% | 10% | 9% | 8,539 |
| Meat | | | | | 7% | 21% | 37% | 35,743 |
| Other | 9% | 6% | 20% | 20% | 15% | 12% | 12% | 11,341 |
| | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 96,026 |

Revenues from wool production have fallen due to declines in both market prices and output volumes, while dairy production has increased as farms are converted. The most noticeable area of growth has been in other revenues that cover quite a range of products as noted above. The growth of this revenue stream could provide some indication of the efforts to diversify that have taken place in the business. With its exit from meat processing, 50% of Landcorp Farming's revenue will be from the sale of sheep and cattle. Although prices have been depressed, lamb prices have returned to the levels of the early 1980's with great advances in the extent of processing in NZ and the export of chilled cuts rather than frozen carcasses. Beef prices have been very low in the late 1990's.

Landcorp Farming is a price taker in the sense that it is free of regulatory interference to set prices but the stiff competition faced in all its markets eliminates any significant market power. It is however subject to the dynamics of international trading and the impacts of the prices in agricultural commodity markets. The impact on the NZ dollar of changes in international capital markets obviously affects the NZ dollar price of its outputs.

Technology affects Landcorp Farming in a number of ways. At the operating level, it has been very active in implementing a comprehensive quality assurance programme across both the production and marketing of Landcorp Farming products. Processes and management procedures have both benefited from this initiative. Improving animal health has also been a particular focus, as has the enhancement of animal performance from Landcorp Farming's breeding schemes, especially its Inner Vision tomography (quality grading of unborn animals) programme.

As with other farmers in NZ, Landcorp Farming has been experiencing poor returns from traditional product markets and is having to find new markets and look for opportunities to enhance margins in existing ones. It has had limited success with some of its diversification efforts, notably the breeding and export of live goats as well as expansion of deer products and dairy volumes. However, it does seem that a portion of its marketing effort has been targeted at enhancing the value of existing products. The major strategic initiative in the period 1996-1998 centred around the processing and marketing of its own meat. To date none of these efforts that have been successful. The latest diversification into meat processing is being discontinued.

Landcorp Farming – Economic Profit

Here we estimate the economic profit or producer's surplus that Landcorp Farming has been able to generate since it was corporatised in 1987. By economic profit we mean the real economic surplus that remains after all costs are deducted from the real revenue stream. Capital, conceptually valued at replacement cost, is included on an annualised basis. As the data from Landcorp Farming did not allow this calculation to be carried out at a segment level, we have completed the work at the aggregate Landcorp Farming level. Note also that results are presented in levels of contribution and as cumulative growth over the period, the latter being an easy to understand method of showing both short and long term changes. Landcorp Farming provided the data.

The economic surplus was calculated the following way. All revenues and costs have been converted to constant 1998\$ using the appropriate deflator (Statistics New Zealand Consumer Price Index CPI, Producers Price Index PPI and the Wage Rate Index WRI). Capital costs in each year have been estimated using the book value of assets and a pre-tax WACC of 12% real. We use the book value of assets as representing replacement value simply because 96% of Landcorp Farming's assets are either land including improvements or livestock, both of which are on the books at their end-of-year replacement values.

In the same way, book depreciation is considered an adequate indicator of economic depreciation, though this matters less as the impact of depreciation is very small in Landcorp Farming.

Table 1 – Landcorp Farming - Producer's Surplus

(In constant 1998 \$m)

| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------------------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Core Farm revenue | 107.5 | 89.4 | 92.8 | 74.9 | 74.6 | 71.7 | 72.9 | 61.9 | 60.7 | 69.0 | 84.7 |
| Other revenue | 11.1 | 9.6 | 2.7 | 4.6 | 5.5 | 11.4 | 17.8 | 15.8 | 10.5 | 9.8 | 11.3 |
| Total Revenue | 118.6 | 99.0 | 95.5 | 79.5 | 80.1 | 83.1 | 90.7 | 77.7 | 71.2 | 78.8 | 96.0 |
| less: | | | | | | | | | | | |
| Variable costs | 49.4 | 41.2 | 40.6 | 40.6 | 44.8 | 38.9 | 34.7 | 38.7 | 38.0 | 38.6 | 42.1 |
| Contribution to Shared Costs | 69.2 | 57.7 | 53.8 | 38.9 | 35.3 | 44.2 | 55.9 | 39.0 | 33.1 | 40.2 | 53.9 |
| Shared Costs (Inc charge on capital employed) | 70.9 | 76.3 | 66.3 | 62.0 | 61.0 | 65.6 | 69.7 | 78.2 | 90.9 | 88.8 | 101.7 |
| Economic Profit in Constant \$ | (1.7) | (18.6) | (12.5) | (23.1) | (25.7) | (21.4) | (13.8) | (39.2) | (57.8) | (48.6) | (47.8) |

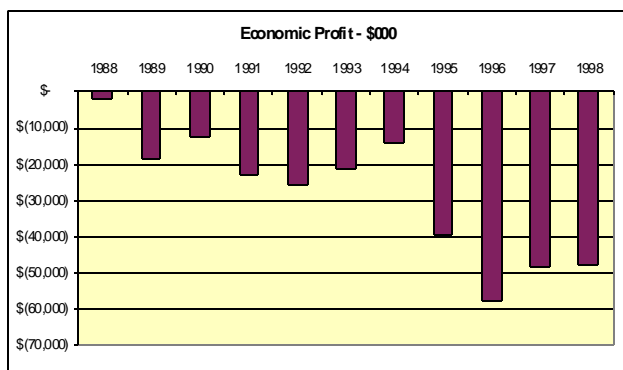


Figure 1

The economic profit of Landcorp Farming is negative for the entire period. It shows the results of a number of factors that are discussed elsewhere in this paper. The profit

decline from 1994 was due to a large growth in marketing costs (\$2m in 1995 to be \$25m in 1998), and a trebling of the replacement value of its land and livestock. Its replacement capital grew in real terms from \$239m in 1991 to be \$409m in 1998.

The real economic profit of NZ Farming Inc holding land values constant has remained fairly constant over the period. The general level is arbitrary because drawings are treated as wages of management, which may well overstate these because of the existence of off-farm work and farm income by the household, but it will indicate any trend.

The economic profit figures in figure 1 reflect increases in the relative price of land. For productivity measurement purposes, the increases in land value subtract from performance and they may not represent changes in the real quantity or quality of the land.

We tested the sensitivity of the Landcorp Farming profit results to land inflation, by removing the large increases in land values that gave rise to the deterioration in calculated profit during the later 1990's, and by setting the value of the land at 1989 levels for the full period (but in 1998 prices). This treats the value of the land as fixed. In fact the area farmed by Landcorp Farming fell by 12% but we have no way of assessing the quality changes that accompanied this reduction in area. Ideally the land value should reflect this. The profit performance improves somewhat but still remains negative in all but one year, as follows.

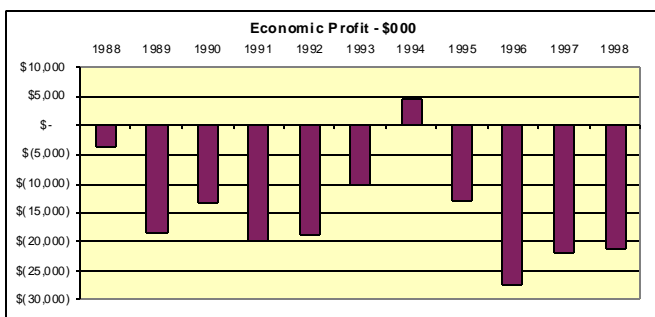


Figure 1a

Similarly we have also tested the sensitivity of the results to a lower pre tax WACC of 10% and report that shared costs from table 1 reduce by approximately 8% and obviously improve profit though the qualitative outcome is not much affected.

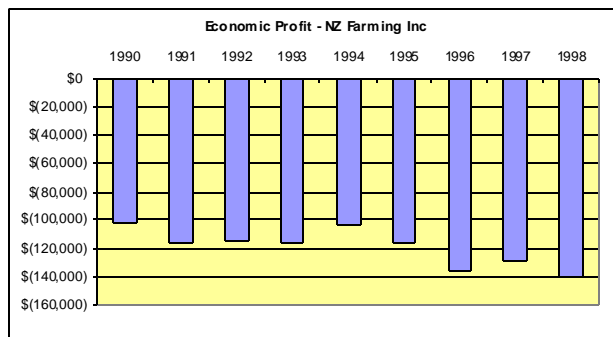


Figure 1b

Landcorp Farming - Market Changes

In figure 2 we show the price indices of Landcorp Farming and NZ Farming Inc. The divergent price series reflects the fact that NZ Farming Inc is primarily the sheep and beef component of NZ Farming and that Landcorp Farming has diversified over the period of our analysis. In figure 3a the relative prices of relevant products are shown. For Landcorp Farming the switch to meat processing and dairy (and to some extent deer) shows up as a decline on output kgs but an increase in gross revenue yielding the economic profits of figure 1.

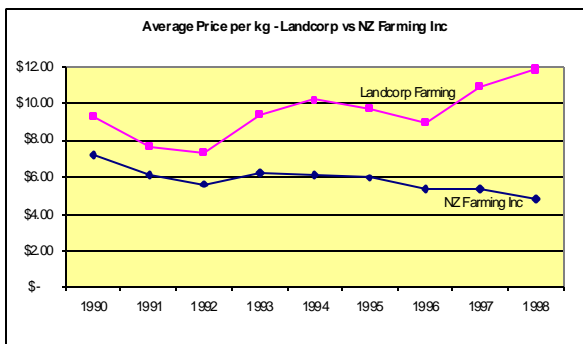


Figure 2

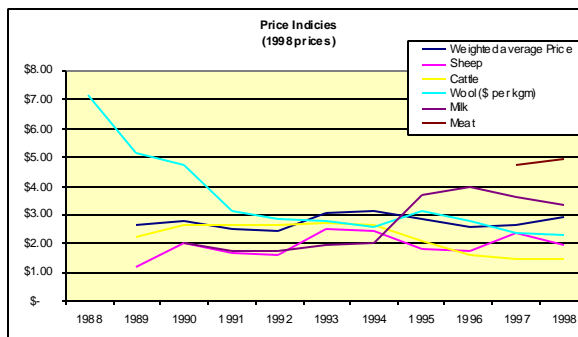


Figure2a

Volumes for traditional farm outputs have fallen as per figure 3, but Landcorp Farming did attempt to improve its returns by investing in meat processing. This venture had limited success, but did serve to improve its average price per output unit as seen in figure 2.

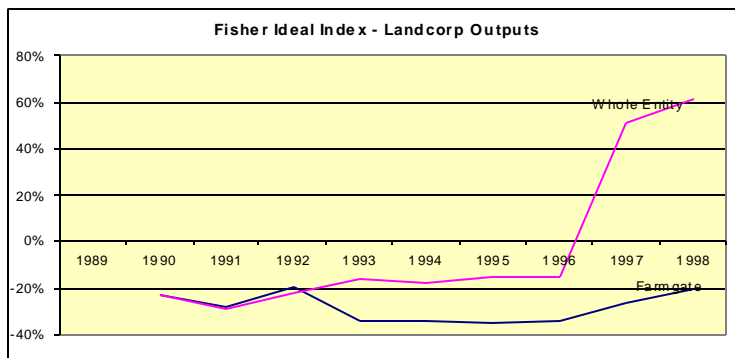


Figure 3

The output volume index for Landcorp Farming as an entity is obtained in two ways. In one all outputs (sheep, cattle, wool, deer, goats, wood, meat and dairy) expressed in kilograms are aggregated by weighting their kilograms with their share of revenue. In the other, outputs in kilograms at the farmgate are aggregated by simply weighting the farmgate kilograms by their share of revenue. In short, the second output measure ignores processing outputs. The first approach yields a measure of output whose composition changes in a way that changes the meaning of output. The increasing importance of processed meat revenues results in a very rapidly increasing weight on an output that is in fact growing very rapidly in 1997 and 1998.⁴ This is an illustration of the problems of index

⁴ Meat output in the “whole entity” index has been estimated by identifying the number of “Landcorp Farming” animals that left their farms for processing into meat and converting them to kgs of

numbers when new products are introduced. Dairy measured as kilograms of milk fat has not changed significantly in the last four years and has been included the same way in each series.

These indicies will reflect the changing composition of inputs and outputs. While land area for Landcorp Farming fell by 12%, for the average sheep farm it increased by 14%. In fact Landcorp Farming number of farms fell by 36% over the period so output per Landcorp Farming farm actually increased.

The volume decline from 1992-1995 can be mostly attributed to the halving of the number of sheep that were sold, though from 1997 this was to some degree replaced by sales of processed meat. Other indicators of output changes and their comparison to NZ Farming Inc are described in figure 4.

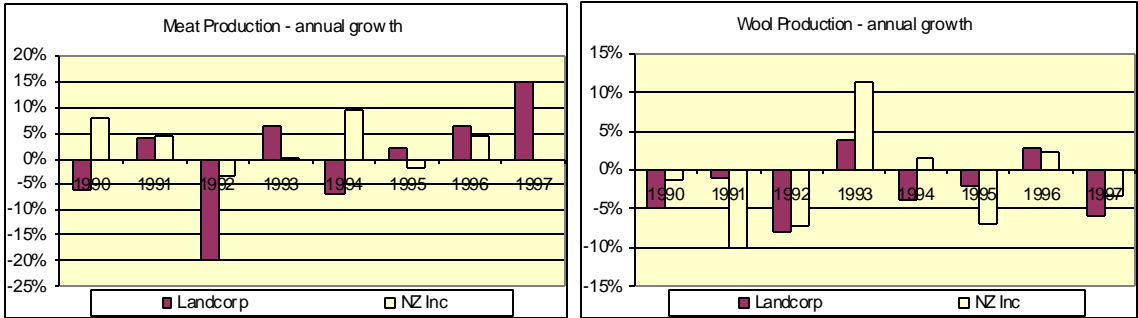


Figure 4

Figure 4a

Figure 4 describes the annual growth in kilograms of meat produced, that is, animals sold to market plus meat processed in house by Landcorp Farming. Of the five SOE's in the study only Landcorp Farming has significant inventories: livestock not sold appear as livestock on hand at the end of the financial year. Livestock at balance date are treated as capital. If an unusual amount of livestock was not sold in any year, but was retained, the output measure - kilograms sold - would fall even though output (kilograms) produced that year may not fall. This would cause year-on-year fluctuations in our measure of output but not affect measured output trends over time. Extra stock not sold this year will be sold next year unless capital stock trend upwards, which does not happen in the data.

There is little correlation between Landcorp Farming and NZ Farming Inc, with NZ Farming Inc showing aggregate growth of +21% and Landcorp Farming output showing 0% growth in aggregate. On the other hand, wool production (figure 4a) follows a very similar pattern in both, with Landcorp Farming and NZ Farming Inc each experiencing negative growth in aggregate (NZ Farming Inc -13% and Landcorp Farming -19%). Overall the per farm output index for NZ Farming Inc grew by 40% (figure 5 below) against the decline of 22.5% for Landcorp Farming.

processed meat at an average kgs per animal (provided each year by NZMWBEs) and the average meat yield (provided by Landcorp). We have taken this approach rather than using reported kgs because the Landcorp subsidiaries that processed meat for Landcorp Farming also processed meat for themselves or third parties and as such the use of the actual meat outputs recorded by these processors could overstate outputs in the productivity analysis.

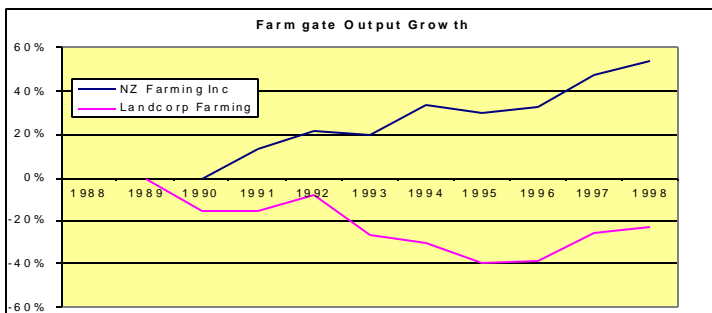


Figure 5

The only portion of Landcorp Farming’s output that is missing from the index of overall output is the approximately 10% of revenue that is covered by “other outputs” that cannot be meaningfully included in the count of physical output that we have here. These include the processed meat output. While revenue from other outputs has fluctuated a little over the period it has not changed enough to materially affect the overall output growth.

Landcorp Farming - Productivity Changes

We have had difficulty in accounting for the beyond farmgate processing cost elements because they are not separately identified. These costs appear under marketing in Landcorp Farming’s accounts. We have implemented a crude separation by attributing all the increase in marketing costs after 1994 to the processing activity. The two curves in figure 7 show the effect of this allocation. Productivity analysis is also confounded by the way that the subsidiaries are consolidated into Landcorp Farming financial statements. Processing revenues are recorded as “net revenue”, that is, net of costs, and here the resultant costs will understate inputs, while other transactions are recorded as both revenue and costs (gross) and are more representative of inputs matching outputs. Because outputs are measured as an aggregate of physical outputs, the productivity calculation requires the deduction of real gross costs. The understating of inputs is an insurmountable problem if we consider Landcorp Farming as an entity, including processing. We bypass this problem by considering Landcorp Farming from a farmgate perspective only. Thus our measure of output is the farmgate index.

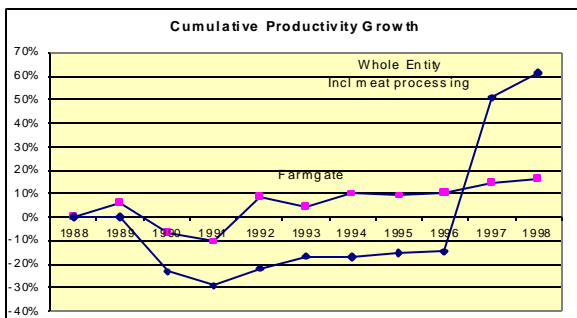


Figure 6

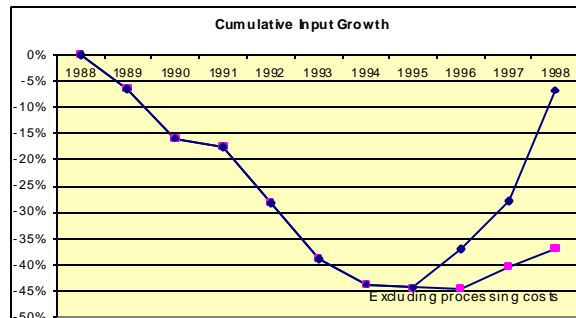


Figure 7

The graph of figure 6 shows the effect on total factor productivity of this allocation. It suggests that for the full period farmgate productivity has increased by 16%.

The entity productivity figures show the effect of a rapid escalation of a new activity. It suggests that productivity of the entity as a whole has increased significantly. However Landcorp Farming is not continuing with its downstream processing activity: as it is wound down measured cumulative productivity will drop. The focus of the remainder of this report is on farmgate performance.

The comparable results for NZ Farming Inc are as follows, showing an average productivity growth of +1.2% over the period from 1990. We have more confidence in the data to 1995 because after that time we have had to allocate costs arbitrarily. In that year Landcorp Farming exhibited 5% cumulative productivity as compared to NZ Farming Inc's 10%. Since that time (and this included a number of droughts) the productivity indices have reversed.

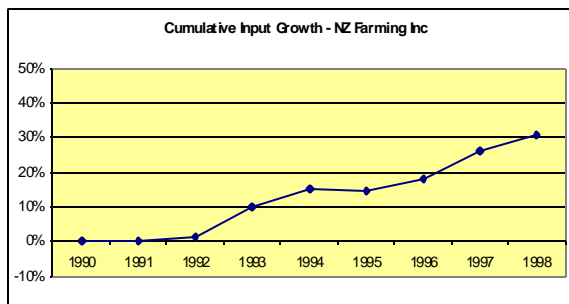
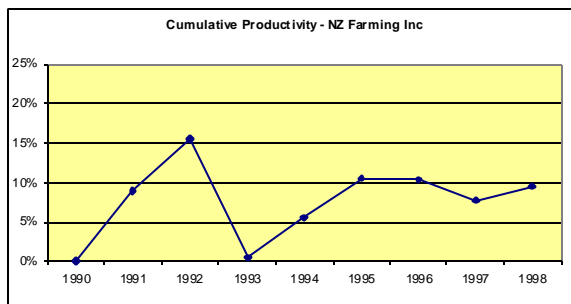


Figure 8

Figure 9

In the period to 1992 the positive productivity growth for Landcorp Farming came not from the stable output, that fell by only a little, but a steep decline in the consumption of inputs. The poor productivity performance from 1993 was driven in equal portion by the decline in outputs as well as a sustained increase in aggregate inputs. Figure 7 highlights the latter point. The individual input changes for Landcorp Farming are described below.

Labour inputs account for 12% of the total costs of Landcorp Farming, having fallen from 18% at the beginning of the period. Total staff numbers have fallen by about one third, with labour expenses declining by more than 20%, per figure 10. Some of this may be explained by share milking being carried out on dairy farms, although this is only a small proportion of the business.

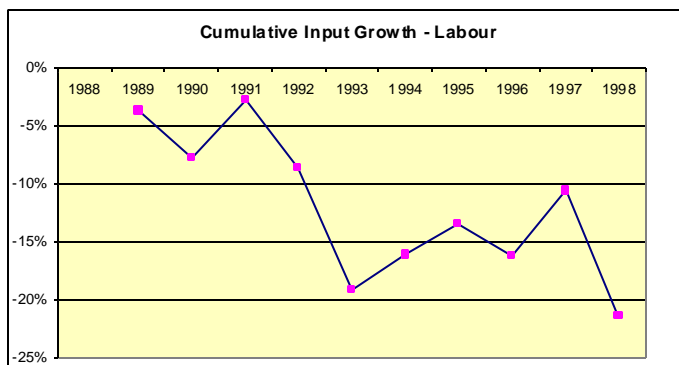


Figure 10

The amount spent on the combination of other material inputs, (accommodation, direct, non-people costs, marketing costs, overheads etc) makes up more than two thirds of total costs, having grown somewhat from 56% of total costs in 1990. The consumption of

these inputs has grown by an aggregate 10% over the period with a consistent decline in consumption in the early 1990's and consistent increases 1994 to 1998. There was a particularly sharp increase in 1998, visible in figure 11 below, some of which is related to its sortie into meat production noted earlier.

Fertiliser is one of the largest single expense items in this category at \$9.2m in 1998, and is recognised as an important factor in farming performance. Landcorp Farming has consistently differed from NZ Farming Inc in the application of fertiliser per stock unit, as described in figure 12. While this data series is not complete, the data that does exist shows that Landcorp Farming uses about 50% more fertiliser per stock unit than on the average NZ sheep and beef farm. This result is despite the fact that not all dairy fertiliser is included in the dairy farm expenses, as fertiliser is an expense of some of the share milkers that run Landcorp Farming dairy farms under a 50% share contract.

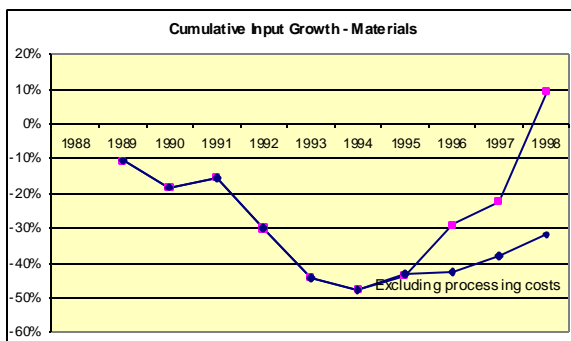


Figure 11

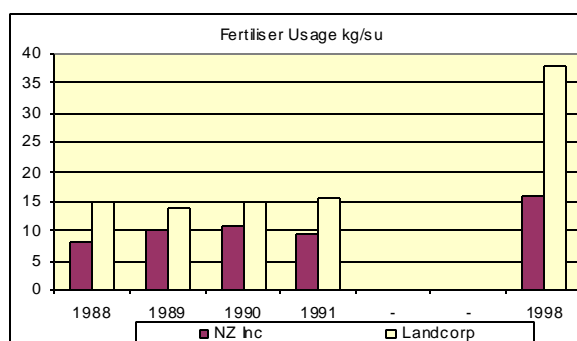


Figure 12

We have taken the analysis further by comparing Landcorp Farming's and NZ Farming Inc's ratios of value added to revenue. Value added is simply revenue less expenditure on material inputs and hence the ratio is:

$$1 - \frac{\text{material input costs}}{\text{revenue}}$$

which, because the two sets of farmers face the same prices, leads to a comparison of average productivity of aggregate material inputs. Figure 13 below indicates that the average material productivity of NZ Farming Inc exceeds that of Landcorp Farming.

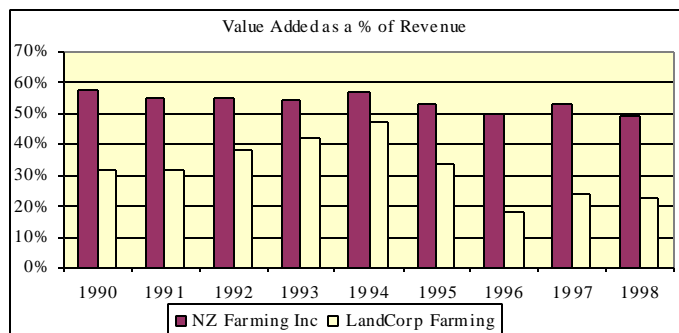


Figure 13

The last three years of comparison will be confounded somewhat with the inclusion of meat processing in Landcorp Farming.

We also sought to compare the ratio of [(revenue – material cost - labour cost)/revenue] to incorporate in-house farm labour in the productivity comparison. This part of the analysis is plagued by the traditional problem of measuring the household labour input to farming. While for Landcorp Farming, managerial salaries are known, there is no equivalent measure for private farms. The use of drawings (living expenses) suggested that Landcorp Farming was the more productive, but drawings are materially influenced by off-farm income. Off-farm earned income is known to be significant, but it is not recorded, and it will yield overestimates of the payment for, even use of, managerial labour. We have not pursued this issue further.

Mr Neil Pritchard (CEO of Landcorp Farming) did not accept our comparative work and argued instead that comparisons of productivity should only be made on a per-stock-unit basis. While conceding that stock unit performance is indeed a critical indicator, we maintain that the productivity comparison should be based on “whole entity” measures, such as total factor productivity.

Capital costs (including land at replacement value) make up more than 40% of Landcorp Farming's total costs and are dominated by the replacement value of land, which account for 80% of the 1998 capital stock of \$415m. In the productivity analysis, we have removed the effects of the land inflation of the 1990's from the calculation of capital growth. This is because we consider that the increase in value is not a function of Landcorp Farming's operating performance and should not influence on the calculation of its productivity. Economic profit is modified by setting land values at their 1989 level (but at 1998 prices), whence capital accounts for only 20% of Landcorp Farming's total costs. The effect of this is to hold land value constant in our productivity analysis even though the total area farmed fell by 12%. We do not have enough information on the quality of the land input to value it precisely.

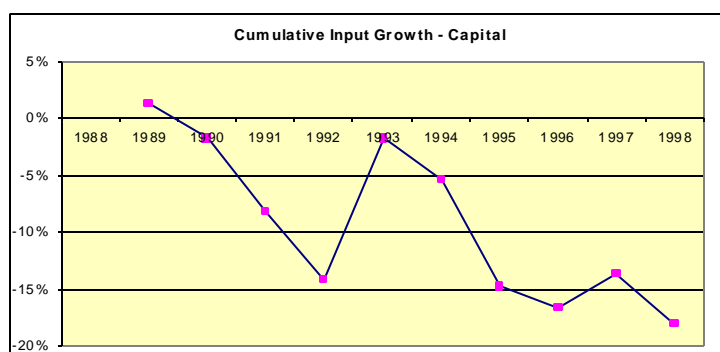


Figure 14

Figure 14 shows the growth over time using this approach. The increase from 1992 was due to an increase in the value of livestock held by Landcorp Farming, however livestock values have declined steadily since 1993. Expenditure on capital items and depreciation do not have a big influence, as Landcorp Farming typically spends only \$10 to \$15m per year and depreciation is a mere \$3.5m pa. Note also that the productivity result is not particularly sensitive to a reduction in the WACC from 12% to 10% real, it improves only marginally.

Comparison with NZ Farming Inc

The performance of New Zealand Farming Inc will have been affected by the withdrawal of land from sheep and beef farming – eg to forestry and horticulture – and changing farm size. The performance of Landcorp Farming is affected by the presence of Molesworth – the removal of Molesworth renders Landcorp Farmings and New Zealand Incs stock per hectare comparable – but this should not affect performance over time. In both cases a deeper analysis would be required to ascertain the impact on productivity growth of the qualities of inputs such as land.

Individual Results
New Zealand Post Limited

New Zealand Post - Market Structure

For a review of the corporatisation process and subsequent evolution of the company see *Reining in the Dinosaur: the story behind the remarkable turnaround of New Zealand Post* by Vivienne Smith, 1997.

New Zealand Post is in a number of markets, including a mix of recently deregulated markets and markets that have been competitive for some time. Its core revenues (80% of total revenue) are from the delivery of letters and parcels, either through its mail delivery network or via its courier service. Mail delivery services were deregulated on 1 April 1998, 10 years after the government first suggested that this market could be opened up to competition. The courier business is very competitive. It has quite low start-up costs that are mostly variable and it is easy to enter at a local level. A national network would however involve more investment and a higher level of fixed costs.

New Zealand Post generates 13% of its revenues from its other network: its retail shops and agencies, where customer transactions are processed. These transactions include the sale of a wide range of items, as well as the receipt of payments on behalf of other service providers. Its network of retail shops was unmatched in NZ and provided New Zealand Post with a unique capability to access customers. However new technology has diluted this opportunity, especially the internet and direct use of telephony to transact business. New Zealand Post has recognised the threat of electronic media to its business and is responding to these opportunities.

New Zealand Post is free of direct regulatory interference to set prices but, as part of the deregulation process, an agreement was made with the Government that limits price increases on contestable core services for 3 years. It has other constraints on its activities; in particular, its retail network has to be maintained at a minimum size, and delivery frequencies are benchmarked. Pricing of competitive services is set from market levels to satisfy specific objectives.

Technology is having a major influence on New Zealand Post in a number of respects. At the operating level, technology that reduces costs and speeds up mail sorting has been used by New Zealand Post for some years, though very recently it has invested in more sophisticated machines. It also has one of the more advanced point of sale systems installed in its retail shops, improving the efficiency of its transaction business.

In its product markets New Zealand Post is, as noted above, coming under pressure from growth in the use of electronic distribution via telecommunications networks. These are replacing traditional physical distribution networks. This technology replacement is taking a number of forms, from telephone banking to email communications and electronic commerce on the internet.

The use of technology as a substitute will continue to be a major issue for New Zealand Post. However while it is a threat on one side, the company is also in a good position to use technology to develop new products and services and thereby maintain or expand its business. The opportunities that technology offers the company must be significant.

New Zealand Post – Economic Profit

Here we estimate the economic profit or producer's surplus that New Zealand Post has been able to generate since it was corporatised in 1987. By economic profit we mean the real economic surplus that remains after all costs (capital, valued at replacement cost is included on an annualised basis) are deducted from the real revenue stream. As the data from New Zealand Post did not allow this calculation to be carried out at a segment level, we have completed the work at the aggregate New Zealand Post level. Note also that results are presented in levels and as cumulative growth over the period: the latter being an easy to understand method of showing both short and long term changes. The data were provided by New Zealand Post.

The economic surplus was calculated the following way. All revenues and costs have been converted to constant 1998\$ using the appropriate deflator (CPI, PPI and WRI). Capital cost in each year has been estimated using the book value of assets and a pre-tax WACC of 12% real. The book value has been compared with a replacement valuation undertaken in 1999 and we are satisfied that any mis-estimation that results will be small. In this regard it should be noted that the annualised capital cost averages 15% of total New Zealand Post cost in any year. Book depreciation is probably an adequate indicator of economic depreciation simply because the bulk of the assets are buildings that are revalued each year and the plant/equipment assets (that make up the majority of remaining asset value) are, on average, only 4 years old. It should be noted that use of a 10% WACC improves the economic profit by an aggregate \$50m (e: +5%) over the 10 year period while the impact of the changed WACC on productivity is negligible.

Table 1 – New Zealand Post Producer's Surplus

(In constant 1997 \$m)

| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-----------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Core Revenue | 559.9 | 453.5 | 447.9 | 469.9 | 508.0 | 554.7 | 548.0 | 549.6 | 533.7 | 565.2 | 570.7 |
| Other Revenue | 265.3 | 127.5 | 96.8 | 100.1 | 86.7 | 101.5 | 124.2 | 127.7 | 131.8 | 123.8 | 135.6 |
| Total Revenue | 825.2 | 581.0 | 544.7 | 570.0 | 594.7 | 656.2 | 672.2 | 677.3 | 665.5 | 689.0 | 706.3 |
| Less: | | | | | | | | | | | |
| Variable costs | 77.9 | 70.7 | 73.3 | 85.6 | 107.3 | 113.4 | 114.7 | 117.2 | 125.5 | 163.0 | 183.2 |
| Contribution to Shared Costs | 747.3 | 510.4 | 471.4 | 484.4 | 487.4 | 542.8 | 557.6 | 560.1 | 540.1 | 526.1 | 523.1 |
| Shared Costs (Inc charge on capital employed) | 483.7 | 490.6 | 431.1 | 444.9 | 434.7 | 423.1 | 445.9 | 462.6 | 444.7 | 469.8 | 513.9 |
| Economic Profit in Constant \$ | 263.6 | 19.8 | 40.3 | 39.5 | 52.7 | 119.7 | 111.7 | 97.5 | 95.4 | 56.3 | 9.2 |

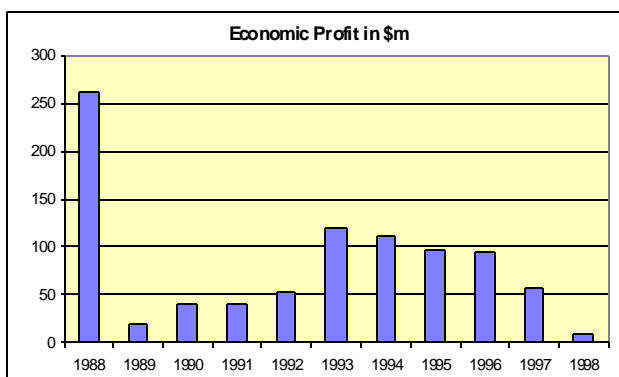


Figure 1

New Zealand Post profit can be described as having two distinct phases. The early period had strong growth through to 1993, while from that time growth has fallen, slowly at first but quite steeply from 1996. A series of (mainly) market factors seem to be the root cause of these changes, with price changes most significant among them. The result for 1988 includes a range of abnormal arrangements resulting from relationships with Post Bank and Telecom that flowed from the previous departmental structure. It should be ignored for the purpose of the study of New Zealand Post's performance.

New Zealand Post - Market Changes

The price for standard letters was raised in 1991, in advance of a reduction in mail handling costs. This, as well as a doubling of the rural delivery fee (later resiled), affect the 1993 profit growth. Significant changes to pricing occurred in 1995. Figure 3 below shows the effect of the drop in standard letter price and abolition of the rural delivery fee of that year.

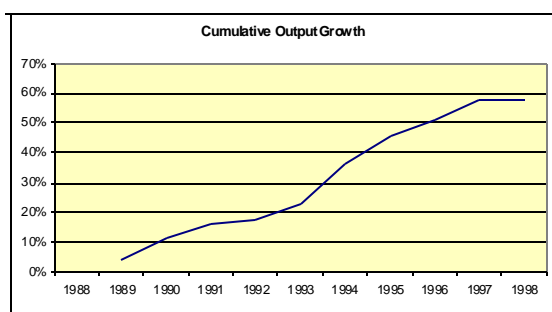


Figure 2

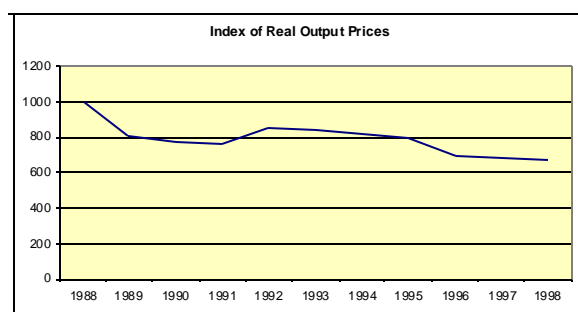


Figure 3

Figure 2 above shows that strong growth in (mail) output volumes, averaging 6% per year and an aggregate of nearly 60% over the period, are a feature of New Zealand Post's performance, lifting growth of real revenue dollars despite the economic slump in 1991 and 1992. The volume growth continued in 1996 and 1997 but declines in real prices blunted revenue growth.

The growth in other (non-core mail) revenues that make up about 13% of total revenue cannot be factored directly into the analysis of outputs because we cannot identify separately the appropriate price indices. These revenues are mainly made up of transactions that go through New Zealand Post's shops, but they also include new business revenues. The data suggest that even if the other outputs that yielded this revenue were included in measured output, aggregate output growth for New Zealand Post would not be materially different from that reported here.

Prior to market de-regulation in 1998, New Zealand Post focussed on improved mail transmission quality, including improved Saturday and other statutory holiday service and sharper customer focus. Much of such quality changes will not be reflected in the output measure.

While there has been entry of competitors since de-regulation, because of the absence of data on this facet of the business, we cannot assess the impact.

New Zealand Post - Productivity Changes

The total factor productivity of New Zealand Post is described in Figure 4 below, in cumulative form.



Figure 4

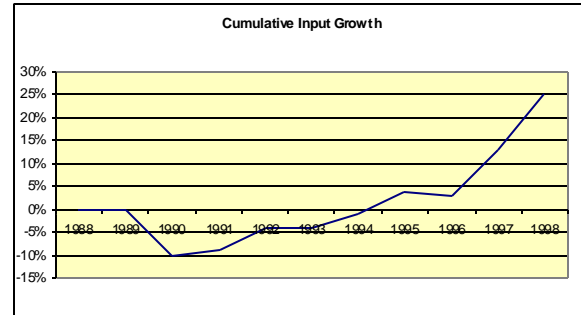


Figure 5

In aggregate New Zealand Post productivity has improved by more than 33% over the period at an average of more than 3.2% p.a, but, like economic surplus, the aggregate disguises two distinct phases. In the period to 1996, growth averaged 5.9% p.a, which is a significant growth rate, but the period 1997-1998 productivity declined at an average of 8.0% p.a. It was during this period that investment in quality enhancement took place.

The majority of the productivity improvement was a result of the strong growth in output volumes, noted earlier however Figure 5 shows that much of the output growth was eroded by increases in the growth of input use, especially in the period 1996 to 1998. The individual input changes are described below.

Labour input accounts for more than 60% of New Zealand Post's costs and it is therefore a major influence on productivity. Declining staff numbers in the early 1990's were followed by increases from 1994. Figure 6 shows the cumulative changes in the growth of in-house labour. External contractors appear in materials, the growth of which is described in Figure 8. The unit cost per FTE labour unit (in-house and contract labour) has grown in aggregate by 46%, mostly as a result of employing contract labour. Some of this growth may have resulted from a one-off effect of a switch to contracting. Contracting costs include allowance for elements, such as potential redundancy, that are part of long term labour contracts but which are not expenses incurred on an annual basis.

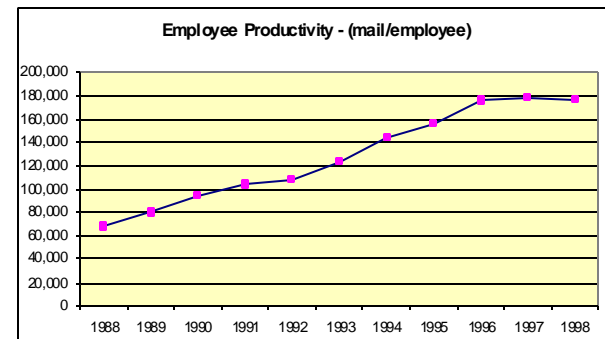
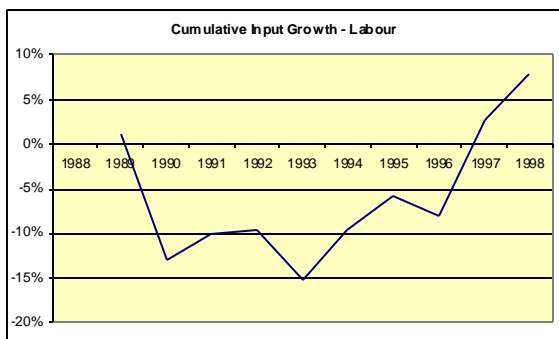


Figure 6

Figure 7

The employee productivity described in Figure 7 captures the combined impact of output growth slowing in 1997 and 1998 and the increasing number of total labour inputs: in-house and contract labour.

The amount spent on the combination of other material inputs, (accommodation, direct non-people costs, marketing costs, overheads etc) makes up about 28% of total costs. It has risen from approximately 20% in 1990. The consumption of these inputs has grown 52% in aggregate over the period. Most of the increase can be linked to output volume change.

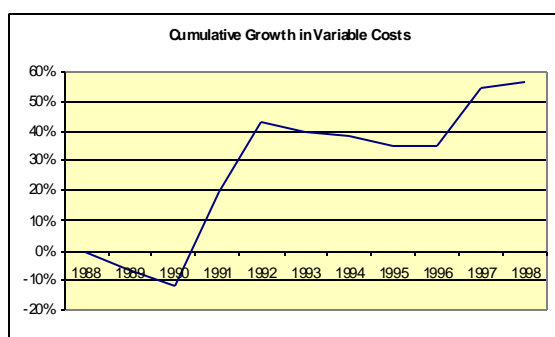
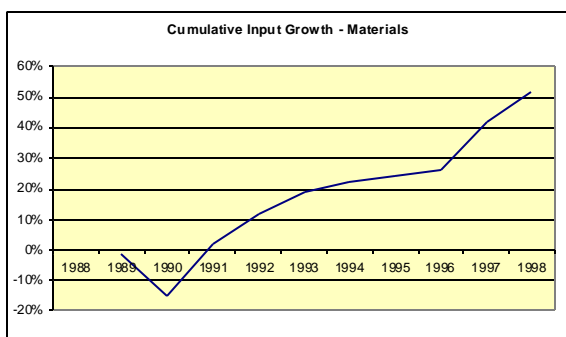


Figure 8

Figure 9

A price/volume analysis on aggregate material inputs revealed that while input prices moved up and down during the period, overall they fell. The cumulative total growth in materials prices was only -3.4% over the period.

Figure 8 highlights the sustained increase in material inputs, while Figure 9 shows that, on a weighted unit cost basis, direct variable costs account for all (and more) of the increase in material costs. The variable costs (expressed per unit of output) in Figure 9 are network costs and cost of goods sold, and are a subset of material costs in Figure 8.

Capital costs are very small by comparison with labour and materials costs, typically making up 15% (dropping to 13% in 1998) of New Zealand Post's total costs. The overall book value of assets is as described above but, in the productivity analysis, it has a "grossed up" value of current capital costs added to it. An example of these current capital costs is rental expenses that are associated with capital assets. The impact of any plausible variation here will have a small effect in the overall productivity analysis.

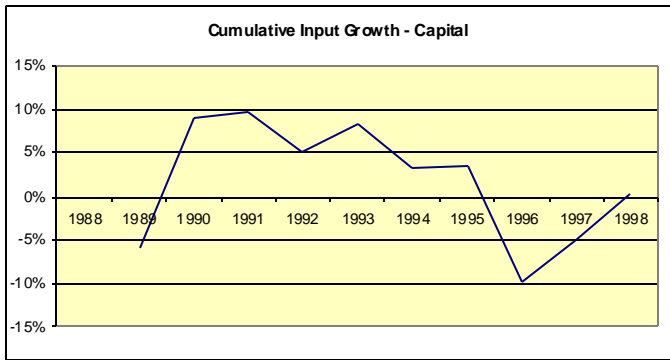


Figure 10

Figure 10 shows the growth over time using this approach: note the sharp increase from 1996, reflecting investments, such as that of mail sorting machines.