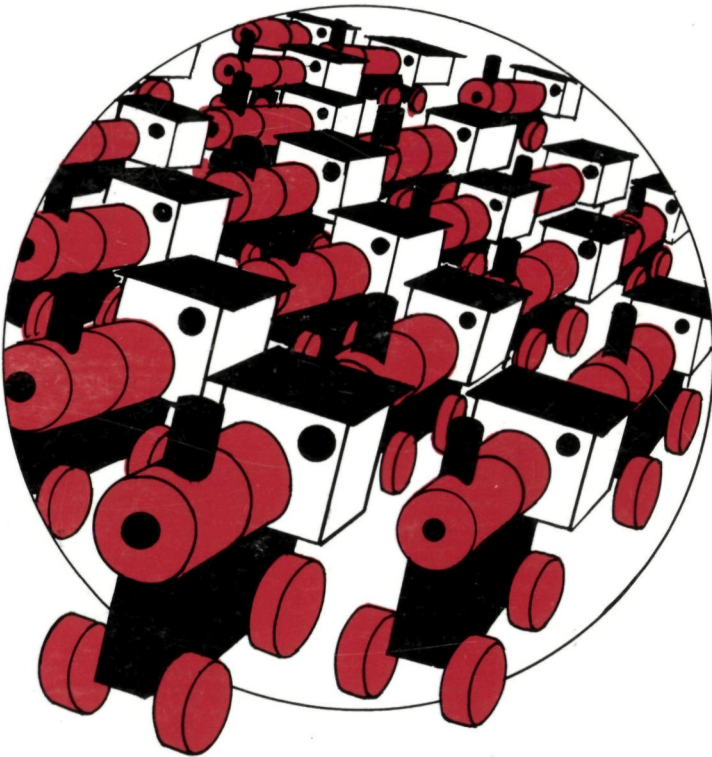




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Productivity and Quality in New Zealand Firms: Effects of Deregulation

Colin Cambell, Alan Bollard and John Savage.



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by
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I THE STUDY

1.1 Introduction

This study examines the way regulatory change has impacted on firms over the last five years and the quality and productivity strategies that these firms are using to react to these changes and survive in the more competitive environment that results.

The programme of deregulation and liberalisation has been undertaken on the basis that firms will respond positively to a neutral operating environment with resource allocation determined principally by market signals. The future of industry in New Zealand depends on the ability of firms to react to this environment in an efficient way. This means producing what the customer wants in the most cost-effective way. It is these two concepts - "what the customer wants", and "the most cost-effective way" that form the basis for this study. The first of these concepts is centred on the idea of *quality* in production or servicing; the second relies heavily on *productivity*.

In this study we discuss the concepts of quality and productivity and set up a framework which analyses the way these concepts are affected by deregulation in the New Zealand manufacturing and service sectors. We hypothesise that regulatory change has indeed affected firms, inducing them to devise new strategies to improve their quality and productivity performance. In section II we survey the literature on the microeconomic aspects of quality and productivity in firms. In section III we report on our field study of 200 New Zealand firms. The response to the questionnaire is tabulated in section IV. In section V we analyse these responses with respect to our hypotheses, to determine the influence of structural variables and firm strategies on the relationships. Finally, section VI concludes the study and derives some further strategies for action.

1.2 The Concepts

Productivity

At its simplest, the concept of productivity is about comparing the outputs of the production process with the inputs into it. These inputs will include tangibles like labour, capital, land, materials, and energy, and some intangible resources like managerial expertise and information.¹ It is, therefore, a measure of the efficiency with which products or services are produced. Within this general definition two aspects of productivity can be distinguished. Total input productivity is concerned with the measurement of output against the total amount of inputs used to produce it. Thus, an improvement in a firm's production technology or management practice which better utilises overall resource use would enhance total input productivity. It is this broad definition of productivity which we are interested in. In contrast, partial factor productivity focuses attention on output relative to a single factor input - usually either labour or capital.

Despite this simple definition, several difficulties arise when analysing productivity issues:

(a) Productivity and profitability are often confused. There are two key differences. Profitability is about revenue in money terms. Hence profitability can increase without a productivity gain simply by an increase in the profit margin on the price a good or service is sold for. Second, high productivity does not necessarily imply high profitability since that depends on the prices of inputs and outputs.

(b) A distinction should be made between short and long run issues. Short run productivity gains may have detrimental effects in the longer run. Examples of this are: reductions of expenditure on R & D (which may reduce the availability of better technology to the firm in the future), and lay-offs of skilled staff.

(c) The literature has tended to concentrate only on well defined or tangible physical inputs into the production system (especially

1. It may also be measured in terms of output relative to time taken to achieve it.

labour). In fact less tangible inputs may be equally important. The most obvious of these is information, around which a whole technology has now developed.² Another example would be reputation or brand-name capital.

(d) In practice, for any given firm, definitions of productivity can be wide-ranging. They may include any or all of: the degree to which the firm's objectives are achieved; overall efficiency (i.e. how well resources are used to generate quality output which is in demand); effectiveness ("what is achieved compared with what is possible"); and "comparability" (how productivity changes over time).

For the purposes of this study we define improved productivity as follows:

an improvement in the ability of an enterprise's real inputs to create products or services of a specified quality

Productivity generally assumes some range of technical possibilities, and looks at how these may be used in the most efficient way. This is developed further in appendix A1.

Quality

Quality is a multidimensional concept and is, to a large extent, a perceptual issue on the part of the consumer. Hence it might be defined as, "the degree to which a specific product or service meets the expectations of a specific person" (Katzan, 1986, p17).

However, this tight definition of quality obscures other aspects of the concept. A distinction can be made between "internal" and "external" quality. Internal quality refers to the overall quality and efficiency of the production process and is therefore about the *firm's* perception and measurement of quality (eg. quality control and management etc). In contrast, external quality is about *customer* perceptions of the product. This covers "customer satisfaction" about such attributes as "reliability in use, longevity, easy of handling and maintenance, design, timely delivery" and the like (OECD, 1986, p52). Hence while measures of a particular aspect of quality (eg.

.....
2. For a discussion on the importance of information as an input see Porter and Miller (1985)

frequency of defects) are possible it is difficult to quantitatively assess it in an overall sense and quality comparisons between products can be difficult. As these definitions suggest, internal and external quality are closely related.

While product quality may be directly influenced by a range of specific technical and organisational mechanisms, a common philosophy of writers in this area is the idea of total quality commitment which permeates all aspects of management and production and is as much about attitude as technique. Within a firm there are both vertical and horizontal aspects to this approach.

In a vertical sense, total quality commitment relates to responsibility for quality being maintained throughout all hierarchical levels of the company, with senior management having a particular role as motivators (OECD,1986). In a horizontal sense the idea relates to the need for quality commitment to apply to all aspects of the firm, i.e. not just the production line but also research, development, sales, marketing, servicing and distribution.

Finally, for the purposes of this study, it is useful to distinguish between two sources of differences in product quality. Two firms may produce products of differing quality either because: (a) they are targetting different segments of a given market; or, (b) for a given segment of the market one firm's reorganisation/ technology allows it to produce a superior product. We have defined improved quality as: a change to the attributes of a product or service which is perceived by consumers as an improvement relative to the products or services available from other suppliers.

It is important to note that under this definition attaining better *quality* could mean improvements in the product or service itself, or in the process used to produce it. There is not necessarily any physical change to the product or service: its "attributes" include its price, so a price cut or improvement in its delivery could increase quality. Note however, that improving quality does not necessarily mean taking the product up-market. Down-grading the product could conceivably improve quality, if that is what consumers want. Ultimately quality is in the mind of the consumer, and is measured with respect to other products actually or potentially available. This concept is developed in more detail in Appendix A1.

For some of our respondents, the distinction between productivity and quality was unhelpful. Followers of Deming practice apply an emphasis on quality both to the product and to the productive process, the one as a natural extension of the other.

Measurement

Economic measures of total-input-productivity are well established and can be applied at industry level, or to the individual firm (see eg Campbell, 1984). In practice however, firms develop and use measures of productivity performance which cover only some of the inputs used. We asked respondents what measures they use and their answers are reported below.

The measurement of quality improvements is a more challenging task again. Conceptually, indifference curves appear to offer an appropriate framework; but no measures of quality gain have been developed from this base to our knowledge. The measures used by our respondents are, as for productivity, partial indicators of quality gains rather than comprehensive measures.

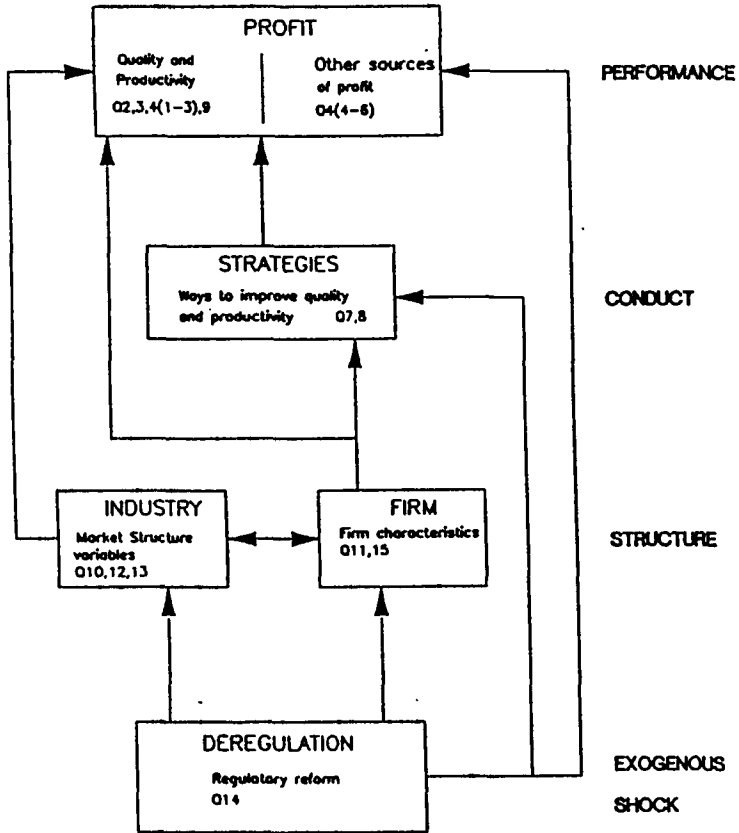
For the purposes of this study we have therefore relied on the judgement of our respondents to assess the importance of quality and productivity (QP) to their firm's profitability.

1.3 The Framework

The framework used for the analysis is a broad one based in the structure-conduct-performance paradigm. This is a simplified approach in which background structural characteristics of an industry are assumed to determine the strategies used by firms in that industry, which in turn determine how well a firm does in achieving quality, productivity and other goals. This one-way line of causation does not lend itself well to some competitive structures but would appear to provide a simple and useful unifying framework for the analysis of quality and productivity (see Hay and Morris, 1979).

The framework is outlined in Figure 1.1. Regulatory change is viewed as being an exogenous shock to the system, impinging

FIGURE 1.1 : FRAMEWORK FOR ANALYSIS



directly on the firm, on other parts of the industry, and affecting quality and productivity strategies and outcomes directly. Firm and industry characteristics also determine what happens to quality and productivity in a direct way. However in addition, when one investigates what lies inside the "black box" of the firm, it is seen that a whole class of positive strategies may be put in place to improve quality and productivity rather than to simply treat them as the passive outcomes of production processes. Below we investigate the major elements in more detail:

1.4 Regulatory Change

New Zealand has undergone a radical and major set of regulatory reforms during the period 1984 to 1988. These have been so widespread and farreaching in comparison with the size of the economy that we have hypothesised that not only will they affect firm behaviour, but also that their impact on quality and productivity will be measurable.

Regulatory reform has covered a wide range of industries at the level of entry restrictions and operating requirements in product markets, partial or more complete deregulation of factor markets, capital and exchange rate deregulation and corporatisation of state trading activity. A list of measures is given in Table 1.1. For a detailed discussion of the process see Bollard and Buckle (1987).

From this programme of reform we have isolated four particular measures in which we are interested, and which we believe exert influences discernible by respondents to our survey. They are:

- the relaxation of import protection (quotas and tariffs) in the domestic market;
- the relaxation of price controls;
- the removal of legal barriers on entry to the industry;
- the reduction of restrictions on the labour market.

It is important to note that these individual deregulatory measures have taken place against a macroeconomic setting in which we have seen a number of broader-based changes such as tax reform and removal of industry-specific incentives. More importantly in this

Table 1.1 : List of Economic Liberalisation Measures

Deregulation of entry licensing in industry
Partial deregulation of occupational licensing
Removal of other operating barriers in industry
Removal of price control
Removal of import licensing and significant decrease in tariffs
Revision of town and country planning
Revision of role of producer marketing boards
Abolition of many quangos and quasi-government organisations
Removal of financial controls (interest rate ceiling, reserve ratio requirements, priorities for various sectors)
Removal of exchange controls
Liberalisation of foreign direct investment
Floating of the exchange rate
Revision of corporate, personal and direct taxation
Corporatisation and privatisation of state trading activities
Removal of monopoly rights on state trading
Reviewed competition regulation (Commerce Act/ Bank Act/Companies Act)
Deregulation of the transport sector
Removal of concessions for favoured investment (eg. R & D)
Removal of concessions for favoured sectors (agriculture, export sectors)
Establishment of Closer Economic Relations with Australia
Partial labour market deregulation.

setting some of the microeconomic signals have been outweighed by macroeconomic ones such as the strength of interest rates and the exchange rate.

1.5 Market Structure

The response that any firm makes to these regulatory changes depends on a number of characteristics of that firm and other firms in the industry. Industry variables that are potentially relevant include the number of players, the competitive structure, the ease of entry, the degree of integration, diversification and differentiation,

scale and scope economies, industry maturity, the state of technology, ownership questions, the nature of markets, and how any of these may change.

The firms that we are directing this enquiry towards are each part of their own industry, and are affected by the industry structure. Partly in response to this, they each exhibit their own set of characteristics which in turn will help determine the type of strategies they design, and their ultimate performance. This includes firm size and ownership, their use of labour and physical assets, their financial structure, the use of R & D, and managerial abilities.

For the purpose of this study we have isolated the following industry and firm-level structural variables

- stage in product life cycle
- industry growth rate
- rate of technical change in industry
- change in ownership
- type of corporate ownership
- degree of foreign markets
- penetration of foreign competitors
- degree of concentration of ownership
- proportion of product exported
- size of firm
- education of workforce
- unionisation of workforce
- age of plant and equipment
- research and development

1.6 Firm Strategies

Firms may passively "satisfice" within an operating environment with managers being content to achieve some sub-capacity level of quality and productivity and profit. The general aim of industrial deregulation has been to eliminate such behaviour by forcing firms to actively compete, with only the best surviving. An outcome of this has been the development of more conscious active strategies to achieve performance goals. These strategies may relate to pricing or market conduct, to competitive issues, to technology development or improvement, to product or process design, or to management of

inputs.

We are interested in whether firms consider such strategies important and thus invest in them. We are also interested in whether these strategies work, in the sense of improving quality and productivity. The strategies that we have isolated as important in this case are:

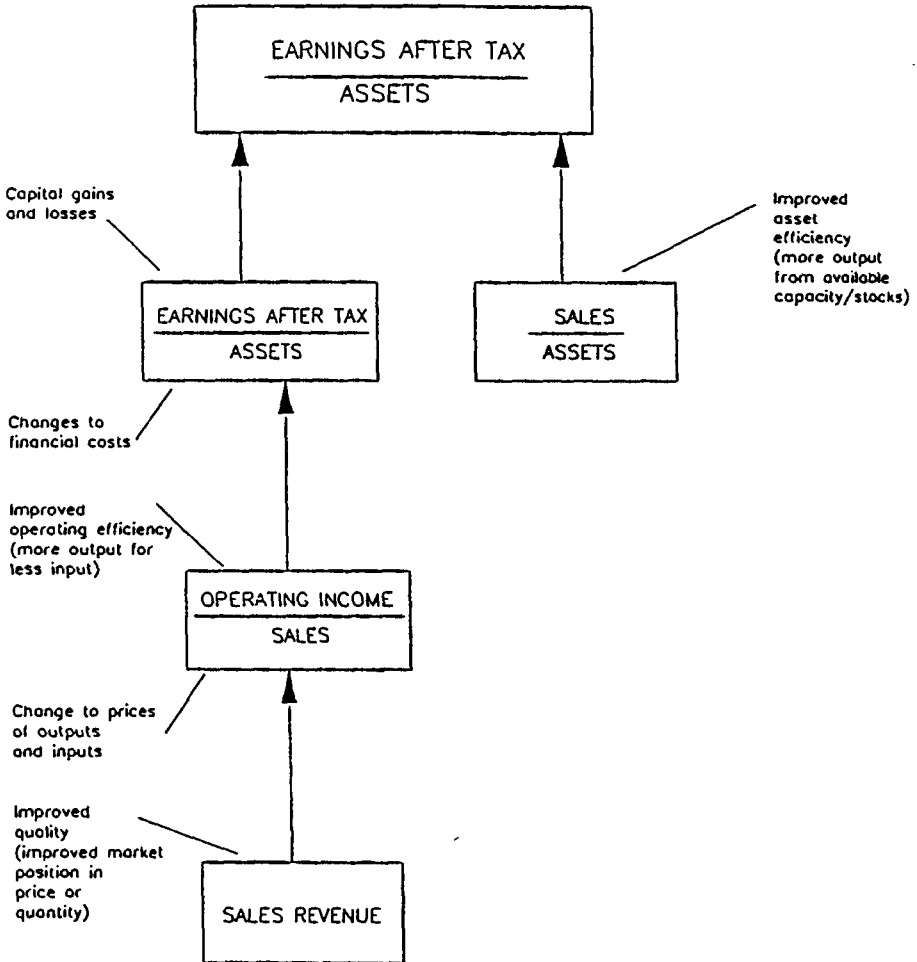
- redesign or style change to product/service
- change to of product service presentation
- new features or options on product
- improved availability
- quality control, quality assurance and quality management
- product differentiation, niche marketing
- improved management practices
- improved labour practices
- arrangements with subcontractors, supplies, distributors
- more efficient use of materials and energy
- new computing and information systems
- new or better use of plant and equipment
- improved tooling, maintenance, etc
- higher capacity utilisation
- better inventory controls
- improved warehousing
- improved financial controls
- new operating/workflow regimes.

1.7 Quality and Productivity Performance

A firm might rationally have a range of management goals to do with maximizing rates of return, surviving in a hostile world, or maximizing some combination of managers', workers' and shareholders' interests. For the purposes of this study we will assume that they aim to maximise profit.

The ratio analysis of accounting data commonly breaks down the rate of return on assets into the ratios of profit-to-sales, and of sales-to-assets. We have used this framework to identify six distinct influences on a firm's overall profitability in the way set out in Figure 1.2.

FIGURE 1.2 : MAJOR FACTORS IN CHANGING PROFITABILITY



- Improved quality of the product or service (eg a marketing campaign) can improve sales revenue by increasing either price or quantity.
- The ratio of operating income to sales may then be influenced by exogenous-to-the-firm changes in prices of primary inputs and outputs;
- and by improved operating efficiency (eg. new work regimes with improved use of labour, materials, energy etc)
- Moving down the income statement (and up the figure), the ratio of after-tax earnings to sales is affected by the operating income ratio by changes to financial costs (interest rates);
- and by any gains or losses on disposal of assets.
- The ratio of sales to assets can be changed by a number of strategies aimed at the greater utilisation of stocks of fixed or current assets

These six influences on profit can be categorised according to whether they are or are not subject to management's influence:

Factors Within Managers' Influence

- asset efficiency
- operating efficiency
- quality, as perceived by consumer

Factors Determined Outside Firm

- market price changes
- financial cost changes
- capital gains or losses

Asset and operating efficiency, as defined above, can be taken as measures of the contribution of productivity to profit. Quality is represented as acting on profit by improving product/service revenues.

We asked our respondents to rank each of the above in terms of its impact on profits (Question 4). We did not ask whether that impact was to improve profits or make them worse. We sought only a measure of the most important influences on profit, positive or negative.

However, given our distinctive interest in quality and productivity strategies, we did ask respondents to rank the importance of quality and productivity relative to other ways of *improving* profits (Question 2). We also asked respondents to rank their quality and productivity strategies relative to world standards (Question 9). These questions form the anchor of our analysis in that the effect of regulation change, quality and productivity strategies, firm and industry characteristics on the quality and productivity performance of firms are all evaluated according to our respondents' ranking on these questions.

1.8 Hypotheses

We can use this structure to outline several broad hypotheses to test:

- (1) That deregulation has affected the contribution made to profits by quality and productivity strategies.
- (2) That deregulation has affected a number of aspects of industry and firm characteristics.
- (3) That deregulation has influenced the selection of quality and productivity strategies by firms.
- (4) That the contribution to profits of quality and productivity is also affected by industry structure, firm characteristics, and strategies used.

II LITERATURE REVIEW

2.1 Economic Views of Productivity

Within the diverse economics literature on productivity a broad distinction can be made between the basic neoclassical model (and some variations on it) and what Nelson (1981) refers to as a wider eclectic approach.

The development of the neoclassical model is closely aligned to models of economic growth, particularly that of Solow (1956).³ As Nelson explains it, in this model "firms are the key productive actors transforming inputs into outputs according to a production function... which defines the maximum output achievable with any given quantity of inputs" (p.1031). The production function is determined by the current state of technological knowledge - this being available to all firms. (i.e. no one firm or group of firms has a technological advantage). Subject to conditions of factor supply and product demand, firms will produce in a way which maximises profits. Firms will be price takers for both factors of production and their output since those markets are assumed to be perfectly competitive. Hence full employment of both labour and capital are generally assumed and adjustment to changed circumstances is instantaneous. In this model, output growth has two possible sources: growth in one or more inputs, or technological advance. (i.e. "shifts" in the production function).

Clearly, as Nelson notes, "there are some strong presumptions here, the view of firms and markets is very stylized - not much room for incompetent management, labour-management strife or oligopolistic rivalry" (p.1031). Also, institutional factors are ignored. There are no labour unions, industry lobby groups or regulatory regimes. Moreover, technological advance becomes the only source of productivity gain and hence economic growth.

Despite this, the simple neoclassical paradigm has provided a framework on which much subsequent work has been based, particularly the so-called "growth accounting" literature (e.g. Denison

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3. For a brief review of this extensive literature see Kindleberger and Herrick (1977), p.39 on.

1962, 1974). This work was initially concerned just with technological advance, but many later studies considered other factors in more depth. Labour inputs were disaggregated by level of education, sex and age, while capital inputs were broken down by type (machinery and buildings) and age or "vintage". Inputs other than labour and capital were also included in the production function, including raw materials and energy. In the area of technological advance considerable attention has been paid to R & D expenditures as an explanation of productivity growth.

These extensions to the basic neoclassical framework have highlighted the inadequacies of it and consequently many studies have shifted towards a less narrowly defined approach. In particular, attempts have been made to explore in more depth the nature and operation of the firm rather than simply presenting it as a "black-box". There are several strands to this work. One concentrates on firm organisation and decision making and the institutional environments in which firms operate. A second strand is concerned with the microeconomics of technological advance (particularly R & D issues), while another group of writers have been interested in shifts of resources from low to high productivity sectors of the economy. Much of this work has been based on inter-country and intra-industry comparisons of productivity performance to isolate the determinants of productivity.

2.2 Factors Affecting Productivity

In this section we are concerned with the literature on the determinants of firm productivity performance. To be consistent with the rest of the study, we have organised the material into the framework outlined in Figure 1.1. In this structure-conduct-performance framework, background business environmental factors are seen as affecting market structure and hence strategies for quality and productivity. Regulatory change changes this environment and hence impacts on market structure and on quality and productivity strategies. We thus consider the material under four loose headings: the business environment, deregulation, market structures, and business strategies.

(1) The Business Environment:

The first component under this heading concerns the overall institutional/economic environment in which firms operate. Relatively little has been written in this area. Maddison (1967) suggests that part of the explanation for the rapid growth in productivity in western nations in the 1950s and 1960s was the sustained full employment over that period. This in turn is identified with the adoption by many governments of Keynesian policies over that period and the macroeconomic stability associated with them. Similarly, "many scholars have noted that the post-1973 productivity slowdown (was) accompanied by higher average unemployment and inflation rates and stop and start economic policies" (Nelson, p.1034). Tobin (1980) concludes that inadequate macroeconomic policies are the cause of economic instability and slow growth over that period. However, in terms of the now well documented 1970s productivity slowdown, the problem was one of isolating causality - does slow growth cause poor productivity performance or vice versa? Alternatively, perhaps the key issue is one of instability and uncertainty rather than slow growth *per se*.⁴

The influence of trade is noted by some authors. In particular Nelson cites Abramovitz (1979) as contending that one factor explaining the 1950s and 1960s productivity gains was the rapid growth in international trade in goods, capital and technology in the post-Second World War period.

More generally, Kendrick discusses how the basic value system of a society will impact on productivity by the way it affects the development of social and economic institutions and practices (e.g. the style and emphasis of the education system). Similarly, the attitudes and ambitions of individuals within a society will be relevant since they have direct implications for "propensities to save, invest, and incur risks and willingness to adapt to change - all of (which) have a bearing on potential rates of productivity advance"

4. Hall (1980) discusses one mechanism by which stabilisation policy will impact on productivity - via its impact on capital formation. There is also a body of work on the impacts of increased uncertainty about inflation. Makin (1982) for instance, argues that it depresses economic activity, while Levi and Makin (1980) show how it may be negatively related to employment.

(p.70).

(2) *Regulatory Change:*

The focus of this study is what happens when this business environment changes; the particular change we are interested in occurs when a high degree of intervention, protection and assistance is removed from the private sector. There is a growing literature on deregulation and liberalisation, but relatively little on its effects on quality and productivity. What literature there is tends to be couched in terms of the impact of regulation - rather than deregulation - on firm performance. Here, two main types of intervention are focused on: industrial protection and industrial regulation.

The effect of trade protection policies is dealt with by Bernhardt (1981), among others. In considering sources of differences in productivity among Canadian and U.S. manufacturing industries he suggests that a high effective Canadian tariff may induce low productivity in two ways. First, "it may encourage self production as opposed to importing of inputs and minor parts of production lines, thus leading to excessive integration and diversification", and second, "it may encourage the building of a plant for Canadian production where aggregate sales of all products in a line are too small to justify efficient size." (p.504). In empirically examining relative Canadian/U.S. productivity in two particular years (1963 and 1972), conflicting results are produced. The effective tariff is not a significant explainer of relative net *labour* productivity in either year. However it is an important determinant of relative *total factor* productivity in 1963. Bernhardt speculates that "the tariff may have induced adjustments that affected the efficiency of capital use more than that of labour use", although it is not obvious why. (p.511)

In a similar type of study Goldar (1986) analyses sources of productivity change in Indian manufacturing. The econometric results suggest a significant negative relationship between levels of import substitution and total factor productivity growth. It is suggested that this is because protecting local industry has allowed inefficient firms and techniques of production to persist. Nonetheless in the context of a developing economy such as that of India, Goldar notes that these negative effects may, to a degree, be

offset by the fact that protection helps industries to grow, and that growth may be associated with learning by doing, adoption of new advanced technology and economies of scale which would not otherwise arise.

This "infant industry" proposition ignores the question of whether, in a wider sense, there are net benefits from such growth. Certainly other work such as Nishimizu and Robinson (1984), in considering 13 industries in four countries⁵, concludes that overall the empirical results are "consistent with the hypothesis that increased import substitution (import liberalisation) leads to lower (higher) total factor productivity growth, perhaps through reducing (increasing) competitive cost- reduction incentives" (p.198)

A further focus of research has been the impact of government regulation on technical change. Eads (1980) identifies four lines of association. First, regulation may result in the diversion of resources away from research. Second, regulation may alter the firm's ability to calculate what the returns to investment in R & D are. Eads suggests that the major source of this problem is uncertainty about future regulation with regard to the safety, health, and environmental impact of new products.⁶ The third effect of regulation on technological progress is that it changes the nature of research which firm's undertake. This point is connected to the previous one. Some large firms (Eads cites the case of chemical producers) may have been induced to devote more resources to "basic" research (e.g. toxicology) in an effort to "stay abreast of research that can overnight direct the regulatory spotlight at important segments of their businesses" (p.53) or to place them in a better position to respond to statutory monitors on their behaviour.⁷ Finally, Eads comments that regulation may change the "optimal institutional patterns for performing certain types of research". (p.51) His point here is that not only will regulation change the type of

5. Japan, Korea, Turkey and Yugoslavia

6. Firm's cannot be sure that a new development will not subsequently be legislated against in some way.

7. A possible example in New Zealand might be the need for mineral extraction companies to be familiar with issues related to the environmental impact of their activities.

research which firms engage in but also the way in which it is carried out. In particular the threat or existence of regulation of the type outlined above may produce incentives for firms in a given industry to collude when undertaking some types of research.

Several authors have analysed the effects of industrial subsidies and protection. (e.g. Martin, 1978; Martin and Page, 1983). These papers suggest that a major consequence of such policies is that they encourage satisficing rather than optimising managerial behaviour and/or encourage managers to engage in rent seeking activity thereby encouraging X-inefficiency. While this literature is not conclusive, it is evident that regulation (and hence deregulation) may be viewed as impacting on quality and productivity indirectly via its effects on market structure, or more directly via its effects on firm strategies. We turn to these next.

(3) Market Structure:

A considerable amount of research has focussed on the importance of market structure : this means testing characteristics of the firm (eg. plant size) and characteristics of the industry it operates in (eg. the level of competition) as explanatory variables.

The National Institute of Economic and Social Research (NIESR) has carried out a number of structural studies of this type in seeking to explain low British productivity in comparison with its trading partners.

Jones and Prais (1978) consider the impact of plant size in the motor vehicle industry. They conclude that there is a clear positive relationship between size and productivity but caution that large size in itself is not sufficient for success. In fact size has associated with it a particular set of problems, most notably poor labour-management relations.⁸ In the case of the U.K. they detail how problems in this area have produced a downward-spiral in performance. When profitability falls, the "tightness of resources" which follows may produce reductions in the quality of output, standard of management and potential for conflict. These factors in

.....
8. For the case of the steel industry, see Ayles (1982)

turn limit the likelihood of a profitability turnaround. Prais (1981) also takes up the issue of plant size and labour relations for the case of the U.K. generally. As he states, small scale plants are able to avoid the complexities and problems of large scale industrial organisations. That is to say "it is necessary to balance production and other economies of scale against managerial or organisational diseconomies of scale" (p.261). We will take up this issue in the following section on business strategies.

Smith *et al* (1982) bring together some of the NIESR work. Among other things, they cite scale of activity, plant size, vertical integration and degree of concentration as salient. In manufacturing, total scale of operation (i.e. firm size rather than plant size) is influential since large markets afford opportunities for specialisation. However, tests for an association between size of establishment and productivity are sensitive to the type of industry concerned. In the case of transport and construction, for example, establishment size has little practical meaning. Nevertheless, in industries where a comparison is possible they conclude that a clear positive relationship exists.⁹ The authors also conclude that degree of vertical integration is relevant. "In both pairs of country comparisons (U.K./U.S. and U.K./Germany) the results suggest that the more vertically integrated a British industry compared with its competitors, the better is its labour productivity performance" (p.97). They do not go on to explain why this might be the case, - it may just be a proxy for scale of production or it may reduce the transaction costs of operation.

In comparing British and American retailing, Smith and Hitchens (1983) dismiss the possibility that degree of specialisation might be a determining factor (since this varies greatly in retail establishments). However, they do establish size of unit as significant. American retail firms are two or three times larger than their British counterparts and this partly explain superior U.S. productivity performance. They estimate that scale is responsible for between 10 and 30 percent of measured productivity difference. Other reasons include more extensive use of self service techniques and a higher capital intensity in the U.S.

9. The study covered; agriculture, extractive industries, manufacturing, construction, public utilities, transport and communications.

The debate about plant and firm size and productivity is essentially concerned with the existence or otherwise of economies of scale. At a more aggregate industry level there has been some dispute over the empirical significance of the relationship. Kaldor (1966) believed that productivity growth depended on employment growth and therefore concluded that Britain's poor industrial performance could be partly traced to shortages of labour (i.e. industry was unable to realise the economies of scale available to it). Britain is contrasted with Japan, which over the period in question (early 1950s to mid 1960s), had surplus labour. Gomulka's (1971) alternative thesis is that productivity growth depends on the diffusion of knowledge and how well technological gaps are closed and that this in turn is a function of the economic and social organisation of a nation. Hence, he argues, Japan's post war economic success can be related to the fact that the economy was geared to the acquisition and application of overseas knowledge.

For the case of New Zealand, Bertram and McCalman (1981) have made some tentative estimates of the association between productivity and firm size in manufacturing. Looking at "net factor productivity"¹⁰ for the three census years from 1974/75 to 1976/77, they find that, "a clear and consistent pattern emerges - firms employing less than 10 persons display net factor productivity over 10 percent greater than average, and firms employing over 100 are more or less average, with some suggestion of a downward trend at the top end of the distribution." (p.2).

Part of the reason for this unexpected result would appear to be that while physical labour productivity does increase with firm size, so to do labour costs (larger firms on average pay higher wages). Further, although larger firms are shown to be more capital intensive, there is an apparent negative relationship between capital productivity and size of firm. The authors do not explore the underlying reasons for these patterns. However, when they disaggregate the data used into 123 sub- groups of the manufacturing sector, it becomes clear that there is considerable variation in the relationships referred to.

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10. That is "number of dollars of value added for each dollar spent on labour and capital services" (p.2).

Multinational corporations are now common in many industries. Bernhardt (1981) raises the point that for the host country foreign ownership may have an impact on relative productivity. In a positive sense it may provide access to low priced technical and managerial support and to offshore markets. Also access to the industry by foreign firms may improve efficiency via competitive forces. However, against this, in the case of Canada, he suggests there could be negative effects. Specifically, "if most of the larger firms in the source country enter the Canadian market their market shares in Canada will approximate those at home. Such shares of small Canadian markets... may induce excessive integration and diversification and/or sub-optimal plants" (p.504). Bernhardt's empirical analysis produces unclear results although Saunders (1980) earlier work indicates that for Canadian manufacturing the net effect of foreign ownership is negative.

Lichtenberg and Siegel (1988) question whether *changes* in ownership affect productivity. Their empirical analysis of a sample of U.S. manufacturing plants provides evidence consistent with the theory that firms "lacking a comparative advantage with respect to a given plant will sell (that) establishment to another corporation, leading on average to an improvement in the plant's economic performance" (p29), as measured by total factor productivity. Specifically, they show that change in ownership adds 0.5 percent to total factor productivity growth between 1974 and 1980.¹¹ Most of this growth comes from those plants which changed hands early in the period (0.8 percent for them), implying that it may take several years for gains to become evident. As would be expected, they also show that plants with low productivity are those most likely to experience a change in ownership.

(4) *Business Strategies:*

Under the heading of business strategies comes the literature assessing the importance of firm conduct on quality and productivity. These are the things that managers and owners have some control over in their struggle to pursue the firms' objectives.

11. This figure may appear low, however the period covered was one of productivity slowdown economy-wide. Between 1974-1980 the average productivity change for all plants was -0.3 percent.

The economic literature has concentrated on several types of strategy : technological change, labour use, organisational structure, and managerial efficiency.

Leibenstein (1966) noted the unrealism of the neoclassical assumption that firms always make optimal decisions. He argues that we should allow for individuals within firms behaving less than optimally (e.g. not always working as hard as they could or searching for and utilising information as effectively as they could).

While there has subsequently been some dispute over the meaning and interpretation of Leibenstein's concept of "X-efficiency", within the literature on productivity performance, problems of this nature are frequently raised.

The most common theme of this type is that of industrial relations. As earlier noted, many of the NIESR studies refer to labour relations problems in comparisons of British productivity with that of other industrialised nations. An example is Aylen's (1982) study of the U.K. steel industry. Compared with European plants Aylen found that British steel works were overmanned in terms of maintenance, largely because of demarcation disputes. This in turn was a function of the large number of unions which also produced other problems such as very complex pay structures and negotiation procedures. The studies of both Smith *et al* (1982) and Prais (1981) cite similar problems in the case of the U.K.

However, usually the precise empirical significance of industrial relations matters is difficult to assess. Norsworthy and Zdabala (1985) have attempted to do this by developing an index of worker behaviour and attitudes in the U.S. auto industry based on plant level data on grievances, quits and unauthorised strike activity. Using this data they were able to show that in 1976 a 10 percent improvement in the index (i.e. less quits, grievances, etc.) would improve productivity (and lower unit costs) by about 5 per cent. They make no attempt to isolate the causes of the negative attitudes.

Arising out of an interest in the relative wage effects of trade unions, some U.S. research has shown that productivity in unionised plants is higher than that of similar non-unionised plants. There are several possible explanations for this. One is that because unionised

firms have to pay higher wage rates they are careful about choosing higher productivity workers. Second, and relatedly, it may be that once unionised, firms may push in various ways for higher productivity. In particular they may expand to achieve economies of scale. This is consistent with overseas research which shows that unions tend to be concentrated in larger firms. Alternatively unions may more directly enhance efficiency by acting as agents for workers in evaluating and negotiating potentially complex wage and benefit packages. They also provide a direct mechanism for collective representation of grievances and in this sense may actually reduce conflict (see Freeman and Medoff, 1984).

Other than industrial relations *per se*, there is an extensive literature on the broader aspects of organisational forms and productivity. Ouchi (1982), for instance, compares the relative success of Japanese businesses against those of the U.S. and contends that the key difference is in the form of firms' organisation and social integration. The Japanese operate on the basis of the firm as an "industrial clan" where the development of strong social networks and relationships are crucial. This contrasts with American companies which emphasise individual decision making and responsibility and specialised career paths.

Armandi and Mills (1985) identify several specific aspects of firm organisation that affect efficiency. These include the degree of complexity (negative effect), formalisation of tasks (negative), stratification (i.e. income and prestige differentials between different levels of the hierarchy; positive), and "span of control" (number of employees under the supervision of each manager; positive). These factors are found to explain 20 percent of the variation in overall organisational efficiency (measured by profitability and productivity) and 8 percent of the variation in managerial efficiency (i.e. the performance of just the managerial group).

At the most general level, Williamson's (1975, 1981) transactions costs approach to the development of the modern corporation attempts to explain the origins of different forms of internal organisation. He asserts, for example, that firms with a decentralised multidivisional structure (M-form) will tend to perform better than the more traditionally organised firms with centralised departments¹² (U-form), because the M-form structures better

encourage profit maximising goals within the organisation. A number of tests of Williamson's hypothesis suggest M-form structures do, on average, perform better (see eg. Hill, 1985; Armour and Teece, 1978).

The final category of strategic determinants of productivity is that related to technology. There are three aspects to this which arise in the literature: the generation of new technology (research and development, innovation), the diffusion of technology and quality of capital employed by firms, and the quality of the workforce (investments in human capital).

Kamien and Schwatz (1975) like many authors tend to be concerned with innovation in the narrow sense of specific research and development activities. The important point which they make is that technical advance is not exogenous, but is intimately related to the firm's continuing quest for profit and the associated on-going reallocation of resources.¹³ Not only do these processes affect inventive activity but there are feedback effects, "the state of knowledge shaping and being shaped by profit opportunities and availability of resources" (p.31). Their survey indicates that R & D activity will have increasing returns up to some threshold level of resource commitment and decreasing returns beyond. This threshold may constitute an entry barrier in some industries.

A common hypothesis is that an industry with large firms which have a degree of monopoly power will be the most technologically progressive (ie. that the market structure affects firm performance). Related hypotheses include the ideas that large diversified firms will undertake more research than small single product firms, and that large firms will attract the best innovative talent. Kamien and Schwartz can find little empirical support for these propositions.¹⁴

12. ie sales, production, finance, etc.

13. In particular the extent of resources devoted to R & D.

14. For example there is no direct relationship between firm size and inventive activity. Up to some point (in some industries), there is a positive relationship, but many small firms are highly inventive and often have the best innovative talent. Also there appears to be no clear-cut relationship between R & D activity and degree of concentration in an industry or between diversification and R & D.

Griliches (1980) addresses the relationship between R & D and productivity in testing whether declines in R & D expenditures in the mid 1970s contributed to the U.S. productivity slowdown of that period. His data is suggestive of a significant but small effect of R & D on productivity, however he cautions that the relationship is empirically difficult to isolate.

It is important to distinguish between the development of new production techniques and the diffusion and utilisation of those techniques. Bernhardt's (1981) concern is with the adoption of new technology. He cites evidence that nations which rely on imports of new technology tend to do worse in industries with rapidly developing production methods compared with mature industries which have established technologies. An explanation of this is that technology importing nations start learning the technology later than the exporting nations. When the importer is small and its output is also small, the learning process may take time and this induces low *relative* productivity. Bernhardt believes this to have been the case for Canadian manufacturing.

A major part of the study of the use of capital stock and diffusion of new technology relates to the age of capital employed. So-called "vintage models" (see e.g. Salter, 1966) have attempted to explicitly allow for the fact that the capital stock within a given industry will be heterogeneous due to age differences. If newer capital implies better technology then age differences will *inter alia* explain productivity differences. Gregory and James (1973) test two propositions for the case of Australian manufacturing. First, do new factories embody best available technology, and second, does the vintage model explain productivity differences? They conclude that new factories do not necessarily use the latest technology (depending on cost, availability and uncertainty) and, consequently, the vintage model is unsatisfactory in explaining productivity differences.

In comparing British and German productivity, Daly *et al* (1985) examine the quality of machinery used in a matched sample of manufacturing plants in each country. Although British firms

tended to have slightly higher manning levels than German ones, the level had fallen greatly in the preceeding four years. The age of machinery was not significantly different between countries. The main source of contrast was that German machines tended to be more technically advanced and broke down less often. However the major explanation for poorer British productivity related not to the use and advancement of capital stock but rather to the comparative lack of technical expertise and training of staff.

Overall, it should be remembered that the structure-conduct-performance framework used here vastly over-simplifies the nature of the quality and productivity improvement process, which is riddled with feedback loops rather than one-way lines of causation. We therefore end this section by returning to some environmental influences.

Our emphasis has primarily been on factors of medium and longer term relevance to productivity. Nevertheless as Kendrick (1977) has pointed out there are a number of short run influences which may impact on a firm's productivity performance at any one time. The most obvious of these are cyclical output changes, there being a well established pro-cyclical pattern in labour productivity movements (e.g. labour hoarding in downturns). Other examples, which Kendrick cites, are the fall in productivity resulting from learning requirements associated with the adoption of new technology and the cyclical nature of new investment patterns.

There are also some further dynamic issues raised. In particular some papers have examined the process of resource allocation from low productivity sectors to high productivity sectors (e.g. Kuznets, 1966), although by definition these studies are interested in explaining macro productivity changes. At a micro level Nadiri (1970) reminds us that the speed with which firms are able to maximise potential productivity depends in part on their ability to substitute one factor for another.¹⁵ Also, if technical change is biased towards the use of a particular factor and it is in short supply and/or its cost is relatively high (e.g. temporarily high interests rates, shortages of skilled labour), then potential productivity gains may

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15. i.e. technically, it depends on the elasticity of substitution

not be achieved in the short run. This may be particularly relevant to an economy such as New Zealand's which is undergoing rapid structural change.

2.3 Economic Views of Quality

Although there is now a well developed literature on productivity, issues of quality are not often addressed by economists. This largely reflects its nature as a less easily defined, less quantifiable concept. Further, the traditional neoclassical model assumes homogenous goods, ignoring product attributes such as reliability, or design.

In the field of consumer theory, one of the rare attempts to explicitly integrate issues of quality into the analysis is provided by Lancaster (1966a, 1966b). In the standard framework a good is a good regardless of quality, thus there will, for instance, be no distinction between a car which is reliable and one which is not - except to say that consumer "tastes" may differ between "good" and "bad" cars.¹⁶ Lancaster sidesteps this problem by arguing that it is not the goods themselves which consumers desire but rather the "characteristics" of the goods. Typically any given product will possess a range of characteristics (e.g. a car has as characteristics; the ability to transport, some degree of reliability, colour etc) which will vary among products of a given type. An increase in quality might therefore be defined as an increase in one or more of the characteristics.

Lancaster's alternative approach to consumer theory does not appear to have been pursued subsequently. However, in microeconomic theory some attention is paid to quality in the area of signalling or screening of product attributes. There are two strands to this. Shapiro (1983) has considered the relationship between product quality and a firm's reputation. In particular, the quality of products produced in the past signals quality in current periods, since this may not be easily observable by consumers. Shapiro argues that if a firm initially enters the high quality segment of the market for a

16. An alternative might be to characterise "good" and "bad" cars as different goods. A problem with this approach (as Akerlof (1970) shows) is that consumers may not, ex ante be able to perceive a difference between the two goods.

particular good or service, it may be prepared to sell below cost, since it needs to establish a reputation as a high quality producer. Reputation can therefore be viewed as an input into the production function - an intangible investment.

The second strand to the microeconomic work on signalling deals with the connection between price and quality. A number of writers have noted that not only can price be dependant on quality but quality can itself be dependant on price, if, in the absence of other information, price is used as a proxy to signal quality.¹⁷

One implication of this is that even when a firm discovers a cheaper way of producing a product it may be reluctant to reduce its price as this might signal a reduction in quality. The extent of this effect is likely to depend on the relevant product cycle stage. For newer products technological changes and price changes can be expected to occur frequently and so consumers are less likely to interpret price falls as reflecting quality declines.

In the recent empirical literature on international competitiveness some mention is made of the role of quality in determining the export demand for a product, and in insulating tradeables to some extent against exchange rates movements. In this sense quality is considered in terms of "non-price competitiveness". This work is reviewed in Section 2.5.

2.4 The Link Between Quality and Productivity

Attention to quality in the process of production can have a substantial impact on the total costs which a firm faces. That is to say, internal quality is not just about detecting defects, but also ensuring they do not occur in the first place and thus minimising wastage and subsequent repair costs and enhancing the firm's overall productivity. For example, the OECD cites studies which show that in the U.S. as much as 25 percent of the price of a car is directly attributable to poor quality (ie. scrappage, reject parts, inspection, repair and warranty costs), and in one U.S. computer firm one

17. An early contribution from Gabor and Granger (1966) empirically establishes the relationship with a survey of a selection of products in the United Kingdom and Stiglitz (1987) provides a useful survey of subsequent work.

quarter of all assets were allocated specifically to dealing with quality problems. Not surprisingly therefore, Garvin (1983) has shown, in a comparative study of Japanese and U.S. manufacturers, that not only does higher quality lead to lower unit costs, but the highest quality producers are also those with the highest (labour) productivity. Also, in a less direct sense, the two concepts are linked since product quality may be part of a wider commitment to quality, including that of labour and capital. This is the theme of writers such as Ouchi (1981).

This point also brings us back to our earlier discussion of methods of organisation and management. The case of Japan is, of course, the most commonly cited one, where the organisation of the workplace (in large firms at least) is frequently designed around concerns for both high quality and high productivity production. Indeed, in many ways the two goals are inseparable and are subsumed under the wider goal of overall efficiency. An obvious example of this is *ringi seido* or bottom-up management which is operationalised by way of quality circles (Bradley and Hill, 1983). In theory, an important function of these "alternative" forms of organisation is that they indirectly affect productivity by increasing employee participation in job related decisions and thereby enhance job satisfaction and morale.

This theme also occurs in the literature on productivity and the quality of human capital. Daly (1986) for instance compares the educational qualifications of the U.S. and U.K. labour forces in considering the education/productivity link. An interesting conclusion to emerge is that not only does the U.K. labour force clearly have lower levels of educational attainment but the divergence is not consistent across different educational qualifications. In particular, the largest gap is in management and business studies. This is consistent with Cave's (1980) thesis that Britain has lagged behind the U.S. in "management intensive" industries. Daly found that the nations also differed in a further respect: the U.S. tends to use its available labour more effectively because of more flexible staffing practices. In the U.S. there are fewer demarcation problems between crafts and between skilled and unskilled workers and generally fewer restrictions on entry to a craft. These sorts of factors may be important in the sense that increasing investments in human capital will not necessarily have a

positive return if inflexible use of labour persists.

Notwithstanding these qualifications it should also be noted that not only does the quality of a firm's labour force directly affect productivity but there may also be indirect effects. Most notably there is a connection between investments in human capital and technological advancement. There is evidence to suggest for instance, that educated people are not only more productive (generally) but they also make good innovators and thus labour force quality affects the speed of both the development of new technology and its diffusion. (Nelson and Phelps, 1966).

Although, as we have noted, economic research has been more interested in productivity than quality, the above points suggest that the whole literature on managerial/organisational efficiency in fact has a direct relevance to issues of quality, since achieving quality is closely related to managerial and organisational structure.

2.5 Changes in Performance : Overseas Evidence

While much has been written about the *determinants* of varying productivity performance, whether it be between countries or within industries, there is relatively little major research on *changes* in productivity performance. Here we are interested in the factors which motivate change, the methods employed to achieve it, and the constraints which firms and industries face.

The Australian Bureau of Industry Economics (BIE) had provided two case studies of structural change where many of these issues are raised. In the first instance the BIE (1983a) examines the Australian white goods industry. Three pressures for change in the industry could be identified: declining demand because the product was in the mature stage of its life cycle; continuing cost pressures relating to both labour costs and the price of imported materials; and reductions in import protection. Since the sector had originally developed in response to protection it was characterised by low productivity (in international terms), this being a function primarily of inadequate plant scale and the use of outdated technology. Restructuring consisted of mergers, plant closures, streamlining of distribution networks, and investment in larger, more modern facilities. In the late 1970s substantial improvements in productivity and price

competitiveness resulted.

Similar patterns were noted in the case of the Australian footwear industry (BIE, 1983b). The industry not only faced problems of scale due to the small size of the domestic market (and requirements for variety of product) but over a period of years its natural cost protection (i.e. proximity to the market) had been eroded because of better world communications and delivery systems and the increasing sophistication of Asian producers. The labour intensive nature of footwear production placed Australia at a comparative disadvantage internationally. Again restructuring took the form of mergers and plant closures. Unlike the white goods sector the footwear industry did not generally shift towards new technology. Poor profitability in earlier periods meant most firms could not afford to make large outlays on new equipment - a classic bind for industries facing the need to change. Instead firms focused on changing management and production practices with a given capital stock.

There are numerous management oriented studies which examine the general question of how firms become more successful. An example is Mayes (1986) who analyses "how companies achieve sharp and sustained improvements in performance".¹⁸ Of the 25 "sharpbenders" which are studied in depth, two key strategies for success are evident. First, the firms were prepared to invest in the future by acquiring new plant and equipment and the facilities and staff that would help them develop new ideas for the future. Second, a range of methods were employed to reduce X-inefficiency. Dominant among these was a change in the chief executive, but they also included a general cutting out of waste and reduction in overheads, improved organisation of the firm's activities, and establishment of better monitoring systems.¹⁹

Shetty (1982) has investigated the experiences of a range of U.S. corporations who have implemented specific productivity improvement programmes in order to isolate the essential elements which are common to each. He establishes that for such efforts to be

18. Measures of which included labour and capital productivity

19. For a similar sort of analysis of American businesses see Peters and Waterman (1984).

successful the following characteristics are required: top management must be wholly committed to the programme; an organisational arrangement which has one person ultimately responsible for the programme; well developed communication flows throughout the organisation²⁰; and a well developed system of monitoring, evaluation and feedback built into the system. While these requirements do, in a sense, appear trivial, they do reinforce the importance of the internal workings of the firm.

In the area of quality (rather than productivity) improvement, this focus on internal processes is common. An example is the study of Rehder and Anderson (1984) who have concluded that those companies which are able to achieve a goal of overall quality commitment share the following features:

- a sustained commitment to, and understanding of, the need for quality by senior management;
- a strong customer orientation throughout the firm;
- a commitment to employee training particularly with respect to supporting the development of quality systems; and,
- a well developed "social-technical" system for monitoring quality performance and adapting production methods

These findings closely mirror those of Shetty in considering productivity.

One of the few studies that directly links productivity *and* quality change to changing economic circumstances is that of Marin (1985). Specifically, her paper looks at the impact of real exchange rate appreciation on the productivity and quality of Austrian manufacturing industries. In outlining theories of the exchange rate/structural change relationship, Marin nominates three possible approaches.

(a) The product cycle model.

Here the extent of exchange rate changes on a product depends on the stage of the cycle the product is in. In the early stage there is

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20. Both between labour and management and between departments.

little effect because the "newness" of the product implies inelastic demand both locally and in foreign markets. As the firm begins to produce a more standardised product and the growth phase of the cycle is entered, demand becomes more sensitive to price and the exchange rate effect strengthens. As we have seen in the case of the white goods industries, once a product is "mature" it is much more exposed to import competition.

(b) The import-led-growth model.

In this model productivity growth is largely dependent on the rate of diffusion of foreign-made innovations (as in Gomulka, 1971). An appreciating real exchange rate makes imported technology cheaper and places a direct cost pressure on domestic firms to search for ways to become more competitive.

(c) The export-led-growth model.

In contrast to the other two models the export-led-growth theory postulates a *negative* relationship between the real exchange rate and productivity/quality. In a small open economy export growth is assumed to be a crucial determinant of overall output and investment. Exchange rate appreciations depress export demand and this has two flow-on effects. On the one hand lower output growth leads to lower productivity growth.²¹ On the other hand, lower export growth limits new investment and this in turn is eventually reflected in lower total factor productivity. As competitiveness further declines a vicious circle may develop.

Marin's empirical work attempts to test for the exchange rate effect on both productivity and quality (defined widely as non-price competitiveness). It shows that in all industries (except the machine and steel industry) "actions were taken to protect competitiveness by increasing productivity and efficiency". Further, "most industries tried to meet the revaluation-induced increase in foreign competition by improving the non-price characteristics of their products. This activity diminished export price elasticities thus making exporters less vulnerable to exchange rate appreciations". (p.486) In line with

21. As implied by "Verdoon's Law".

this there seems to have been, in some cases, a shift away from older, more price elastic products, and towards newer products where competitiveness is easier to maintain.

A particularly interesting observation from the study is that exchange rate increases actually had a positive effect on exporters' cash flows in the *short run* and this greatly enhanced their ability to finance technical and organisational innovations. Marin explains: "this liquidity increase occurred because appreciations reduced costs of imported inputs immediately; short-term export performance, however, remained unchanged since foreign demand only slowly responded to revaluation-induced export price increases. In the medium term, export earnings were not reduced substantially by the exchange rate in most Austrian industries so that investment in innovations seems not to have been seriously hampered by reduced export profits". (p.487)

Connell (1979) has investigated the extent to which non-price competitiveness can explain differences in the export success of West Germany, France and the U.K. between 1962 and 1976. In both cases it appeared from data on relative export volumes and relative values per tonne of exports that part of the U.K.'s declining export market share was due to falling non-price competitiveness and a related failure of U.K. firms to devote resources to the design and development of new products.

Brech and Stout (1981) confirm this with a similar study which shows that despite a steadily depreciating currency between 1970 and 1980 - which should have made manufactured exports²² from Britain more competitive - market share declined. They conclude that although depreciation resulted in a higher value of exports it also produced an overall deterioration in export performance because of the substitution of low for high unit value goods. In other words U.K. manufacturers, faced with increasing price competitiveness, allowed quality to decline.

22. Specifically, machine tools.

2.6 Changes in Performance : The Case of New Zealand

At an industry level, Campbell (1984) uses a growth accounting framework to estimate changes in total input productivity for 93 New Zealand manufacturing industries from 1952 to 1973. Importantly, he is able to isolate industry characteristics which appear to influence productivity growth rates. The most prominent of these is the industry's growth rate which has a significant positive association with productivity,²³ (presumably via its correlation with innovation) and a negative association with the volatility of growth (proxying uncertainty). Other positive influences were, the degree of foreign control and the degree of industry protection. The latter result is a little surprising. Campbell speculates that it implies the benefits of market security outweigh the costs resulting from lack of competition. Surprisingly, productivity was negatively related to growth in plant and equipment and numbers of establishments. This probably reflects measurement problems since the analysis makes no adjustment for rates of capacity utilisation. Finally, Campbell notes that there is no evidence that rates of unionisation have adverse effects on productivity, - the correlation was statistically insignificant.

Unfortunately there is little detailed information available on performance change in New Zealand at a firm level. Two studies by the Department of Trade and Industry on post-1984 responses to liberalisation are an exception. The surveys involved in-depth interviews with 30 manufacturing firms and were conducted in the middle of 1985 and 1987.

Since the first survey (Roseveare *et al*, 1986) was conducted only 12 months after policy reform began, the responses are somewhat less revealing than in the second survey. For example, while most respondents felt at the time that liberalisation would produce a more efficient economy overall, it was generally too early to state whether efficiency gains had actually been made. What did, however, emerge in more detail was information on the constraints firms faced in responding to policy change.

23. Even when the data is adjusted for scale effects.

A majority saw high interest rates as a problem mainly because they affected the firm's ability to invest in more technically advanced replacement capital. More than a third of companies were experiencing difficulties in employing both skilled and unskilled labour. As might be expected a long term barrier identified by many participants was the combination of a small and geographically wide-spread population. A final, more general, problem which several firms noted was that "our national attitude to work, change, and productivity were all undermining our ability to perform as a nation" (p.47). This recalls Kendrick's belief that the basic value system of a society influences its achievements (albeit in relation to a small, "biased" sample of respondents).

The 1987 survey (Staley *et al*, 1988) provides a more interesting longer term perspective on post- 1984 changes. The major points of interest are:

(a) Historically high nominal and real interest rates had produced more efficient stock management, discouraged short term investment and discouraged informal research and development activities which were normally funded via cash surpluses. They did not appear to have affected longer term investment plans or well established R & D activities.

(b) There was no evidence that the high exchange rate had encouraged the importing of overseas technology. However one interesting comment to emerge was that second-hand machinery was now relatively cheap because of the number of firms which were exiting the industry.

(c) The impact of increasing import competition had varying effects depending on the product market structure. With regard to finished goods a number of firms had started or increased importing to extend their range of finished goods²⁴ while others had either deliberately sought to produce a higher quality product (than the generally low standard imports) or had shifted to a lower priced, lower quality product. The two companies that had developed new products had subsequently found themselves competing with much

24. Only one had replaced its own lines with imports

cheaper Asian copies.

(d) 20 of the 30 firms had increased their spending on capital equipment. In some cases this was to substitute away from labour inputs. Six of the 20 firms said the new investment had decreased repairs and maintenance.

(e) A majority of firms had reorganised their output by cutting out or reducing less profitable lines and either decreasing their range or introducing new lines.

(f) Most respondents felt that the economy overall was more efficient and often cited changes in their own firms as evidence of that.

(g) Changes in management structure and methods were common: 11 firms had experienced ownership changes; 26 firms had changed their management techniques; many had shifted towards more emphasis on marketing, sales and financial management skills; most had increased their focus on quality (13 had changed their quality control) both to reduce the costs incurred because of poor quality and increase the non-price competitiveness of their product.

2.7 Summary

Most of the economics literature surveyed has focused on factors affecting *levels* of firm or industry performance rather than *changes* in performance. Furthermore, most research has addressed issues of productivity rather than quality, in a direct sense. However, productivity and quality are closely aligned concepts and, indirectly, much of the literature on X-efficiency and firm organisation is about internal quality.

We have divided the factors affecting productivity levels into four broad categories and within these identified more specific influences. We have summarised these and their impacts in Table 2.1.

With regard to changes in performance, the major points which emerge are:

- The stage in the product life cycle matters : more mature goods have higher price elasticities of demand and are therefore more difficult to defend against competition.
- Past profitability matters : poorly performing firms often do not have the resources to make the sort of major changes which are required (eg. changing capital stock, location, etc). Instead they focus on changing management and production practices within their existing plant.
- "Investing in the future" is important : this is particularly true of staff training and development, but also includes investments in new capital, techniques, products and research.
- Reducing x-inefficiency is important : this often takes the form of changing management structures and personnel, improving internal organisation processes, and setting up systems to monitor performance.
- Deregulation affects firms not only via industry specific microeconomic policy changes, but also macroeconomic policies. This is particularly evident in relation to exchange rate pressure (where increasing non-price competitiveness is a frequent strategy) and interest rate increases (which particularly affect stock management and capital investment).
- Differences in industry structure and growth rates will affect firms ability to respond to changed circumstances.
- In the New Zealand context, responses to deregulation have been very wide-ranging, including: switches to importing, increased capital intensity, changed product lines, and changes in management structure and organisation.

Table 2.1 : Factors Affecting Productivity

Factor:	Predicted	Effect: Actual
<i>(1) Business Environment</i>		
- economic growth	+ve	+ve but few studies
- instability/uncertainty	-ve	-ve " " "
- international trade growth	+ve	+ve " " "
<i>(2) Regulatory Environment</i>		
- trade protection	-ve	generally -ve, but +ve for one NZ study
- industry subsidies	-ve	inconclusive, many effects indirect
<i>(3) Market Structure</i>		
- plant size ¹	+ve	+ve but has some negative impacts
- firm size ¹	+ve	as above
- vertical integration	+ve	+ve but only one study
- degree of specialisation	+ve	insignificant, one study only
- foreign ownership	+ve or -ve	-ve in o/s study, +ve in NZ case
- changes in ownership	+ve	+ve
<i>(4) Business Strategies</i>		
- poor industrial relations	-ve	-ve
- unionisation	+ve or -ve	+ve
- organisational structures	depends on measure	depends on measure
- innovation/R&D	+ve	+ve but difficult to isolate
- age of capital stock	-ve	unclear
- quality of capital stock	+ve	unclear, few studies
- quality of labour	+ve	+ve

1. Depends on industry concerned.

III THE SURVEY

This project is based on an in-depth survey of 200 firms in New Zealand. Because we were primarily interested in the effects of regulatory change the procedure used to select the population involved listing 20 industrial sectors in each of which one or more types of regulatory change had taken place. The sectors included manufacturing, importing, retailing, construction, transport and other services. The list of industries covered is noted in the table . However the aim of the questionnaire is not to reveal anything about steelmaking, stockbroking or supermarkets, so much as to examine the collective experience of industries subject to regulatory change.

Having determined the population, the sample of 200 activity units to survey was selected randomly from the Department of Statistics Business Register within the specified industrial groupings. Within these industries the sample selected should be representative regionally, by size and other characteristics. Such stratified sampling will not necessarily imply that the sample is representative of all New Zealand secondary and tertiary productive activity, though we do not believe there are major differences in this case. The one exception to this is the few very small businesses surveyed.

A written questionnaire was devised after considerable pilot testing by the authors, and this posed a series of questions relating to quality and productivity, strategy, market conditions, and regulatory change. The questionnaire was administered in person by Department of Trade and Industry staff. Eighty percent of respondents answered on the basis of their firm, the rest (answered) for divisions of firms. In 70% of cases answers were given by the General Manager of the activity unit. The interviews typically took around an hour, and required the respondents to give quantitative, ranked, and descriptive answers. The questionnaire is reproduced in the appendix. Many questions asked for responses during the last five years and the next five years. In 34% of cases the respondents nominated shorter periods as the unit of analysis.

The median firm surveyed was a private manufacturing company, employing a workforce of 110 and with sales of \$18 million. Table 3.1 gives some statistical details on the sample firms.

Table 3.1 : Characteristics of Respondent Firms

Chief Industrial classification	No.	Ownership	No.	No. Employed		Size of Firm	
					(%)	Sales (\$M)	(%)
Retail	38	Public coy	72	1 - 25	20	0- 4	22
Wholesale	14	Private coy	105	26 - 75	19	5-14	19
Manufacturing	106	State owned					
Construction	6	enterprise	6	76 - 155	21	15-27	19
Transport	8	Partnership	9	156 - 430	19	28-70	21
Other services	25	Proprietorship	2	431 +	21	70 +	19

IV THE RESPONSE

This section outlines how the respondents answered the survey questions. We follow the same structural framework as laid out in Figure 1.1.

4.1 Regulatory Change

**Table 4.1 : Incidence of Deregulation (last 5 years)
(% of respondents)**

	Occurred	Did not occur
Reduction in import protection	75	20
Relaxation of price controls	50	48
Removal of legal entry barriers	31	63
Labour market deregulation	19	76

Source: Survey Q14

Table 4.1 indicates that most firms had experienced the relaxation of restrictions on foreign access to New Zealand markets (tariff or quota reductions), and the eroding of price controls²⁵. Rather fewer have experienced entry deregulation or a reduction of restrictions in the labour markets. Clearly most had also experienced more general effects of increased competitive pressures in their own market, and direct deregulation in upstream and downstream markets.

4.2 Market Structure

Respondents were questioned about the rate of output growth and technological change in their industry. The results are shown in Table 4.2. The industries showed a wide spread with 21% of respondents labelling theirs as "declining" and 13% reporting very high growth rate. Four percent of respondents reported they were in technologically declining industries, while 20% felt theirs was enjoying very high technological growth. Most respondents report moderate growth of output and moderate technology development. Similarly, 42% of respondents described their product as being in a

25. Figures in some tables may not add to 100 percent since not all firms answered all questions.

Table 4.2 : Industry Maturity

Rate of Change in Industry

	Decline (-0% pa)	Low (0-2% pa)	Moderate (3-5% pa)	High (6-10% pa)	Very high (10%+ pa)
Growth of output:					
last 5 years	21	19	24	19	13
next 5 years	17	30	27	15	7
Rate of technical change:					
last 5 years	4	17	29	28	20
next 5 years	2	13	34	30	18
Stage in product life cycle	Declining	Mature	Growth	High growth	
	15	42	31	9	

Source: Survey Q10

Table 4.3 : Market Competition

	Average Proportion of New Zealand Market met by: (%)		
	Foreign-owned competitors	Three biggest domestic suppliers	Respondent firm
Currently	33	68	34
Next 5 years	38	69	36

Source: Survey Q12

Table 4.4 : Firm Size

Employees	(No.)	1-25	26-75	76-155	156-430	431+
	(%)	20	19	21	19	21
Sales or turnover	(\$M)	1-4	4-14	14-27	27-70	70+
	(%)	22	19	19	21	19

Source : Survey Q15

"mature" phase, while 31% considered theirs in a "growth" phase of the product life cycle.

Average expected growth over the next five years at 2.6% is significantly lower (at the 5% level)²⁶ than the average growth experienced over the last five years of 2.8%. The small rise in the average rate of technical advance from 3.47% to 3.52% is not significantly different from zero however.

In an attempt to assess the level of competition in the market, respondents were asked what proportion of the New Zealand market for their product or service is met by foreign-owned competitors compared with domestic suppliers. These questions appear however to have been interpreted as the proportion of the New Zealand market sourced from abroad and from domestic supplies. On average one third of the market appeared to be sourced from abroad and this is expected to increase, the difference being significant at the 10% level. Markets generally seemed relatively highly concentrated, with two thirds supplied by the three biggest domestic suppliers. This is not expected to change in the next five years. However, respondents expect their own market share to increase slightly, on average, the difference being significant at the 5% level.

Table 4.4 illustrates the distribution of firm size in the sample. It shows a wide range of respondents, but indicates that our typical sample firm is larger than the average for the New Zealand population.

Table 4.5 lists the composition of the workforce of respondent firms by education and unionisation. On average, three quarters of our firms' workforces is unionised; half has no school qualifications (a high proportion compared with other western countries); and a quarter have post-school qualifications.

26. This measure of statistical significance means that we can be 95% certain that a difference between the growth rates actually exists.

Table 4.5 : Firm Workforce

Proportion of workforce: (average over responding firms)	(%)
Post-school qualifications	24
School qualifications	28
No school qualifications	48
Unionised	78

Source: Survey Q14

The average age of plant and machinery among respondents was 8.5 years, with 17% reporting plant older than 15 years (table 4.6). On average, the cost of research and product development was about 4% of the value of sales. But this includes one small start-up manufacturer with R & D as 100% of sales. The modal response was 1% for the 92 firms who answered this question. The majority (106 firms) did not respond to this question.

With regard to firm ownership (table 4.7) a staggering 45% of respondents reported a significant change in their firm's ownership over the last five years, a reflection of the highly dynamic nature of New Zealand corporate life in the industries selected. Three quarters of these considered the ownership change altered effective control of the firm. One third of all respondents reported some degree of foreign ownership.

Half of the firms reported some export of products offshore and, of those, on average 23% of output was exported. This is expected to increase slightly to 25.4%, the difference being significant at the 1% level. Eighteen percent of those who export send the majority of their production offshore.

4.3 Strategies

While respondents were questioned in a general way about the nature of strategies for quality and productivity, they were also given a checklist and asked to indicate their own strategies. The frequency of replies is indicated in the table 4.8. The quality improvement strategies most frequently cited were quality assurance programmes

Table 4.6 : Firm Assets and R & D

(a) Average age of plant and equipment

(Years)	(% of respondents)
1 - 3	26
4 - 6	26
7 - 10	25
11 - 40	23

(b) Research and product development

(% of sales)	(% of respondents)
1	46
2	19
3 - 4	13
5-100	22

Source: Survey Q15

Table 4.7 : Firm Ownership (% of respondents)

(a) Change in Ownership

Recent Change		No Change
Change in effective control	No change in effective control	
34	11	56

(b) Extent of Foreign Ownership (% of equity)

0%	1-49%	50-99%	100%
68	9	8	16

Source: Survey Q11

Table 4.8 : Some Detailed Quality and Productivity Strategies

	Nos Reporting Use	
	Last 5 years	Next 5 years
Quality Improvement Strategies		
Complete redesign of product	39	42
Complete redesign of service	57	47
Style change to product	60	44
Change to presentation of service	86	56
Speed of service	104	92
Range of features included	70	75
Range of options offered	84	82
Quality control	109	106
Quality assurance	115	129
Quality Management	110	111
Product availability	83	82
Service availability	77	76
Product presentation	78	71
Service presentation	55	61
New labour work-practices	79	82
Staff training	116	113
New arrangements with suppliers, distributors etc	59	66
New management practices	47	40
New organisation structure	53	38
New marketing programmes	50	65
Other	4	8
Operating Efficiency		
New labour work-practices	89	95
Reduced staffing/hours	70	70
New composition of workforce	53	65
Changed use of subcontractors	33	41
Reduce materials use	61	63
Reduce energy use	66	62
Substitution: materials	31	36
Use new materials	44	62
Staff training	122	131
New computer systems	140	119

New arrangements with suppliers, distributors etc	73	80
New accounting systems	76	75
New management information systems	115	104
New organisation structure	77	67
New management practices	44	47
Other	3	8

Asset Efficiency

New building	65	51
New location	41	46
Reduce average age of equipment	59	59
Buy new equipment	125	110
Buy used equipment	39	27
Sell old equipment	58	65
Retooling and other plant modifications	65	56
Change maintenance regime	57	46
Change output for economies of scale	52	75
New operating regime	77	82
Improve capacity utilisation	79	108
New inventory controls	94	91
Change warehousing systems	64	57
New organisation structure	54	52
New credits/collectns system	66	54
Other	2	4

Source: Q7 & 8

for customers, staff training, firm-wide quality management, quality control programmes to deliver specified quality, and speed of service. These were mentioned by over half of respondents. At the other end of the scale fewer than a quarter cited redesign of product or service, new organisational structures, or other new management practices.

The operating efficiency strategies most commonly cited were staff training, new computer systems and new management information systems. Considered least important were substitution of new materials, changed use of subcontractors, and other new management practices.

The asset efficiency strategies most commonly cited were buying new equipment, improving capacity utilisation, and setting up new inventory controls. Buying used equipment, establishing a new location, and developing new organisational structures were used least frequently.

The common theme running through these responses is what is important is a firm-wide quality "culture", staff training, improved information and inventory systems for managers and new computers to run the systems on. The big changes like relocating the firm, reorganising its structure, and redesigning the product were apparently much less common.

4.4 Quality and Productivity Measurement

We asked respondents whether or not they used quantified measures of quality and productivity performance. Seventy seven percent said that they did and many of these reported the measures they use. These were of variable relevance. In productivity measures, for example, one seeks some ratio of inputs to outputs stated in units which are not sensitive to price changes. Of the 161 measures reported to us :

- only 47 were of this type, for example: litres of output per manhour; electricity units per ton of output; sharebroking contract notes per employee
- 42 were subject to price influences on one-half of the ratio, for example : sales revenue per square foot of retail area; sales revenue per representative; cost per tonne of output
- and 30 were subject to price influences on both parts of the ratio, for example : labour costs as a percentage of sales turnover; return on assets; purchases-to-sales.
- A further 42 used time as a numeraire, acting as something of a proxy for a resource fixed over the time period, for example : sales per day; prescriptions per day; number of cases despatched per day.

In every case bar one the measures used were partial, that is covered only a part of the range of inputs used on outputs produced. The exception was one respondent who reports using a composite index of partial productivity measures. With this exception, the quantification of productivity gains is invariably limited in scope, and often in relevance also.

Serious attempts to measure quality are even more infrequent : only 30 of the 198 respondents report measures of this type. For a handful of firms this involves elaborate accounting of the "poor quality cost" (Harrington, 1987) of the full range of their activities. The most frequently used measures are more limited however : customer satisfaction surveys; reject levels; and complaint levels. For manufacturers, statistical sampling of quality throughout the process is relatively infrequent : seven respondents of the 106 manufacturers in our sample report using these methods.

4.5 Quality and Productivity Performance

Table 4.9 indicates the relative importance of quality improvement and productivity improvement relative to other ways of improving profit. On average quality improvement was ranked at 4.1 on a 5-point scale, significantly higher than productivity improvement (which ranked 3.8 on average). Nearly half of our respondents rated quality strategies as among the most important sources of profit; more than a third said the same of productivity.

Asked to indicate how their quality and productivity strategies ranked with respect to world standards, firms typically considered their quality strategies at about world standards, but their productivity strategies rather lower (table 4.10). Again, the difference in average rank is significant (at the .01 level). We discuss in the next section the various perceptions that different types of firm might have about their world rankings.

Finally, respondents were asked to rank the importance of six quality and productivity and non-quality and productivity factors in the overall profitability of the business (table 4.11). The former proved more significant : operating efficiency, quality and asset efficiency were each rated more important to profit than any other factor,

**Table 4.9 : Importance of Q & P
(% of responses)**

	Over last 5 years relative to other ways of improving profit (%)				
	Least	Unimportant	Average	Important	Most important
Quality improvement	2	8	16	23	47
Productivity improvement	4	11	21	24	36

Source: Survey Q2. 3

**Table 4.10 : Comparisons of Quality and Productivity to World Standard
(% of responses)**

	Above	At	Below
Quality improvement strategies	20	48	30
Productivity improvement strategies	11	39	47

Source: Survey Q9a, 9b

Table 4.11 : Ranking of Influences on Profitability

Importance of Factors to Overall Business Profitability

	Last 5 years	Next 5 years
Asset efficiency	3.01	2.88
Operating efficiency	2.34	2.21
Quality	2.47	2.38
Market prices	3.12	3.18
Financial costs	3.60	3.88
Capital gains/losses	5.60	5.57

Notes: Measured on 6 point scale, with 1 = most important. The question asks for the magnitude of the impact of each factor; this could be positive or negative.

Source: Survey Q4a, 4b

(significance level .01) with the exception that the ranking of market prices and asset efficiency cannot be distinguished. This ranking does not change for expectations for the future; however the importance of financial costs to profits is expected to lessen over the next five years (significance level .01).

V ANALYSIS OF RESULTS

In this section we go beyond the simple reporting of questionnaire results in the previous section, to attempt to analyse interrelationships between variables, and thus to address the hypothesis that regulatory reform has affected quality and productivity. We begin by examining the relationship between quality and productivity and regulation change directly, and in later sections we explore indirect associations via the intermediate variables of industry and firm characteristics, and the choice of quality and productivity strategies. (See Figure 5.1.)

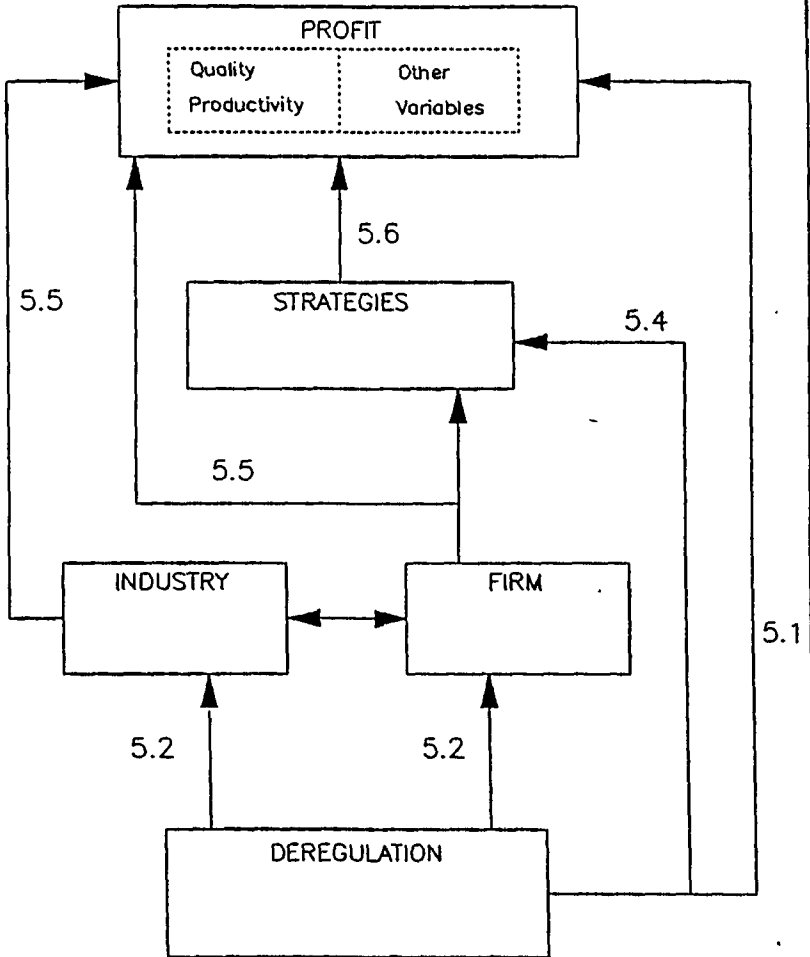
Our main statistical analysis has been the use of chi-squared tests on pairs of variables to test for association in the underlying population. This is a loose test and does not specify any direction to the relationship, nor any particular functional form. Where significant associations were found, we also tested for a direction to the relationship by testing for any difference between the means of two sub-sets of firms (for example, those subject and not subject to regulation change); or by a simple regression between the pairs of scaled variables.

Frequently we found significant association between variables, using chi-squared tests, which could not be shown to be related to each other in any directional sense. We interpret these results as evidence that the observed association embraces more than one directional relationship (ie that for some firms the relationship between A and B is positive; for others negative); or that the relationship is non-linear (positive over some range of behaviours but negative elsewhere).

Also, neither association nor direction implies that the variables are linked causally. Such causation as there may be in the relationship could flow in either direction, or may be the result of a third variable associated with each of the pair under consideration. We have referred to what our respondents told us in answer to open-ended questions to suggest and illustrate possible lines of causation in these relationships.

Finally, the evaluation of relationships two at a time is an evaluation of the *total* effect of one upon the other. This will be made up of a direct, or impact effect, and of indirect effects operating through

FIGURE 5.1 : RELATIONSHIPS WITHIN THE FRAMEWORK



Note: The numbers refer to the sections of Part V that analyse these relationships

other variables. For example, changes in price controls may have a direct and positive effect on quality and productivity through competitive pressures for greater efficiency; but these may be offset if the incidence of price deregulation is greater in industries where quality and productivity is poor, for some other reason. We believe there are several places in our analysis where such offsetting influences occur.

5.1 The Effect of Regulation Change on Quality and Productivity : All Firms

In addition to eliciting general responses to the effects of regulatory change, we asked respondents specifically about the effects of New Zealand trade liberalisation in their industry, the effects of relaxation of price controls, the effects of deregulation of labour markets. Note that these questions related only to the respondent's own industry, not to upstream and downstream industries that could also affect the firm.

Table 5.1 summarises the significant relationships between changes in regulation and the quality and productivity performance of firms. There are only two: the liberalisation of price controls is associated with the contribution of quality strategies to profit; and labour market deregulation with the ranking of productivity strategies by comparison with a world standard. The relationships are significant at the 5% level, but neither can be shown to have any single direction. We expect that price decontrol would lead to greater pressure on profits. Responses to this pressure have clearly not been of one type: we were not able to establish any direction to this relationship. But, for some respondents, a heightened emphasis on product quality has helped counteract the pressure. Several comments suggest this: "quality has been critical to retain business in a deregulated environment"; a brewer "competes on quality"; a retailer has "witnessed a considerable improvement in quality design of locally manufactured goods"; a flour miller sees "big improvements in quality after deregulation".

The intent of labour market deregulation is to improve the industrial relations environment for firms and hence productivity. (Refer Table 2.1). Indeed, it was the view of many respondents that inflexible labour practices were a barrier to improved productivity. Overtime

TABLE 5.1

AREA OF REGULATION CHANGE	Questionnaire Refs	Q14A Foreign Access	Q14B Price Control	Q14C Industry Access	Q14D Labour Market
EFFECTIVENESS OF QP STRATEGIES					
Quality contribution to profit	Q2A	AA			
Productivity contribution to profit	Q3A				
Quality of world	Q9A				
Productivity of world	Q9B				
PROFIT IMPACT					
Asset efficiency last 5 years	Q4A1	AA+++			
next 5 years	Q4B1				
Operating Efficiency last 5 years	Q4A2	---			
next 5 years	Q4B2				
Quality last 5 years	Q4A3	---			
next 5 years	Q4B3				
Market prices last 5 years	Q4A4	AA+ AAA+++ A+++			
next 5 years	Q4B4				
Financial costs last 5 years	Q4A5	A--			
next 5 years	Q4B5				
Capital gains/losses last 5 years	Q4A6	---			
next 5 years	Q4B6				

LEGEND

Chi-squared tests of association
 A= significant association at the .1 level
 AA= ditto at the .05 level
 AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression
 +/- significant positive/negative relationship at the .1 level
 ++/-- ditto at the .05 level
 +++/-- ditto at the .01 level

rates, hours worked, compulsory unionism, and the union award structure were cited as areas of inflexibility. One respondent felt that the Labour Relations Act has improved flexibility for that firm. These experiences are not universal however. For the sample as a whole we were again unable to identify a direction to this relationship, either positive or negative.

A first reading of Table 5.1 suggests that the regulation changes of the past five years have had almost no discernible effect on the importance of quality and productivity performance for firms. But such a conclusion would be extreme. The result could be due to positive direct effects being offset through other behaviours associated with the change in regulation. Or it could be the case that some firms have responded to the changes with improved quality and productivity, while others have experienced declining quality and productivity. We take up the latter possibility below.

The impact of deregulation on the various sources of profit is more obvious. In particular, price deregulation is associated with a higher average ranking for the importance of market prices to profits, both over the last and the next five years.

Increased industry access is also associated with a greater expected impact of market prices on profits. It appears that deregulation is, at least, having an impact on the pricing signals received by firms.

Also of note is the higher ranking given to asset efficiency as an expected source of profit by firms subject to greater foreign access to their markets. Firms in the electronics, knitwear and chemicals industries noted inventory controls as having particular importance to their recent performance. Foreign access appears to be one of the most powerful sources of change in our sample of firms and we will see more of these effects below.

5.2 Regulation Change and the Characteristics of Industries and Firms

In contrast to the results of the previous section, regulation change is closely associated with several dimensions of industry and firm structure. The results are set out in Tables 5.2 and 5.3.

TABLE 5.2

AREA OF REGULATION CHANGE	Questionnaire Refs	Q14A Foreign Access	Q14B Price Control	Q14C Industry Access	Q14D Labour Market
INCIDENCE BY SECTOR	Q1C2 code		AAA	AAA	
Retail	1		higher	higher	
Wholesale	2		higher	higher	
Manuf	3		lower	lower	
Construction	4		higher	lower	
Transport	5		higher	higher	
Services	6		lower	higher	
INDUSTRY CHARACTERISTICS					
Growth					
Stage in life cycle	Q10A	AAA+++			
Growth last 5 years	Q10B				
Growth next 5 years	Q10C	AAA			
Tech change					
Rate last 5 years	Q10D				
Rate next 5 years	Q10E				
Competition:market shares					
Foreign last 5 years	R12A	AAA+++	AAA+++	AAA+++	
Big 3 last 5 years	R12B				
Respondent last 5 years	R12C			AA---	
Foreign next 5 years	R12D	AA+++		AA+++	
Big 3 next 5 years	R12E				
Respondent next 5 years	R12F				

LEGEND

Chi-squared tests of association

A= significant association at the .1 level

AA= ditto at the .05 level

AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level

++/-- ditto at the .05 level

+++/-- ditto at the .01 level

TABLE 5.3

AREA OF REGULATION CHANGE	Questionnaire Refs	Q14A Foreign Access	Q14B Price Control	Q14C Industry Access	Q14D Labour Market				
FIRM CHARACTERISTICS									
Ownership change									
Change in ownership	Q11A	A							
How recently?	Q11B								
Change control	Q11C					A:higher			
Form of ownership									
	Q11D code								
Public company	1								
Private company	2								
SOE	3								
Partnership	4								
Proprietorship	5	AA							
% foreign owned	R11E								
Market power									
Market share last 5 years	R12C	AA---							
Market share next 5 years	R12F	A--							
No employed	R15A					AA++			
Turnover \$m	R15E					A			
Trading:% sales exported									
last 5 years	R13A	A							
next 5 years	R13B	AAA---							
Labour resources									
No employed	R15A	A--							
%post-school quals	R15B1	AA++							
%some school quals	R15B2								
%no school quals	R15B3								
%unionised	R15C	AAA---		AA--					
Physical assets									
Age of plant	R15D	AA+							
Smart assets									
R&D%sales	R15F								
%post-school quals	R15B1								

LEGEND

Chi-squared tests of association

A= significant association at the .1 level

AA= ditto at the .05 level

AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level

++/-- ditto at the .05 level

+++/-- ditto at the .01 level

5.2.1 Foreign Access.

Increased foreign access to markets is associated with:

- firms in the latter stages of the industry life-cycle;
- higher market shares for offshore competitors;
- smaller firms, by number employed;
- a higher incidence of changed control of the firm;
- and, lower proportions of the workforce unionised.

Also, it may be noted that sectoral differences in foreign access only just fail to meet a 10% level of significance. Manufacturers and transport companies record a higher incidence of this deregulation, other sectors lower.

A possible explanation here seems to be that reduced import protection has most directly affected mature firms, mostly small, that have until recently enjoyed a relatively protected life. It is among these firms that we find representatives of the footwear, textiles, clothing, motor vehicle assembly, agricultural implement and milling industries.

Under deregulation, foreign companies have been able to increase their market share. Of the companies subject to easier foreign access, 64% expect an increase in foreign share-of-market over the next five years, 30% expect no change and only 6% expect the foreign share to fall.

As a result of these pressures, many of these firms are being sold. Sixty five firms in our sample have experienced a change in control, all but nine come from industries which have been opened up to foreign competition. Twenty percent of taken-over firms are now more than 50% foreign-owned. For the former owners of these firms, the strategic response to deregulation has been to sell the business to other management, often foreign, which believes it can do better.

Our respondents gave one predominant reason which could account for this experience: the limited economies of scale available in New Zealand. By comparison with overseas producers, particularly Australian, domestic firms lack the scale to be competitive, find their scale of operations still further reduced by foreign entrants,

and feel unable to extend scale overseas due to the high exchange rate. Several indicated they had closed down manufacturing operations and become importers, or had moved manufacturing offshore.

Economies of scale are a major theme in the overseas literature (Chapter 2) and were noted as important by respondents in motor vehicle assembly, chemical products, brewing, flour milling, clothing and agricultural implements. Several retailers also commented that domestic manufacturers lacked the scale to compete. A particular form of these diseconomies was the inability to support competitive R & D: a limitation mentioned by respondents from rubber, plastics, vehicle assembly, electrical and chemical industries. In the view of one electronics manufacturer which gets most of the firm's R & D from its overseas parent, high rates of technical change will "require overseas takeovers".

The effect of foreign imports further impeding scale economies in the domestic market was noted by manufacturers in the above industries, and also in footwear, rubber goods, electrical and electronics products. Some firms in these industries were moving manufacturing offshore, eg. to Malaysia. The closure of small firms and the rationalisation of their industry was mentioned by producers of knitwear and flour; and, outside manufacturing, by sawmillers and hotel operators also.

For several respondents, the option of developing exports to capture scale economies was felt to be precluded by a high exchange rate. The point is made by producers of rubber goods, processed foods, plastic products, clothing and agricultural implements.

5.2.2. Price Deregulation

The deregulation of prices has had a distinctive impact in the trade, construction and transport sectors; manufacturing and other services being relatively less affected, directly, at least. These sectoral differences probably also explain the association of price decontrol with firms which export a relatively small proportion of their output.

There are also highly significant associations with expected future growth in the industry, and with the extent of foreign market share.

It is not possible to identify any direction to expected growth, however, whether positive or negative. The close relationship between price decontrol and the extent of foreign market share seems likely to be the result of some missing third variable associated with each, but it is possible that foreign firms have been able to make distinctive gains in markets where price competition is less constrained.

5.2.3 Industry Access

Improved industry access has impacted particularly on the retail, wholesale, transport and other services sectors. It is associated with markets in which foreigners took, and are expected to take, higher market shares, and with firms with relatively low unionisation and low established market shares of their own. These relationships echo the results we have discussed above on the opening of markets to offshore competition.

5.2.4 Labour Deregulation

Labour market deregulation appears to have been associated with firms employing larger numbers and using older plant - a proxy perhaps for more labour-intensive operations.

5.3 Regulation Change and Quality and Productivity : Retail and Manufacturing Firms.

We have seen above that the incidence of regulatory reform varies with a number of characteristics of firms and industries. Our initial difficulty in finding overall relationships between regulation change and quality and productivity can be explained, at least in part, by this variety. We accordingly explored a number of ways of breaking down our sample into groups of firms whose response to deregulation might be more similar.

We found sectoral differences, as reported in Table 5.2, to be the most helpful in this respect. Unfortunately, a breakdown by sector leaves very few firms in all but the retail and manufacturing sectors. We accordingly report detail for these two sectors only. They serve to demonstrate that the relationships between deregulation and quality and productivity improvements can be quite distinctive.

Table 5.4 reports the significant associations between regulation change and performance for each of these two sectors. The number of associations is to be contrasted with the very few linkages established over all firms (Table 5.1). In particular, we note that labour market deregulation, which showed no relationship to quality and productivity performance in the aggregate, has significant associations with the productivity standards of both sectors, and for retailers has the positive effect on productivity which the literature and our respondents' own judgement suggests it should have.

Price deregulation appears to have the most widespread influence on manufacturing firms in that it is significantly associated with both efficiency and quality effects on profit. This is in spite of the relatively low incidence of price deregulation reported by manufacturers. Retailers, by contrast, appear to have been more affected by easier industry access. While none of the associations with manufacturing can be shown to have a distinct direction, the impact of industry access on retailers is clearly to increase the importance of asset efficiency to profits over the last five years, and to increase also the contribution which productivity has made to profits.

We interpret this in the light of the predicted positive effects of trade liberalisation on productivity (refer Table 2.1), and note that for retailers in our sample, these gains have been made most effectively through improved asset efficiency.

For manufacturers, many deregulatory moves appear to be associated with the importance of quality to profits; retailers, on the other hand appear to feel deregulation as a productivity effect. Possibly manufacturers have a greater ability to respond to the effects of deregulation with changes to product and service quality. Retailers may have fewer degrees of freedom here and be forced to pursue productivity improvements. But any such dichotomy is far from exclusive: manufacturers also report productivity improvements in response to deregulation - "import pressure has encouraged the development of labour saving machinery" (footwear); and retailers emphasise service - "the retailer's emphasis is on quality service, productivity is the producer's [manufacturer's] job" (motor vehicle retailing).

TABLE 5.4

AREA OF REGULATION CHANGE	Questionnaire Refs	Q14A Foreign Access	Q14B Price Control	Q14C Industry Access	Q14D Labour Market
EFFECTIVENESS OF QP STRATEGIES					
Quality contribution to profit	Q2A	(M) A			
Productivity contribution to profit	Q3A	(R) AA		(R) AA+++	
Quality of world	Q9A			(R) AA	
Productivity of world	Q9B				(R) A++ (M) AA
PROFIT IMPACT					
Asset efficiency					
last 5 years	Q4A1	(R) AA+++			
next 5 years	Q4B1				
Operating Efficiency					
last 5 years	Q4A2	(M) A			
next 5 years	Q4B2				
Quality					
last 5 years	Q4A3	(M) A		(M) A	
next 5 years	Q4B3				
Market prices					
last 5 years	Q4A4				
next 5 years	Q4B4				
Financial costs					
last 5 years	Q4A5				
next 5 years	Q4B5				
Capital gains/losses					
last 5 years	Q4A6	(M) AAA			
next 5 years	Q4B6				

LEGEND

(M)=manufacturers (R)=retailers

Chi-squared tests of association

A= significant association at the .1 level

AA= ditto at the .05 level

AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level

++/-- ditto at the .05 level

+++/-- ditto at the .01 level

Thus these two sectors are affected by different aspects of deregulation, and in different ways. This diversity of behaviour, which a crude sectoral breakdown only begins to capture, is in part responsible for the difficulty in finding general associations between deregulation and quality and productivity. To this must be added the fact that the same stimulus can encourage opposite responses, even within the same industry. Among the several retailers which sought to improve service, there was one which had adopted a strategy of cost cutting, reduced floor staff with a consequent *reduction* in service.

5.4 Deregulation and Firm Strategies

We turn now to address the question of how deregulation has affected the quality and productivity strategies chosen by our responding firms. In Table 5.5, the results are given for all firms, and for retail and manufacturing firms separately. Because the cross tabulations here are 2x2, the direction of any relationship is evident, and is reported in the Table.

For all firms, and for retailers, strategies associated with increased foreign access are mostly of an effect opposite to that predicted in the literature (Table 2.1), that is, showing a *lower* incidence of quality and productivity improvement strategy in the group subject to foreign competition. We believe the result is again due to the relatively poor quality and productivity performance of firms now open to offshore competition. It is apparently reflected also in the choice of quality and productivity strategies.

For manufacturing, however, increased foreign access is associated with greater use of new materials and presentation of service, which provides some evidence that positive quality and productivity responses to access are being made. Improved materials are mentioned by a flour miller, a garment manufacturer and a manufacturer of french fries. Improved materials were also mentioned by three of the six construction firms surveyed.

TABLE 5.5

ALL FIRMS

Questionnaire Ref		Foreign Access Q14A	Price Control Q14B	Industry Access Q14C	Labour Market Q14D
Q7A QUALITY IMPROVEMENT STRATEGIES					
1	Complete redesign of product	(A)--			
9	Quality assurance	(A)-			
11	Product availability			(A)-	
12	Service availability		(A)+		
13	Product presentation				(A)+
15	New labour work-practices				(A)++
19	New organisation structure				(A)++
Q7B OPERATING EFFICIENCY STRATEGIES					
1	New labour work practices				(A)+
5	Reduce materials use		(A)---	(A)---	
6	Reduce energy use	(A)-		(A)--	
8	Use new materials			(A)--	
9	Staff training			(A)-	
11	New arrangements with suppliers, distributors etc		(A)+		
12	New accounting systems	(A)---			
15	New management practices	(A)-			
Q7C ASSET EFFICIENCY STRATEGIES					
4	Buy new equipment			(A)--	
14	New organisation structure				(A)+++

LEGEND

Chi-squared tests of association

+/- significant positive/negative relationship at the .1 level

++/-- ditto at the .05 level

+++/-- ditto at the .01 level

(A) all firms

(M) manufacturing

(R) retail

TABLE 5.5 Continued

MANUFACTURERS

Questionnaire Ref		Foreign Access Q14A	Price Control Q14B	Industry Access Q14C	Labour Market Q14D
Q7A	QUALITY IMPROVEMENT STRATEGIES				
4	Change to presentation of service	(M)+		(M)+	
8	Quality control		(M)++		
9	Quality assurance		(M)+		
11	Product availability		(M)++		
17	New arrangements with suppliers, distributors etc		(M)+		
19	New organisation structure				(M)++
Q7B	OPERATING EFFICIENCY STRATEGIES				
2	Reduced staffing/hours		(M)++		
8	Use new materials	(M)+			
14	New organisation structure				(M)+
Q7C	ASSET EFFICIENCY STRATEGIES				
2	New location				(M)+++
9	Change output for economies of scale		(M)+		
10	New operating regime		(M)+	(M)++	
14	New organisation structure				(M)+++

RETAILERS

Questionnaire Ref		Foreign Access Q14A	Price Control Q14B	Industry Access Q14C	Labour Market Q14D
Q7A	QUALITY IMPROVEMENT STRATEGIES				
5	Speed of service			(R)+++	
10	Quality management	(R)++	(R)++		
11	Product availability			(R)--	
16	Staff training			(R)--	
19	New organisation structure	(R)-	(R)---		
20	New marketing programmes		(R)-		
Q7B	OPERATING EFFICIENCY STRATEGIES				
2	Reduced staffing/hours	(R)-	(R)--		
13	New management information systems	(R)-			
Q7C	ASSET EFFICIENCY STRATEGIES				
4	Buy new equipment	(R)-			
16	Controls on financial assets	(R)---	(R)--		

LEGEND

Chi-squared tests of association

+/- significant positive/negative relationship at the .1 level

++/-- ditto at the .05 level

+++/-- ditto at the .01 level

(A) all firms

(M) manufacturing

(R) retail

The strategic responses to price decontrol are more clearly related to known behaviours. Taken over all firms, there is a higher incidence of quality management techniques; service availability; new arrangements with suppliers and distributors; and a *lower* incidence of saving on materials. These results are consistent with the adoption of a quality-based niche strategy in response to price competition. Product specialisation is noted as a strategy by producers of knitwear, timber, electrical and electronics goods, and chemical products. The aim is to "look for a niche in the market". Taken over all firms, the results do not suggest that the challenge of lowering costs is being picked up.

However, a slightly different picture emerges for manufacturing firms, and it is they whose profits and quality and productivity seem to be the most affected by price deregulation. For these firms, price decontrol is associated with higher use of a range of service/quality related strategies (quality assurance and control, product availability); but also with strategies aimed at improving efficiency: new arrangements with suppliers; reduced staff hours; economies of scale; new operating regimes. A garment manufacturer has improved productivity by centralising all production under one roof. A manufacturer of malted barley is upgrading old plant and installing new production processes. There were several committed followers of the Deming philosophy: in electrical and electronics; chemical products; and motor vehicle assembly. And, outside manufacturing, a construction firm is improving productivity with more off-site work, and a transport operator is restructuring and re-routing his entire system. There are clearly some manufacturing firms who are responding to cost pressures. But, as Table 5.4 above shows, their efforts have yet to bear fruit in relative improvements in productivity for the sector as a whole.

The associations between strategy and the lowering of entry barriers to industry are all of the wrong sign, when taken over the full sample; but are more descriptive at a lower level of aggregation. Both retailers and manufacturers improve some aspect of their service in response to new entrants, and this is manufacturers' response to foreign access also. It is surprising however that retailers, whose productivity appears to be distinctively affected by easier access (see Table 5.4), do not indicate the selection of any productivity-enhancing strategies in response to this deregulation.

Exactly how industry access encourages productivity gains thus remains a mystery.

The effects of labour market deregulation are the most readily explicable. For the sample as a whole, deregulation has apparently made it easier to introduce new work practices, and to change organisation structure. Examples of the latter are to be found in several sectors: a financial services firm has changed structure in order to put more responsibility at lower levels; an SOE has found it easier to change its former bureaucratic structures; and a pulp and paper manufacturer has sought to create a flatter organisation with fewer layers of management. Manufacturers echo the overall result, and add a higher incidence of changes in location. In summary, labour deregulation is associated in this data with greater flexibility in the marshalling of productive resources. Retailers' selection of quality and productivity strategies appears to be quite unaffected by labour market deregulation.

5.5 Industry and Firm Effects on Quality and Productivity

We now examine influences on quality and productivity other than deregulation. Table 5.6 summarises the associations which exist between industry characteristics and the quality and productivity performance of our respondents.

Clearly, growth is the industry characteristic which is most closely associated with quality and productivity performance. Respondents who experienced, and expect to experience, more rapid growth typically rank their productivity and quality strategies ahead of world standards; whereas those who grow less rapidly typically describe their quality and productivity strategies as 'catch-up'. The contribution made to profits by quality-improvement strategies declines as firms move through their life cycle from high-growth to maturity and decline. The association between growth and quality and productivity is likely to be one of mutual dependency: high growth encouraging innovation and being in turn supported by it. The "explosive" growth in the New Zealand stock market was cited by one stockbroker as the major incentive to improve quality and productivity in that industry. It is typical of quality and productivity behaviour however that another stockbroker believed that the crash had been an equally important spur to quality and

TABLE 5.6

EFFECTIVENESS OF QP STRATEGIES		Quality Contribut'n to Profit Q2A	Productivity Contribut'n to Profit Q3A	Quality of World Q9A	Productivity of World Q9B
Questionnaire Refs					
INDUSTRY CHARACTERISTICS					
Growth					
Stage in life cycle	Q10A	AA---	A		
Growth last 5 years	Q10B			A++	A+++
Growth next 5 years	Q10C			AAA+++	
Tech change					
Rate last 5 years	Q10D	A---			
Rate next 5 years	Q10E	AA			
Competition:market shares					
Foreign last 5 years	R12A				
Big 3 last 5 years	R12B			AAA	
Respondent last 5 years	R12C				
Foreign next 5 years	R12D				
Big 3 next 5 years	R12E				
Respondent next 5 years	R12F				
INCIDENCE BY SECTOR					
	Q1C2 code				A
Retail	1				higher
Wholesale	2				moderate
Manuf	3				lower
Construction	4				lower
Transport	5				higher
Services	6				lower

LEGEND

Chi-squared tests of association
 A= significant association at the .1 level
 AA= ditto at the .05 level
 AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level
 ++/-- ditto at the .05 level
 +++/-- ditto at the .01 level

productivity. Likewise, a manufacturer of agricultural implements found that it was *weak* demand that "forced changes to design and quality". But these are the exceptions. Typically, it is rapid growth that encourages quality and productivity gains.

Apart from growth, few other industry characteristics are associated with quality and productivity performance. Market concentration, as measured by the market share of the biggest three domestic operators, is strongly associated with quality standards; but, as with other associations with this variable, the direction of the relationship is ambiguous. Market concentration may be good for quality in some instances, not in others; but we have not yet isolated a factor which can explain the difference in behaviour. Our respondents, however, frequently asserted that their quality, service, or productivity had improved as the result of increased competition, often as the result of regulatory change (see section 5.1 above). The position is well summed up in the words of one manufacturer: "the government is right; increasing competition raises standards". It is perhaps the case that market concentration, which can encourage (oligopolistic) competition in some industries but inhibit it in others, has an effect on quality and productivity gains which is similarly, and consequentially, ambivalent.

The rate of technical change, both past and expected, is associated with the profit-contribution of quality strategies, but the direction of the relationship is the opposite to that expected (see Table 2.1): higher rates of technical change are associated with poorer ratings for quality. Perhaps respondents are failing to match the technical advances of their industry; but the result could also be due to the hidden effect of some third variable associated with both technical change and quality. It is interesting that our respondents suggest that technical change is associated, for them, with product and service quality, rather than the productivity of production. The literature on the effects of technical change is invariably couched in terms of the theory of production. It seems that attention to the role of technology in consumer welfare would be more relevant to our respondents.

Two respondents, in the rubber and plastics industries, regretted the lack of R & D incentives in New Zealand. Others, in vehicle assembly, electronics and chemicals used their overseas parent as a

source of R & D. It will be recalled that one of these felt that technically based businesses in New Zealand would have to seek overseas ownership as a source of R & D. One flour miller felt there was a role for government in improving the quality of wheat strains through research.

There are sector differences in the ranking of productivity strategies by comparison with the rest of the world. Retail and transport companies are more likely to rank themselves ahead of world standard in this respect. It might be that this represents a certain degree of illusion by the non-traded sectors of the economy, for manufacturers and other services are more likely to rank themselves behind world productivity standards.

As to the influence of firm-characteristics on quality and productivity performance, these appear to be associated with the firm's resources, particularly its labour and plant and equipment, rather than any changes in ownership, market power, trading performance or 'smart' assets. Table 5.7 sets out the significant associations. Table 2.1 above summarises the relationships predicted by the literature.

The inverse relationship between plant age and productivity is predicted by the literature and widely supported in the judgement of our respondents, being mentioned by industries as diverse as supermarkets, brewing, cement, stationery, wood products, and agricultural implements. The reason for the connection, as the capital-embodiment hypothesis suggests, is that the latest technology often comes packaged with the latest machinery: eg. a new dry process for cement manufacture.

Although there is no relationship for the sample as a whole between foreign ownership and quality and productivity performance, several manufacturers refer to the valuable input they receive from their overseas principals. One printing firm's foreign owner is said to have "the best quality and productivity in the world" and parent company managers are imported to run operations directly. At the other extreme are firms which feel they have benefitted from and been inspired by sending their managers overseas for trips. In between are companies which occasionally bring in overseas expertise (printing), or simply benefit from the chance to compare

TABLE 5.7

EFFECTIVENESS OF QP STRATEGIES		Quality	Productivity	Quality	Productivity
Questionnaire		Contribut'n	Contribut'n	of World	of World
Refs		Q2A	Q3A	Q9A	Q9B
FIRM CHARACTERISTICS					
Ownership change					
Change in ownership	Q11A				
How recently?	Q11B				
Change control	Q11C				
A					
Form of ownership					
	Q11D code				AA
Public company	1				lower
Private company	2				moderate
SCE	3				higher
Partnership	4				high/mod
Proprietorship	5				lower
% foreign owned	R11E				
Market power					
Market share last 5 years	R12C				
Market share next 5 years	R12F				
No employed	R15A				
Turnover \$m	R15E	A	A		
Trading: % sales exported					
last 5 years	R13A				
next 5 years	R13B				
Labour resources					
No employed	R15A	A	A		
%post-school quals	R15B1	AAA			
%some school quals	R15B2	AA---			A
%no school quals	R15B3	A			
%unionised	R15C				
Physical Assets					
Age of plant	R15D	AAA---			
Smart assets					
R&D%sales	R15F				
%post-school quals	R15B1				

LEGEND

Chi-squared tests of association

A= significant association at the .1 level

AA= ditto at the .05 level

AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level

++/- ditto at the .05 level

+++/- ditto at the .01 level

their standards with others in the international group (stationery). Japanese parent companies appear to have a particularly pervasive influence on their local subsidiary's quality and productivity efforts through robotics, worker-management teams, and setting Japanese standards of performance (electronics and vehicle assembly). The special role of foreign owners as sources of R & D has been noted above.

In a similar way, changes to the control of firms do not show, for the sample as a whole, the improved quality and productivity performance predicted by the literature. However, the importance of management commitments to achieving quality and productivity gains is widely acknowledged by our respondents and there are several examples of improvements brought about by new management: in department stores; brewing; and electronics. In one firm the "personal ambition of the owner" is said to be "to drive for international-standard quality and productivity". And one garment manufacturer reports the reverse experience: that "changes driven by the CEO foundered when he left".

The ranking of productivity strategies also varies with the *form* of ownership. Relative to world standards, public companies are most likely to rate their performance 'behind', private companies as 'equal to', and state-owned enterprises as 'in front'. The possibility exists that the standards set by these respondents falls with the degree of disclosure required of them.

There are several significant associations between the size and educational composition of the workforce and quality and productivity performance; but their direction is not clear. Given the clear expectation that the quality of the labour force will be positively associated with productivity (Table 2.1), the negative relationship between the contribution of productivity strategies to profit and the proportion of workforce with some school qualifications is hard to explain except through the operation of some missing variable.

In their open comments, our respondents frequently referred to the difficulties they faced in finding and developing an appropriate workforce. Shortages of skilled labour are mentioned by industries as diverse as stockbroking, hospitality, department stores,

transportation, construction, and agricultural implements. Some quite pejorative comments were passed about the general standard of the workforce. A hotelier is faced with "low quality, high turnover staff"; a sawmiller believes our schooling is poor; many manufacturers point to a problem in the attitude of the workforce, especially by contrast with Japan; and a pharmaceutical wholesaler sees "a low level of technical skill in the population at large". In several cases, labour is imported to meet the need. From these comments, it is possible that our respondents' experience with some segments of the workforce have indeed been inimical to productivity advance, as Table 5.7 suggests.

We also explored associations between industry and firm characteristics and the relative importance of a number of sources of profit. The results are reported in Tables 5.8 and 5.9.

Asset efficiency has had a relatively important impact on profits in retail and manufacturing businesses over the last five years, and has been more important for firms with larger proportions of foreign ownership. Its expected importance to profits over the next five years rises with the age of the firm's plant, and with the proportion of the workforce with no school qualifications - a variable which may here be acting as a proxy for more mechanised, deskilled processes.

Operating efficiency appears to be most frequently associated with the competitive structure of the industry. Lower levels of foreign participation in the domestic market are associated with higher rankings for the importance of operating efficiency over the next five years; and conversely, firms reporting lower impact of operating efficiency over the last five years expect higher market shares for foreigners, and their own firms, in the future. The combination of low efficiency with higher foreign market shares has been commented on above. Also of note is that the impact of operating efficiency on profits falls with the proportion of the workforce unionised. It should be recalled that this relates to the *impact* on profits, which could be positive as well as negative. There is no evidence here to suggest that higher rates of unionisation are inimical to efficiency.

TABLE 5.8

PROFIT IMPACT	Questionnaire Refs	Asset efficiency		Operating Efficiency		Quality		Market prices		Financial costs		Capital gains/losses	
		last5	next5	last5	next5	last5	next5	last5	next5	last5	next5	last5	next5
		Q4A1	Q4B1	Q4A2	Q4B2	Q4A3	Q4B3	Q4A4	Q4B3	Q4A5	Q4B5	Q4A6	Q4B6
INDUSTRY CHARACTERISTICS													
Growth													
Stage in life cycle	Q10A				AA		A-						
Growth last 5 years	Q10B					AAA+++				AA	A	AA-	
Growth next 5 years	Q10C												
Tech change													
Rate last 5 years	Q10D												
Rate next 5 years	Q10E					AAA	AAA+						
Competition:market shares													
Foreign last 5 years	R12A				A--		A			AA			
Big 3 last 5 years	R12B				AAA					AA			
Respondent last 5 years	R12C									AA++			
Foreign next 5 years	R12D			A--						AAA			
Big 3 next 5 years	R12E				A	AA							
Respondent next 5 years	R12F			A--						AAA			
INCIDENCE BY SECTOR													
	Q1C2 code	A						A		AAA			
Retail	1	higher						mod/low		mod/high			
Wholesale	2	moderate						moderate		mod/low			
Manuf	3	higher						mod/high		high&low			
Construction	4	moderate						mod/low		higher			
Transport	5	high&low								lower			
Services	6	mod/low						mod/high		lower			

LEGEND

Chi-squared tests of association

A= significant association at the .1 level

AA= ditto at the .05 level

AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level

+/-= ditto at the .05 level

+/-/= ditto at the .01 level

TABLE 5.9

PROFIT IMPACT	Questionnaire Refs	Asset efficiency		Operating Efficiency		Quality		Market prices		Financial costs		Capital gains/losses	
		last5 Q4A1	next5 Q4B1	last5 Q4A2	next5 Q4B2	last5 Q4A3	next5 Q4B3	last5 Q4A4	next5 Q4B3	last5 Q4A5	next5 Q4B5	last5 Q4A6	next5 Q4B6
FIRM CHARACTERISTICS													
Ownership change													
Change in ownership	Q11A												
How recently?	Q11B	AA										AA:lower	
Change control	Q11C												
Form of ownership	Q11Dcode												
Public company	1	A		AA									
Private company	2	higher mod/low		higher mod/low									
SCE	3	high&low		mod/high									
Partnership	4	mod/high		higher									
Proprietorship	5	higher		moderate									
% foreign owned	R11E	AA+											
Market power													
Market share last 5 years	R12C												
Market share next 5 years	R12F	A--										AA++	
No employed	R15A	AAA											
Turnover \$m	R15E												
Trading:% sales exported													
last 5 years	R13A	A				A		A++					
next 5 years	R13B			A		A++							
Labour resources													
No employed	R15A	AAA											
%post-school quals	R15B1												
%some school quals	R15B2											A	
%no school quals	R15B3	A++						A					
%unionised	R15C			AA-									
Physical Assets													
Age of plant	R15D	A+		A		A		AA--		AA			
Smart assets													
R&D%sales	R15F												
%post-school quals	R15B1												

LEGEND

Chi-squared tests of association
 A= significant association at the .1 level
 AA= ditto at the .05 level
 AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level
 ++/-- ditto at the .05 level
 +++/-- ditto at the .01 level

The contribution of quality to profits is most strongly associated with the rate of industry growth and the rate of technical change; both of which exhibit positive relationships with quality. On the negative side, the importance of quality to profits is expected to be less over the next five years for firms with older plant.

Market prices have had a greater impact on profits among firms which export a higher proportion of their sales and, for the same reason possibly, have been more important to manufacturers and other services. It seems likely that past and expected movements in the exchange rate are responsible for the heightened concern with market prices among these firms. The barrier presented by a high exchange rate to manufacturers seeking to increase the scale of their operations has been discussed above in section 5.2. But it has had an effect on traded services also, according to two hotel operators interviewed. One said that the high rate had "killed off the convention traffic from Australia".

Other domestic prices, and the high interest rate, were identified by many respondents as being an issue for their business over the last five years. A tour operator says that high internal costs make New Zealand a high cost destination. A hotel operator agrees, citing air travel and wages in particular. Manufacturers using domestically-sourced inputs believe they are too expensive. High inter-island transport costs are cited as a major cost burden for the flour milling industry. The newly formed SOEs are mentioned a number of times as contributing to the high cost domestic market: to sawmillers; and to a hotelier. An agricultural retailer is bitter at the rural decline and the high financial costs which have contributed to it. High interest rates inhibit investment and hence productivity for a wholesale grocer, and a hotel operator. And, as always, there is a case of a business going against the stream: a plastic manufacturer who believes that interest rates have *encouraged* productivity gains.

The importance of financial costs to profits is associated primarily with industry structure, although the direction of the relationship is unclear in most cases. The exception is that respondents reporting higher market shares have also had financial costs bear distinctively on their profits. This could be the result of firms acquiring market share through leveraged acquisitions; but we cannot verify this and none of our respondents reported use of the technique.

Finally, the importance to profits of capital gains and losses is related to aspects of the ownership of our respondents: its average ranking is lower for firms which have changed hands during the past five years; and the more recent the change, the less important the impact of capital transactions on profits. Possibly, the opportunity to revalue assets at the time of acquisition reduces the exposure of consolidated firms to capital gains and losses.

Over all firms, we have found a rich array of relationships operating between industry and firm characteristics and the various sources of profit in the firm, in particular the contribution made to profit by quality and productivity strategies. These relationships are certainly more numerous and close than those found to exist between quality and productivity and regulation change over all firms. (see Table 5.1). We conclude that the primary influences on the quality and productivity

performance of firms are to be found in their industry environment and in their own resources and capabilities. Although regulation change is associated with these same environmental factors, as we have seen in the previous section, its influence has not fed through to show a consistent influence on quality and productivity.

5.6 The Effect of Strategy on Quality and Productivity

We were interested to know if we could discriminate between the strategies used by firms according to whether or not they produced positive quality and productivity results. Also we sought to identify any strategies which could be associated with superior (or inferior) quality and productivity performances by world standards. Table 5.10 shows the results of these investigations over the full sample of firms.

The first question, on the importance of quality and productivity strategies to profit, can be addressed in the first two columns of the table. The first observation is to note the relatively high incidence of strategies which have successfully increased the contribution made by improved quality. By contrast, strategies designed to improve operating efficiency have been less effective; and asset-efficiency strategies have been least effective of all. It is interesting that

TABLE 5.10 ALL FIRMS

Questionnaire Ref		Quality contribution to profit Q2A	Productivity contribution to profit Q3A	Quality of world Q9A	Productivity of world Q9B
Q7A QUALITY IMPROVEMENT STRATEGIES					
1	Complete redesign of product		AAA-	AA---	
2	Complete redesign of service				A-
3	Style change to product				
4	Change to presentation of service	AA++			
5	Speed of service		AAA+++		
6	Range of features included				
7	Range of options offered				
8	Quality control				
9	Quality assurance				AA
10	Quality management	AAA+++		A	
11	Product availability		AAA		
12	Service availability	A++			A
13	Product presentation				AA
14	Service presentation	A+++			
15	New labour work-practices		A+++		
16	Staff training			AAA--	
17	New arrangements with suppliers, distributors etc				
18	New management practices				
19	New organisation structure			A	A
20	New marketing programmes				
21	Other				

Q7B OPERATING EFFICIENCY STRATEGIES					
1	New labour work practices				
2	Reduced staffing/hours				
3	New composition of workforce			A	
4	Changed use of subcontractors				AAA--
5	Reduce materials use				
6	Reduce energy use		A++		
7	Substitution: materials				A-
8	Use new materials				
9	Staff training			A	
10	New computer systems		A	AA	
11	New arrangements with suppliers, distributors etc				
12	New accounting systems				A
13	New management information systems		A	A	
14	New organisation structure				
15	New management practices			AA-	
16	Other				

TABLE 5.10 ALL FIRMS

Questionnaire Ref	Quality contribution to profit Q2A	Productivity contribution to profit Q3A	Quality of world Q9A	Productivity of world Q9B
Q7C ASSET EFFICIENCY STRATEGIES				
1 New building				
2 New location				
3 Reduce average age of equipment		A		
4 Buy new equipment				
5 Buy used equipment				
6 Sell old equipment				A
7 Retooling and other plant modifications				
8 Change maintenance regime				
9 Change output for economies of scale	A			
10 New operating regime				
11 Improve capacity utilisation				
12 New inventory controls				AA+
13 Change warehousing systems				
14 New organisation structure				
15 New credits/collections system				
16 Controls on financial assets			AA	A
17 Other				

LEGEND

Chi-squared tests of association

A= significant association at the .1 level

AA= ditto at the .05 level

AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level

++/-- ditto at the .05 level

+++/-- ditto at the .01 level

quality-improvement strategies are also frequently associated with the improvement of productivity in firms. The close connection between the two was drawn to our attention by several of the advocates of the Deming method, who consequently found our questionnaire's separation of the two profoundly unhelpful.

Looking in greater detail, an emphasis on service appears to be behind all of the successful improvements to quality. Productivity improving strategies involve quicker service, new labour work practices, and reductions in energy use (one manufacturer reported a 50% saving in energy costs). Firms involved in a complete redesign of their product are those with below-average productivity contributions to profit.

Our second concern was to establish which strategies could be associated with superior/inferior quality and productivity by world standards. The last two columns of the table report associations between strategies and respondents' ranking of their quality and productivity.

Only one strategy is identified which is positively associated with superior productivity performance; that is the introduction of new inventory controls. This is the only example of what one might call a leadership strategy for quality and productivity. By contrast, several strategies are associated with inferior quality and productivity, by world standards.

These could be one of two types: strategies which are being used successfully to catch up with world standards; or strategies which are ineffective and, to a degree, are an expression of the firm's poor quality and productivity. We can discriminate between them by reference to the contribution such strategies have made to profits, as recorded in the first two columns of the table. If a strategy is negatively associated with both profit-contribution and standards, we regard it as unsuccessful; otherwise we identify it as a strategy by which firms hope to catch up with world quality and productivity standards. In all cases, strategies are of the second type.

Significant catch-up strategies for quality are therefore the complete redesign of product; staff training; and new management practices. For productivity, the catch-up strategies are redesign of service;

changed use of subcontractors and the substitution of materials.

There are many other strategies which appear on the table as being associated with the quality and productivity standard of respondents, but with no distinct direction. These could be interpreted to be of use in both leadership and catch-up situations. They include the use of quality management and quality assurance techniques; service availability; product presentation; new organisation structures new composition of the workforce; staff training; new computer, accounting and management information systems; the selling of old equipment and improved controls on financial assets.

Several of these strategies are mentioned by our respondents in their open-ended replies. The introduction of computer-based systems has been particularly widespread. A list of the businesses affected includes courier services; banking; pharmacies; department stores; exhaust systems; petrol retailing; construction; newspapers; plastic products; clothing manufacture; printing; vehicle assembly; and chemical products. The number of ways in which quality and productivity is enhanced by computer-based technologies is equally extensive: improving the speed of transactions (in banking); staff reductions; stock control; and saving on raw materials (in clothing manufacture).

Another equally extensive theme running through the open-ended responses was the facilitation of change in the labour force. For some "the need to retain jobs improves the attitude to change". For others, in the same petrol retail industry as well as in construction and apparel manufacture, bonus schemes are used to the same end. Extensive use is made of team building and communication methods, in part to secure changes in the attitude to work. Businesses using team methods include road freight; department stores; SOEs; clothing; packaging; electronics; vehicle assembly; and timber. Training is frequently mentioned as a strategy required to support change in the organisation: eg to new materials; to computers; or to new services.

At the sectoral level, successful quality and productivity strategies differ somewhat from the general picture. These results are summarised in Tables 5.11 and 5.12.

TABLE 5.11 MANUFACTURERS

Questionnaire Ref	Quality contribution to profit C2A	Productivity contribution to profit C3A	Quality cf world C9A	Productivity cf world C9B
Q7A QUALITY IMPROVEMENT STRATEGIES				
1		AA	AAA---	
2				
3				
4				
5		A++		
6			AA--	
7				
8		A		
9				AA
10				
11		AA		
12				
13				A-
14				
15		AA+++		
16			AAA	AAA
17				
18			A--	
19				AA
20				
21				
Q7B OPERATING EFFICIENCY STRATEGIES				
1				A
2				
3			A	A
4	AA			
5				
6		AA		
7				
8	AA--			
9				
10		A	A-	
11				
12				AA
13		AA	A-	
14				A
15				
16				

TABLE 5.11 MANUFACTURERS

Questionnaire Ref	Quality contribution to profit Q2A	Productivity contribution to profit Q3A	Quality of world Q9A	Productivity of world Q9B
Q7C ASSET EFFICIENCY STRATEGIES				
1 New building			AA	
2 New location			AA ---	
3 Reduce average age of equipment				
4 Buy new equipment				
5 Buy used equipment				
6 Sell old equipment				
7 Retooling and other plant modifications				
8 Change maintenance regime				
9 Change output for economies of scale				
10 New operating regime				
11 Improve capacity utilisation			A	
12 New inventory controls		A		
13 Change warehousing systems				
14 New organisation structure				A
15 New credits/collections system				
16 Controls on financial assets			AA	
17 Other				

LEGEND

Chi-squared tests of association

A= significant association at the .1 level

AA= ditto at the .05 level

AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level

++/- ditto at the .05 level

+++/- ditto at the .01 level

TABLE 5.12 RETAILERS

Questionnaire Ref	Quality contribution to profit Q2A	Productivity contribution to profit Q3A	Quality of world Q9A	Productivity of world Q9B
Q7A QUALITY IMPROVEMENT STRATEGIES				
1 Complete redesign of product				
2 Complete redesign of service				
3 Style change to product				
4 Change to presentation of service				
5 Speed of service		AA+	AAA--	A--
6 Range of features included				
7 Range of options offered				
8 Quality control				
9 Quality assurance				
10 Quality management				
11 Product availability			A++	
12 Service availability			A++	
13 Product presentation				
14 Service presentation				
15 New labour work-practices				
16 Staff training		A---	A-	AA---
17 New arrangements with suppliers, distributors etc				
18 New management practices				
19 New organisation structure				
20 New marketing programmes				
21 Other				
Q7B OPERATING EFFICIENCY STRATEGIES				
1 New labour work practices				AA-
2 Reduced staffing/hours				
3 New composition of workforce				
4 Changed use of subcontractors				
5 Reduce materials use				
6 Reduce energy use				
7 Substitution: materials		AA--		
8 Use new materials				
9 Staff training			A	A
10 New computer systems				
11 New arrangements with suppliers, distributors etc				
12 New accounting systems				
13 New management information systems	AAA+	A		
14 New organisation structure				
15 New management practices			A	
16 Other		AAA		

TABLE 5.12 RETAILERS

Questionnaire Ref	Quality contribution to profit Q2A	Productivity contribution to profit Q3A	Quality of world Q9A	Productivity of world Q9B
Q7C ASSET EFFICIENCY STRATEGIES				
1 New building				
2 New location	A -	A - -		A - -
3 Reduce average age of equipment	A + + +			
4 Buy new equipment				
5 Buy used equipment				
6 Sell old equipment				
7 Retooling and other plant modifications				
8 Change maintenance regime				
9 Change output for economies of scale				
10 New operating regime		A		
11 Improve capacity utilisation				
12 New inventory controls				A
13 Change warehousing systems				
14 New organisation structure				
15 New credits/collections system				
16 Controls on financial assets				
17 Other				

LEGEND

Chi-squared tests of association

A= significant association at the .1 level

AA= ditto at the .05 level

AAA=ditto at the .01 level

Tests of direction using difference in means, or simple regression

+/- significant positive/negative relationship at the .1 level

++/- ditto at the .05 level

+++/- ditto at the .01 level

For retailers, strategies associated with the improvement of profits through quality and productivity involve the speed of service; new management information systems and the use of newer equipment. (Many retailers noted the use of point-of-sale terminals, or computer-based dispensing systems, as contributing to their quality and productivity gains). Relocation appears to be associated with inferior quality and productivity contributions to profit, as does staff training and the substitution of materials.

For manufacturers, profitable quality and productivity strategies have also involved the speed of service; but in their case the adoption of new labour work practices has also been important.

Turning to the world ranking of these strategies, retailers record both product and service availability as being significantly associated with superior quality. Catch-up strategies for retailers are speed of service and staff training, both of which are associated with quality; and speed of service and new labour work practices on the productivity side. As productivity strategies, staff training and relocation are associated with both a poor world ranking and with poor contributions to profit.

Manufacturers record a considerable catalogue of quality catch-up strategies: product redesign; the range of features included; new management practices; new computer and management information systems; and the reduction in average age of equipment. By contrast with retailers, no quality and productivity leadership strategies are identified. We recall from Table 5.6 that manufacturers also rate their productivity below that claimed by retailers, perhaps on the basis of better evidence given their greater exposure to trade.

A considerable variety of strategies are associated with quality and productivity profitability and standard for one sector or the other, but without any clear direction to the relationship. Again, we may see these as contributing to both leadership and catch-up strategies. These include quality control, staff training, new organisation structures, new work practices and composition of workforce, new accounting systems, location, improved capacity utilisation and controls on financial assets.

To summarise this search for strategies distinctively associated with quality and productivity, we find that the following are mentioned most frequently by one group or another. The improvement of service lies behind successful quality and productivity more often than any other strategy. Improved labour and management practices; the use of new computer-based and management information systems; and staff training are also mentioned frequently. Others appear to be important for only some firms, in only some uses; product redesign and availability; changed use of subcontractors; changed use of materials the updating of equipment.

Our interviews with managers also included an open-ended question on what they felt the key quality and productivity strategies had been for their organisation over the past five years. Table 5.13 summarises their responses, grouped together on the basis of the words used by our respondents, rather than any structure determined by us. These are broadly supportive of the above analysis, but with important additions and changes in emphasis.

In all of the major sectors, the development of the organisation's human resources has played a key role in quality and productivity improvements. One can isolate three important elements here: standards, training, and team-building/ communications (STT for short). All three are ranked among the top half-dozen strategies for retailers and manufacturers; and elements of the STT set are among the most frequently used strategies in wholesaling and transportation also.

It is interesting that the incidence of strategies directed at staff development greatly outnumbers those of staff recruitment and selection. It seems there are more quality and productivity gains to be made from improving the human resource you already have. Nevertheless, strategies aimed at getting the right people into the right jobs are important in retail and other services, and are mentioned by manufacturers also. Staff selection appears to play a particularly important role for the half-dozen construction companies included in our sample.

Apart from training, the importance and prevalence of STT strategies did not emerge so clearly in the above statistical analysis. Inspection of Exhibit Four of the questionnaire, or Tables 5.10 to

5.12 will show that there was no way for respondents to indicate the importance of team-building, communications and standards, except through 'other management practices'. It seems likely that these are at least some of the techniques respondents had in mind when selecting this item.

What drives these concerns for staff development varies somewhat across sectors. For retailers, transport and other services (largely hotel and banking industries), customer service appears to be the paramount concern. By contrast, wholesale and construction firms appear more inwardly-focussed: wholesalers on the efficiency of their stock management; construction on the selection and supervision of staff. Manufacturers may occupy a middle ground here, giving top priority to quality assurance/quality control, a strategy which can span both the efficiency of production and a concern for meeting customer needs.

The incidence of computer-based strategies is noteworthy. These are given top rating by wholesalers and have been important also to other services and to retailers. The computer has so far played a less salient role in the improvement of quality and productivity in manufacturing.

Strategies based on technology in general, as distinct from computer technology, are much less frequent. They are apparently important to the other services group, especially banking, which is also the only group to mention the word research as part of its quality and productivity strategies. Technology-based strategies are mentioned elsewhere by only a half-dozen manufacturers.

Strategies directed at improving the capabilities of, or use of, a firm's assets are among the top-ranked in all major sectors. Manufacturing and other services have more frequently adopted strategies involving new or improved *fixed* assets. Such strategies are mentioned in transport also. The equivalent effort at retail level appears to be a concern with shop layout. Wholesalers, on the other hand, have put greater emphasis on the management of *current* assets, particularly inventory, in their quality and productivity strategies.

TABLE 5.13

**KEY STRATEGIES FOR QP GAIN:
LAST 5 YEARS**
percent of respondents using strategy

RETAILERS (38 firms)	%
Staff training	34
Customer service	32
Team-building/communication	24
Computer-based	21
Performance standards, incentives, controls	21
Shop layout	21
WHOLESALEERS (14 firms)	
Computer-based	36
Staff training	29
Stock control	21
Performance standards, incentives, controls	21
New, improved products, services	21
Customer service	21
MANUFACTURERS (106 firms)	
Quality assurance/control	28
Team-building/communication	27
Staff training	23
Performance standards, incentives, controls	16
Work methods and flow	15
Management change, commitment	14
CONSTRUCTION (6 firms)	
Staff supervision	33
Staff selection	33
TRANSPORT (8 firms)	
Customer service	37
Product range, packaging	37
Performance standards, incentives, controls	25
SERVICES	
Customer service	36
Staff training	28
Performance standards, incentives, controls	28
Computer-based	24
New fixed assets	20
Technology	16
Product range	16

Relative to the emphasis placed on the consumer, on staff, and on assets, especially computers, the incidence of strategies involving product/service redesign and development appears minor. Changes to the product range and developments to existing products are mentioned by only a handful of manufacturers (5% each), and by only 11% of retailers. Product-based strategies are, however, rated among the top half-dozen by wholesalers and other services, and are indeed ranked as the most important quality and productivity strategy by transport firms. With these exceptions, the general picture seems to be of firms pursuing quality and productivity gains by getting better at what they do now. Strategies based on product/service innovation are less prevalent.

All of the above conclusions have their parallel in the above statistical analysis. What our respondents' own words add is a shift in emphasis towards the importance of people-management issues; and the observation that the many strategies listed in Tables 5.10 to 5.12 which are statistically associated with quality and productivity, but without any apparent direction, do indeed contribute to quality and productivity in a positive way for many firms in our sample.

5.7 Summary of Effects on Quality and Productivity

In the above sections we have examined the various sources of change to a firm's quality and productivity: change to its regulatory environment; the nature of its industry; its own characteristics as a firm; and its choice of strategies. Some of the key influences on quality and productivity to emerge have been:

Increased foreign access is associated with foreign expansion of market share and changes in control of the firm, and has raised the importance of asset efficiency to firms' profits.

Deregulation of prices has impacted particularly on firms in the non-tradable goods sector, and has raised the importance of market prices to firms' profits.

Improved industry access is also associated with increased foreign share-of-market and has led to an improved contribution to profits of productivity strategies, particularly asset efficiency, among retailers.

Labour market deregulation has impacted particularly on larger firms and is associated, again for retailers, with improved productivity performance.

Industry growth has strong positive associations with both quality and productivity performance.

Productivity strategies are rated more highly for firms with more recent plant and equipment and less highly for firms with a higher proportion of their workforce having only some school qualifications.

Effective quality and productivity strategies can involve improved customer service; quality control and assurance; new labour work practices; improved management (especially the STT strategies of setting standards, training and team-building); use of computer-based management information systems; and improved asset management.

These results may helpfully be compared to what our respondents told us directly about the most powerful influences on their quality and productivity performance, both encouraging and inhibiting. These are set out in Tables 5.14 to 5.17.

For all firms (Table 5.14), factors most highly rated as being conducive to quality and productivity improvement were domestic competition, greater price competition, pressure from market decline, and consumer pressure for quality improvement. These all have their parallels in the results we have reached. The same factors were identified by both retailers and manufacturers (Table 5.16); but manufacturers added offshore competition to this list also.

Factors expected to increase in importance for all firms were the rate of technical change, competition from offshore, price competition, more flexible labour markets and effective tax rates. Manufacturers and retailers generally follow this overall pattern, with some differences of items cited, and of emphasis. Manufacturers expect contact with international markets to be of increasing importance; and retailers expect ease of market entry to provide greater stimulus to their quality and productivity. The increase in importance of

labour market flexibility and effective tax rates is particularly pronounced for manufacturers; increased competition from offshore particularly so for retailers. It is apparent from Table 5.16 that expected increases in the importance of technical change are a factor for manufacturers rather than retailers.

Asked to list barriers to quality and productivity improvement (Table 5.15), respondents often cited the same factors identified as encouraging greater quality and productivity: price competition, and domestic competition. This varied response to external pressures for change seems likely to be responsible for the large number of associations we have found in which it has not been possible to identify a single direction of influence.

Table 5.14 : Incentives to Quality and Productivity Improvement

	Nos Reporting Use	
	Last 5 years	Next 5 years
Pressure from rapid growth	61	34
Pressure from market decline	85	88
Rate of technical change	54	65
Change in ownership	42	30
Foreign ownership	9	12
Competition from offshore	57	92
Domestic competition	127	117
Greater price competition	119	139
Contact with international markets	46	50
Consumer pressure for quality gains	85	91
Easier entry to your industry	31	34
More flexible labour market	13	33
Unionisation of workforce	8	8
Effective tax rates	11	34
Other	16	13

Source: Survey Q15

Table 5.15 : Obstacles to Quality and Productivity Improvement

	Nos Reporting Use	
	Last 5 years	Next 5 years
Barriers Outside the firm		
Inadequate industry growth	63	69
Limited technical change	24	14
Change in ownership	14	10
Foreign ownership	7	11
Competition from offshore	25	57
Domestic competition	61	63
Greater price competition	70	87
Easier entry to your industry	23	33
Inflexible labour market	76	53
Tax rates	41	24
Imperfect information	29	19
Shortages of key inputs:		
Labour	66	42
Materials	21	14
Management	39	19
Equipment	23	9
Suppliers	22	19
Technology	20	14
Costs of over-regulation	38	17
Other	14	7
Barriers Inside the firm		
Management resistance to change	55	24
Worker resistance to change	84	51
Time to adjust to change	56	43
High transaction costs of change	39	40
Lack of management experience offshore	26	13
Lack of market power by your firm	26	22
Lack of international market experience	16	19
Age of plant	51	44
Education of workforce	50	42
Unionisation of workforce	44	34
Inadequate investment in R & D	36	24
Size of firm	27	25
Other	6	1

Source: Q17

Other barriers mentioned were: inadequate industry growth; inflexible labour markets; shortages of key inputs, especially labour; worker and management resistance to change; the age of plant; and the education of the workforce. As we have seen, firms able to adopt new labour and management practices, and who have more recent plant, are the ones which rate their quality and productivity performance most highly. Firms employing a high proportion of workforce with only some school qualifications typically record inferior productivity. Examination of Table 5.17 shows that manufacturers and retailers typically cite the same *external* barriers to quality and productivity. But it is manufacturers rather than retailers who appear to face *internal* barriers most frequently. Although not mentioned as frequently as other barriers in answer to question 17, regulatory barriers to quality and productivity were mentioned several times in answer to open-ended questions. Both pharmacists and stockbrokers noted regulation as a barrier, and welcomed its reduction. A department store found limitations on store trading hours a barrier.

It is encouraging to note from Tables 5.15 and 5.17 that many barriers considered important in the past are expected to provide less constraint in the future: shortages of labour, management and equipment; inflexible labour markets; tax rates; and resistance to change from both management and labour. Others are expected to remain important, or increase in importance: competition, especially price competition; inadequate industry growth; and, for manufacturers, competition from offshore.

We note a close correspondence between the results of our statistical explorations over all firms and the direct statement of our responding managers giving their judgement about the most important quality and productivity influences in their own firm. Our confidence in the accuracy of the conclusions is reinforced as a result.

We do note, however, that our respondents cite industry and market factors far more frequently than they do deregulation as a reason for their increased focus on quality and productivity. We accept the accuracy of their view; but believe that the many close associations we have found between deregulation and those same industry and

market forces allow us to see deregulation as playing a powerful role behind the scenes.

Table 5.16 Incentives to Quality and Productivity Improvement
Nos reporting use

	Retailers n=38		Manufacturers n=106	
	Last 5 years	Next 5 years	Last 5 years	Next 5 years
Pressure from rapid growth	8	5	25	14
Pressure from market decline	16	13	50	54
Rate of technical change	11	9	32	41
Change in ownership	8	7	19	15
Foreign ownership	2	3	6	5
Competition from offshore	2	10	48	67
Domestic competition	31	31	64	54
Greater price competition	26	31	65	71
Contact with international markets	5	5	29	34
Consumer pressure for quality gains	19	19	45	47
Easier entry to your industry	4	13	16	13
More flexible labour market	4	7	6	21
Unionisation of workforce	1	1	5	5
Effective tax rates	3	9	6	21
Other	3	2	9	8

Table 5.17 Obstacles to Quality and Productivity Improvement
Nos reporting use

	Retailers n=38		Manufacturers n=106	
	Last 5 years	Next 5 years	Last 5 years	Next 5 years
Barriers outside the firm				
Inadequate industry growth	12	13	38	43
Limited technical change	1	0	20	10
Change in ownership	1	5	9	4
Foreign ownership	0	4	6	5
Competition from offshore	2	6	19	44
Domestic competition	16	14	30	34
Greater price competition	17	19	36	50
Easier entry to your industry	6	9	6	15
Inflexible labour market	13	7	44	35
Tax rates	9	3	25	11
Imperfect information	4	4	18	11
Shortages of key inputs				
Labour	10	8	36	23
Materials	3	2	17	12
Management	4	3	23	13
Equipment	1	0	15	4
Suppliers	3	1	16	15
Technology	1	3	13	8
Costs of over-regulation	9	2	23	13
Other	3	1	7	6
Barriers inside the firm				
Management resistance to change	5	2	36	15
Worker resistance to change	13	5	54	36
Time to adjust to change	7	6	37	29
High transaction costs of change	5	6	25	24
Lack of management experience offshore	4	1	14	8
Lack of market power by your firm	2	2	14	13
Lack of international market experience	0	2	10	13
Age of plant	8	5	34	30
Education of workforce	8	7	38	31
Unionisation of workforce	5	5	31	26
Inadequate investment in R&D	6	4	22	13
Size of firm	7	8	13	8
Other	1	0	4	1

VI A SUMMING UP

6.1 The Study

It is a rare experience to conduct a study entailing so many detailed and extensive personal interviews. We feel fortunate to be the beneficiaries of several hundred work-hours of interviewing time from very senior managers, facilitated by very diligent interviewers. We thank them all.

The mass of data and analysis flowing from this project gives an extensive view of New Zealand's industrial landscape some four years after the programme of economic reform initiated by the 1984 Labour government. The very completeness of the picture makes it hard to extract all of the major trends. We offer the following summing up but urge the reader to absorb the detail too. There are many results here which struck us as being of importance in their own right but which may not receive their deserved weight in this summary.

One result is clear: quality and productivity are of paramount importance to our respondents. Quality matters rather more than productivity; but over the last five years both have made contributions to profit above any other source of profit (Section 4.5). Furthermore they are expected to increase in importance over the coming five years.

But, as a country, we are starting from a weak quality and productivity position. Nearly half of our respondents rate their productivity below world standards; and nearly a third say the same of their quality (4.5). This leaves many firms in a weak position as they are increasingly brought face to face with international standards of quality and productivity performance and competition. There is much evidence in this study to suggest that some firms are responding to this challenge with new strategies and improved performance. But there is also much evidence of firms' management being unable to respond to the change. Manufacturing operations have been closed down; firms' management have ceded control to new hands, in many cases foreign; and there are no doubt many firms which have ceased trading altogether.

From the collective experience of our respondents, we have sought to extract the factors which exert a positive influence on quality and productivity, and in particular to establish whether the programme of deregulation of the last few years has had its desired effect of stimulating quality and productivity improvement. We have used the structure/conduct/performance paradigm as our framework and have explored to what extent deregulation has affected, or been associated with, the structure of industries, the conduct and strategies of firms, and their quality and productivity performance.

6.2 The Quality and Productivity Literature

Our literature survey has distinguished between factors affecting *levels* of productivity, and *changes* in productivity. Following our theoretical framework, we can broadly categorize variables influencing levels as: (a) business environment (growth rates, degree of uncertainty, etc); (b) regulatory environment (trade protection, industry subsidies, etc); (c) market structure (plant and firm size, vertical integration, degree of specialisation, ownership); and, (d) business strategies (quality of inputs, organisational structures, innovative activity, industrial relations).

Unfortunately the empirical evidence is often not clear-cut, but we can draw some general conclusions. In particular, a stable, high growth economic environment is positive for firm performance. Other positive variables include high quality capital and labour, innovative R & D activity, high rates of unionisation (usually), changes in ownership, and often (depending on the product), large scale production. In contrast, factors identified as having a negative effect include: industrial protection and subsidies,²⁷ poor industrial relations, and in some cases foreign ownership.²⁸

In the economics literature, much less has been written on factors which influence changed performance. However it is apparent that: firms producing mature goods find it more difficult to increase

27. Although a New Zealand study suggests otherwise for this country between 1952 and 1973.

28. Again one New Zealand study finds the opposite.

competitiveness, poor profitability in the past may limit firms' ability to make the sort of large scale changes that are required, "investing in the future" (eg staff training, new capital and techniques, etc) are crucial in ensuring *long-term* success, and reducing x-inefficiency (eg. poor management structures and processes) is a very common strategy. In the case of deregulation specifically, it is clear that both micro and macroeconomic policy changes are relevant, and that in the New Zealand context, responses to economic liberalisation have been very wide-ranging.

6.3 The Effects of Deregulation

Turning to our study, the most fundamental point of understanding to absorb from the results is that the effects of deregulation vary. They vary depending on what type of deregulation one is considering; they vary by sector, by industry and by firm; they vary in the extent to which their effects have fed through structural change in the industry, to changes in management practice, to changes in quality and productivity performance; and they vary in direction, in some cases encouraging quality and productivity improvements, in others hindering.

The result of all this variety is that, when one looks for universal, direct relationships between deregulation and improvements in quality and productivity over all firms, one finds none (Section 5.1). Nonetheless, our analysis suggests that deregulation is having widespread and significant effects behind the scenes, in ways that are distinctive to particular groups of firms.

6.3.1 Structural Change

We have found that most forms of deregulation have impacted particularly on smaller, less unionised firms with lower involvement in exporting (5.2). (The exception is labour market deregulation which has to date applied to larger firms.) Price decontrol and improved access to the industry have applied particularly to trade and transport sectors, increased foreign access to manufacturers. Increased foreign access has also impacted particularly on firms in the latter stages of their industry life-cycle (as has been found in overseas studies).

The most salient result of this deregulation over the last five years has been to increase the penetration of the New Zealand market by foreign competitors (5.2). And the trend is expected to continue. As foreign firms move in, domestic firms have often changed hands: of the 149 firms subject to increased foreign access, 56 have been subject to a change in control. Individual respondents report the closing of manufacturing operations or their moving offshore.

The prime reason offered by our respondents for this failure in the marketplace is the limited economies of scale available in New Zealand. By comparison with overseas producers, domestic firms report that they lack the scale to be competitive, find their scale of operations further reduced by foreign entrants, and feel unable to expand scale overseas due to the high exchange rate (5.2). Other factors contributing to a high cost, uncompetitive, domestic market cited by our respondents are interest rates, transport costs, wages and the pricing policies of the new SOEs (5.5).

6.3.2 Changes in Conduct

Another feature of the companies which have felt the greatest impact of deregulation has been their relatively low use of quality and productivity improvement strategies, especially when taken over all firms (5.4). We take this to be another indication of the poor quality and productivity position from which many firms must now face increased competition.

But when we examine the effects of deregulation in greater detail, there is much evidence that it has encouraged firms to adopt QP-improving strategies, in a variety of distinctive ways (5.4).

Labour market deregulation has allowed increased use of new labour work practices and new organisation structures. The association applies to all firms including manufacturers, for whom new locations are another benefit of increased labour market flexibility.

Also, even though many QP-improving strategies appear to be less prevalent among retailers, some strategies in that sector appear to have been encouraged by deregulation: improved speed of service and quality management.

Most importantly, manufacturers as a group have been encouraged to adopt a wide range of QP-improving strategies: new forms of service presentation; quality control and assurance; improved product availability; reduced staffing; new materials; new arrangements with suppliers and distributors; new organisation structures; new locations; new operating regimes and attempts to capture economies of scale. Many of these appear to be in response to the decontrol of prices.

6.3.3. Changes in Performance

Our summary to date suggests that each form of deregulation has encouraged the adoption of at least some QP-improving strategies for at least some firms. But we know from an analysis of structural effects that for many firms these efforts have been insufficient to withstand international standards of competition. The ultimate test of the success of deregulation is whether or not it leads to levels of quality and productivity performance that do match international standards. There are several indications that this is happening.

Even though the general experience of the *last* five years has been that deregulation is not associated with improved quality and productivity, companies subject to increased foreign access do expect asset efficiency to improve profits over the *next* five years (5.1).

Further evidence of positive responses to deregulation comes when we disaggregate our sample into more homogeneous groups of firms (5.3). For instance, over the last five years retailers have already experienced positive improvements in productivity and asset efficiency in response to increased industry access, and labour market deregulation has allowed them to improve their productivity also.

Also, for both retailers and manufacturers, there are several associations between deregulation and quality and productivity performance for which no unique direction can be established. We have interpreted these to mean that deregulation has hindered quality and productivity improvements in some cases (as discussed in the context of structural change above), but encouraged them in others.

We are supported in this belief by what respondents have told us directly about the factors encouraging, and hindering, quality and productivity performance (5.7). Many of the same factors are cited

both as encouragements and barriers to improvement, in particular the amount of competition, both domestically and from offshore, especially price competition. The balance appears to favour the positive effects of deregulation in that respondents cite these factors as incentives to quality and productivity more often than as barriers by margins of between 1.5 and 2 to 1 (Tables 5.14 to 5.17). The result applies equally to all firms and to retailers and manufacturers.

Looking to the future, our respondents expect pressure from domestic competition to encourage and inhibit quality and productivity in about as many firms over the next five years as over the last. But pressure from offshore competition and increased price competition is expected to affect up to twice the present number of firms over the next five years. Despite the increased pressure, more firms continue to expect these factors to encourage quality and productivity than inhibit it.

6.4 Other Effects on Quality and Productivity

Our study has identified many other factors associated with firms' quality and productivity. We note the principle ones below.

6.4.1 Industry Effects

Growth appears to be the major industry factor affecting quality and productivity, both as an incentive to improvement, and as a barrier when growth is inadequate (Sections 5.5 and 5.7). For a considerable number of firms, low growth has been and will remain a barrier to quality and productivity gains. Forty percent of our respondents faced low growth or declining markets over the last five years, rising to 47 percent over the next five years (4.2).

As discussed above, competition in the industry is seen as both the most important barrier and the most important encourager of quality and productivity, the latter effect being the stronger (5.7). The degree of market concentration, as measured by the market share of the largest three firms, is associated with quality standards, but with no unique direction, apparently encouraging quality in some industries but not in others (5.5).

The rate of technical change in industries is reported to be high or very high by nearly half of our respondents (4.2). For our

respondents, it is apparently associated with the quality of their goods or services rather than the efficiency of productive processes, an association which has been negative over the last five years, but is expected to make a positive contribution to profits over the next five years (5.5). The rate of technical change is expected to increase in importance as a factor encouraging quality and productivity over the next five years, especially in manufacturing (5.7).

In spite of the expected importance of technical change, there are few cases of research-based quality and productivity strategies (5.6), and although some respondents call for increased government support for R & D, others believe that R & D is an activity which is best done for them by their overseas parent (5.2).

As discussed above, foreign market share is expected to rise from the one-third average reported for the past five years (4.2). We have found foreign penetration to be inversely related to operating efficiency (5.5): when efficiency is high, the future market share of foreign producers is expected to be less; firms that expect weaker operating efficiency are those with higher foreign market penetration. We repeat our conclusion that foreign competition is expected to improve in more firms than it is expected to impede it.

Others factors expected to show substantial increases in importance to quality and productivity are more flexible labour markets and effective tax rates (5.7). Both have been seen as barriers to quality and productivity gain over the last five years, but are expected to lessen in this role and increasingly encourage quality and productivity improvement.

6.4.2 Firm Effects

Poor productivity is strongly associated with older plant (5.5) and old plant has been a barrier to quality and productivity gains for many of our respondents, especially manufacturers (5.7). It is encouraging to note that this barrier is expected to lessen in importance in future however and we may take it that the average age of plant is expected to reduce from the current 8.5 years (4.2).

Foreign owners are mentioned frequently by our respondents as having an important influence on their quality and productivity strategies; but we have been unable to find a relationship to quality

and productivity performance over all firms, with the exception that asset efficiency appears to have been higher for these firms over the last five years (5.5). Some 32 percent of our respondents report some foreign ownership (4.2).

In a similar way, a change to the ownership of the firm is frequently cited by our respondents as having encouraged quality and productivity; but we have not been able to establish a general relationship. An astonishing 45 percent of our sample have been subject to changes in ownership over the last five years, 34 percent to changes in control (4.2). Many respondents affirmed that management commitment was vital to quality and productivity improvement. Conversely, management resistance to change has been an important barrier for many firms. Fewer than half of these expect it to remain a barrier over the next five years, however (5.7).

There are a number of associations between the educational composition of the firm's workforce and its quality and productivity performance, but if these have any direction, it is negative (5.5). The poor quality and attitudes of the workforce are cited by many respondents as a barrier to quality and productivity gains (5.7). On average, some 48 percent of our respondents' labour force has no school qualifications (4.2) and many firms, especially manufacturers, cite shortages of skilled labour as a barrier to quality and productivity. Again, it is encouraging to note that the importance of these barriers is expected to lessen in future (5.7).

Although several firms believed that unions represented a barrier to quality and productivity (5.7), we were unable to find any overall relationship between unionisation rates and quality and productivity performance (5.5).

6.4.3 Successful Quality and Productivity Strategies

A feature of our study is that we have been interested to explore the detailed methods through which firms seek to improve their quality and productivity. Our results are reported in sections 4.3 and 5.6. We have found a number of general strategies to be positively related to improved quality and productivity; although, as always, the best strategies differ from sector to sector.

The most powerful quality and productivity strategies appear to be: the improvement of service; of labour and management practices; the introduction of new computer-based systems and methods; an extensive array of human resource development techniques including team-building, communication, training, the setting and measurement of standards of performance; quality assurance and control, especially for manufacturers; and improved inventory control.

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APPENDIX A1 QUALITY AND PRODUCTIVITY STRATEGIES : A FRAMEWORK

The following pages are an abridged version of a paper written for the field workers, ie those who did the interviews, for our study. It was written to provide a framework for thinking about quality and productivity; and to define a number of strategies for quality and productivity gain.

Strategies for Quality Improvement

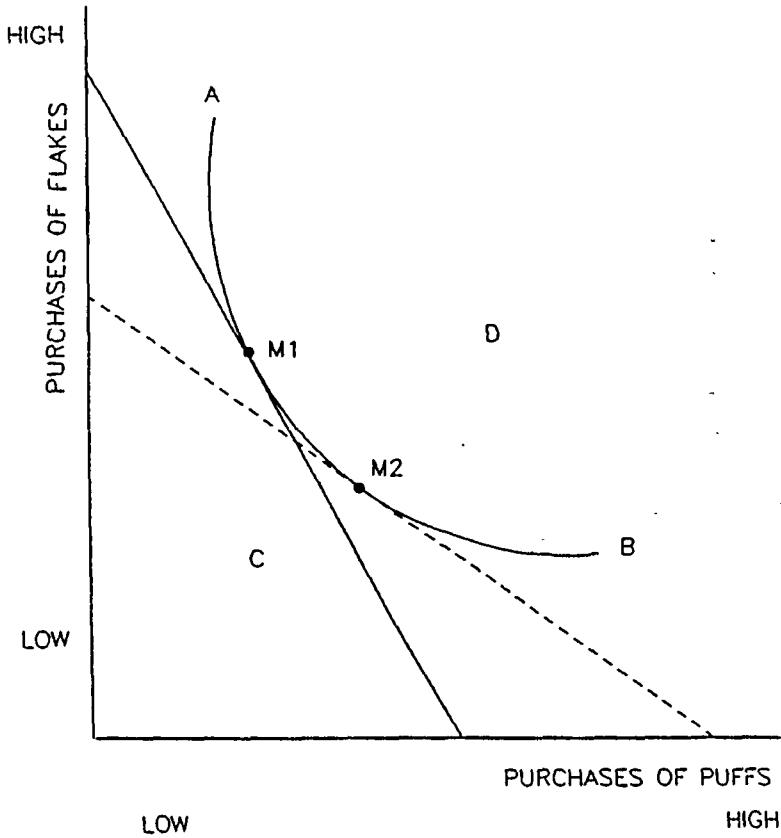
Quality is **in the mind of the consumer**. Producers can change the attributes of their goods and services; but it is the consumer alone who determines the benefit that these changes bring. And these benefits are often quite intangible. The producer of an anti-perspirant can make it last longer, or change its fragrance, but it is the consumer who will experience the tangible and intangible benefits of these changes and who will decide whether its quality has improved or not.

Quality is also a matter of comparisons. A product's quality is defined by the consumer **relative to competing products**, which are the alternative means of meeting the consumer's needs.

The chart on the next page offers one way to think about the consumer's perception of product quality and product choice. It may be familiar to readers as an indifference curve. Out of the vast array of goods and services bought by a representative consumer, we isolate two brands of cereal, Blakes and Puffs. Purchases of every other product are kept constant. We also control the consumer's level of satisfaction or benefit so that it is kept constant. The chart then shows how this consumer would trade off Flakes for Puffs in the weekly menu **in such a way as to keep the benefits of consumption constant**.

For example, menu A on the chart consumes lots of Flakes and few Puffs; menu B the reverse; but both menus are equally attractive to this consumer. In between are a number of other menus labelled M,...,M, all of which yield the same level of benefit as A and B.

CHART 1
THE BENEFIT FRONTIER



Joining up these points defines the consumer's indifference curve or benefit frontier.

The essence of quality-improvement strategies is to shift the benefit frontier, so let us be clear about why it is a frontier. Imagine a point to the left of the line, like C on the chart. This menu involves lower consumption of Flakes relative to menu M_1 , or lower consumption of Puffs relative to menu M_2 . Unless these products increase the benefits they deliver to the consumer, he must be worse off consuming menu C than either of menus M_1 or M_2 . Conversely, menu D involves consumption of more Flakes or more Puffs. Unless these products are of a lower quality, the consumer must be better off at D than at M_2 or B.

Hence if a new product does improve on the level of benefit of the best product currently available, it will lie to the left of the benefit frontier; if it is of inferior quality it will lie to the right; and if it yields the maximum benefit currently available, it will be on the frontier.

The benefit frontier sets out the consumer's choices. This choice will certainly be influenced by the relative prices of the two cereals. If Flakes are inexpensive relative to Puffs, Flakes will be the cheaper source of benefit, and will tend to be preferred in the weekly diet. Chart 1 depicts this behaviour with a budget line which shows how many units of the two products the consumer can afford to buy, given their relative prices. The cheapest way for the consumer to achieve the benefits of AMB is to choose menu M_1 , a menu which uses more of the inexpensive Flakes product. Other menus lie above the budget line and involve higher expenditures. But if relative prices are reversed and Puffs becomes less expensive, as shown in the dotted line on the chart, the consumer will move to menu M_2 and consume more Puffs.

Using the framework of the benefit frontier, we can define four broad strategies for quality improvement:

Q1: Product innovation : a new product which delivers greater satisfaction to the consumer, either by meeting needs better or by meeting new needs.

Q2: Product development: a strategy which aims to extend the benefits that consumers gain from the best existing products.

Q3: Product catch up: a strategy to bring our product up to the levels of benefit available from other competing products.

Q4: Value for money: a product which delivers the best level of benefit; but at a lower price.

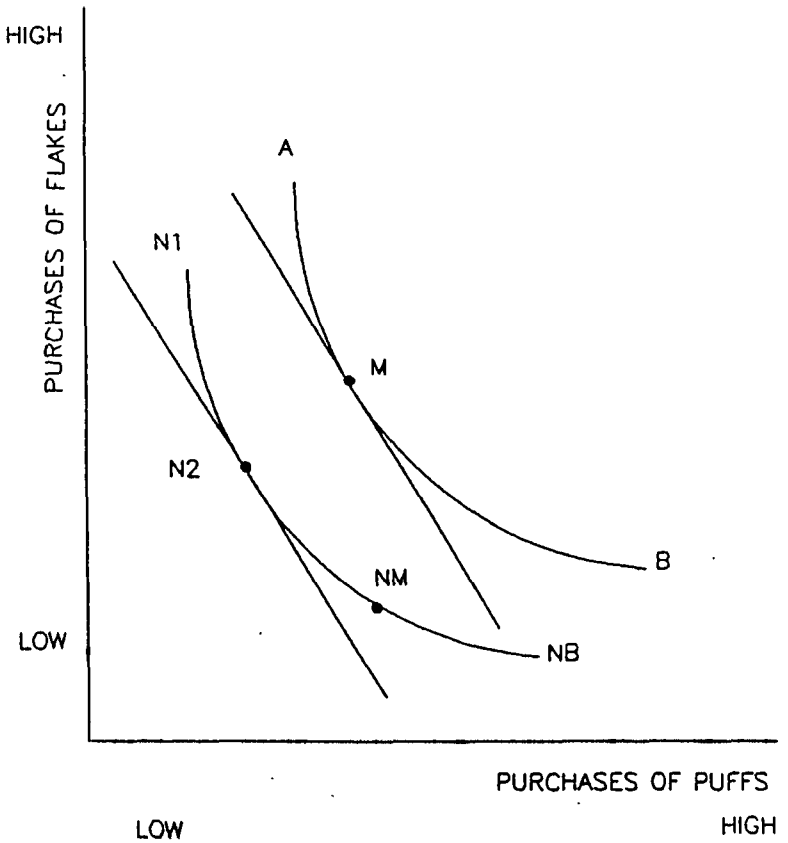
Q1: Product innovation

The essence of this strategy is to introduce a new product or service that gives the consumer more satisfaction than was possible from established products. The stress here is on the word **new**. Product innovation will involve one or more of: new designs; new technology; new consumer needs. A good example is the Polaroid instant camera which developed new film technology, to meet a consumer need (instant development) not met by existing cameras, and required the complete redesign of the product. In the cereals business, we might imagine there-engineering of the brand Flakes such that it retained freshness for longer periods. Chart 2 on the next page shows the result. Two separate effects need to be recognised: first the consumer is better off; and therefore, second, Flakes has improved its competitive position relative to Puffs.

First, the consumer benefit. Recall that the consumer gains the same level of benefit anywhere on the frontier AMB. As a result of the improvement in the quality of Flakes, the consumer can now get that same level of benefit from combinations which include fewer Flakes: N_M gives the same benefit as M; N_B as B. The consumer is better off because menus on the new frontier N are cheaper to buy: the budget line required to reach N is lower than that required to reach AMB.

Second, the benefit to the innovating firm. The consumer now has an added incentive to favour Flakes over Puffs. The more Flakes he puts in his menu, the greater the gain to his benefit frontier. (Compare the gain from M to N_M with that from B to N_B .) The result is a competitive gain for Flakes in the market. This can take a number of forms: the ability to increase price; a gain in sales; a loss in competitor's sales. Chart 2 illustrates a change in sales, from M to N_2 : Flakes gains and Puffs loses market share.

CHART 2
PRODUCT INNOVATION



Product innovation is any quality improvement strategy which shifts back the consumer's benefit frontier by offering a new product or service. For the purposes of this research, we took new to mean new to the world and a product innovation to be one which has not been available to consumers anywhere.

Q2: Product development

This strategy also aims to shift back the benefit frontier, but by improvements to existing products rather than the introduction of new ones. It is obvious straight away that the distinction between product development and product innovation is one of degree rather than one of kind. Most products have a genealogy that links them back to earlier models, so few products are ever completely new. However, to the extent that a change is based on an extension to present product designs, technology, and consumer needs, we would call it a product development. To the extent that a change is based on the new product designs, technology, and consumer needs, we would call it a product innovation. And, to be consistent with our earlier definition of innovation, we will also use product development to describe situations where the best available overseas product or service is modified for the local market.

Some examples may clarify the distinction:

product development	product innovation
Apple IIe	Apple Macintosh
IBM PC/XT	IBM Personal System II
Boeing 747 Big-Top	Boeing 757
Ford Cortina IC	Ford Sierra

Product developments can take many forms: style change; expanded range of options; improved reliability through quality control/assurance programmes; product availability. These can all be used to improve what is already the best product on the market; that is, a product on the consumer's benefit frontier.

Q3: Product catch up

The third strategy for quality improvement is relevant to products which are of a lower perceived quality than the best available. It is the situation shown in Chart 1 at point D. The challenge for the

versions of Puffs included in menu D is to get its quality up to that of the version included in menu M_2 , the version that sets the quality standard and is on the consumer's benefit frontier. This can be done using all the techniques listed above: style change; expanded range of options; improved reliability; quality control/assurance programmes; and product availability. The difference is that in the product development strategy we are **improving on the best available**; here we are **catching-up with the best**.

The question arises how it comes about that an inferior version of a product can survive in the market. Part of the answer is to recall that we are using a world standard of quality here. The best product may not be fully available on the local market. But also, the needs of consumers vary and the variety which is perceived to be of low quality by many consumers may be preferred by some. We may then be in the position of wanting to re-position our product to meet the quality demands of a larger or more rapidly-growing market segment.

Q4: Value for money

The fourth in this list of quality improvement strategies for competitive gain does not strictly speaking involve changes to product quality. It need not even change product attributes in any way. The essence of this strategy is to provide the **same product, but at a lower price**. It is likely therefore to be based on a gain in productivity and costs of the type we will look at next. It is included here because it is easy to illustrate on the benefit frontier.

Return for a moment to Chart 1. Say that the relative prices of Flakes and Puffs are shown by the dotted budget line. The result would be consumer purchase of menu M_2 . An improvement in the production or distribution system for Flakes means that these can now be sold at a lower price, shown by the solid budget line. The consumer would increase use of the now-cheaper source of benefit, Flakes; reduce use of Puffs; and move to menu M_1 . Flakes gains competitiveness; Puffs loses.

To recap our four quality-improvement strategies:

Q1: Product innovation : greater consumer benefit from a new product

Q2: Product development: greater consumer benefit by extending the best existing products.

Q3: Product catch up: bringing our product up to the best

Q4: Value for money: the best product at a lower price.

The next section looks in more detail at ways in which competitive advantage can be gained through improved productivity.

Strategies for Productivity Gain

Key features in a definition of productivity are:

- it tells us something about the **inputs** used by a production or service
- it defines the ability of an input to create a **product**.
- it deals with **tangible or real** resources, not money.

A definition which includes these features is:

productivity defines the ability of an enterprise's real inputs to create products of a specified quality.

Productivity gain therefore involves a change to the relationship between inputs and outputs, often described as **efficiency** changes. Chart 3 on the next page offers one way to think about efficiency. It may be familiar to readers as a production function or isoquant diagram. Our strategies of productivity gain will be defined from this chart.

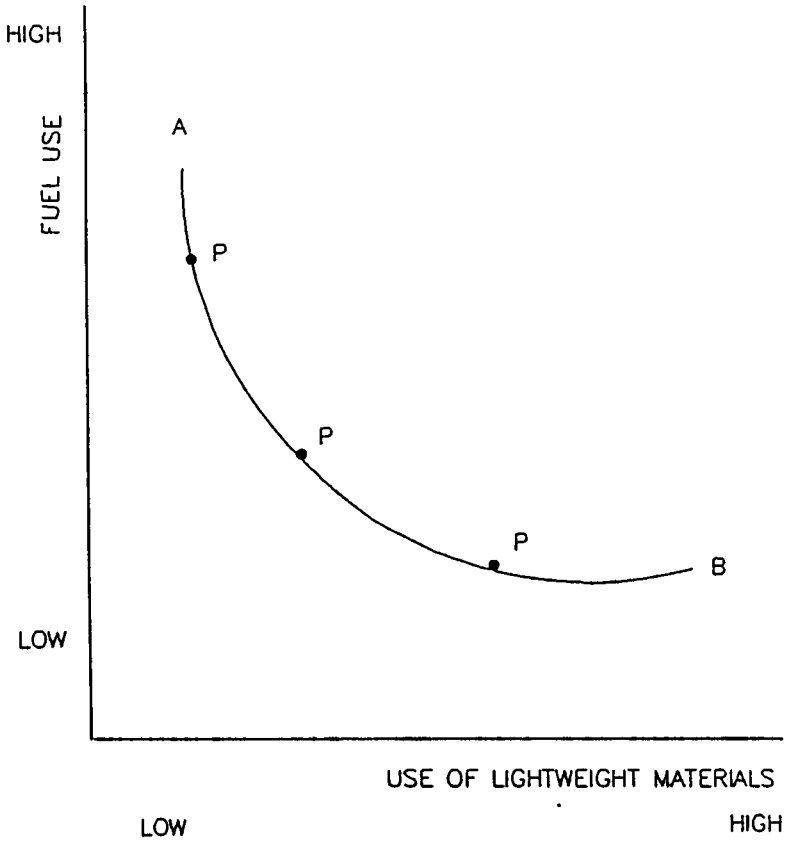
In the chart, the level of quality of outputs, and use of every input is held constant except for two inputs. The chart then describes the choices available to the manager who may wish to substitute one of these two inputs for the other at that level of output-creation and input-use.

The example is one of aeroplane-operation. The output might be stated in units which measure the number of passenger-kilometers travelled, adjusted to the same quality mix of business/leisure class

CHART 3

THE TECHNICAL FRONTIER

USE OF FUEL AND LIGHTWEIGHT MATERIALS IN AVAILABLE AIRCRAFT



travellers. Of the many inputs used by our business, we isolate fuel-use and the amount of lightweight materials used in the construction of the aeroplane. The chart then shows how we can trade off fuel-use for lightweight materials at this level of operation.

For example, point A on Chart 3 represents an aeroplane which makes little use of lightweight materials (measured on the horizontal axis) and therefore uses a lot of fuel (measured on the vertical axis). Aeroplane B is at the other end of the continuum, and uses a lot of lightweight materials and therefore not a lot of fuel. In between these two polar choices, there may be a number of other aeroplanes available to us, with intermediate usage of the two inputs, represented by P,P,...,P. A line drawn through all of the available choices is called **technical frontier**. It represents the best that technology has to offer today.

Using the idea of a technical frontier, we can identify three broad strategies for productivity gain:

P1: Technical innovation: a strategy to develop the next generation technology, moving ahead of today's technical frontier.

P2: Technical development: a strategy for producers who already have the best available technology, and who do everything they know to wring the last drop of productivity from it

P3: Technical catch up: a strategy to get a producer up to the frontier if they are not already there.

P1: Technical innovation

We have described the technical frontier in terms of the machines (aeroplanes) available to the manager today, off-the-shelf as it were. The essence of the **innovation** strategy is to move beyond today's machines to the next generation of technology. It is helpful to think of two sub-strategies here, depending on how ambitious is the strategy:

P1.1: The latest design strategy involves going to the best designer in the business and buying the best of their

"blueprints", an operational description of a machine (aeroplane) that has not yet been built, but is buildable with today's technology

P1.2: the new design strategy involves developing new blueprints, using knowledge that has not before been applied to commercial ends. In the aviation business this might involve designing ultra-slow high volume bulk carriers to compete with maritime transport.

So far we have used the word "machines" to describe the bundles of productive services that managers buy. It is time to expand our concept of productivity gain to include software as well as hardware. A choice between accounting software packages, between operations research proposals, or between sales training programmes involves exactly the same kind of decision as that between types of aeroplane. All these choices can achieve productivity gain.

P2: Technical development

This strategy is based on the best available technology (hardware and software). It seeks productivity gain by wringing the last drop of efficiency from the machines and systems available. A number of sub-strategies may be identified:

P2.1: learning by doing, a strategy variously known as the learning curve, engineering cost functions, or just learning as you go, this strategy involves learning how to improve the productivity of our process in the course of using it. For example, we may find that different flight regimes may reduce fuel consumption on our aircraft. A form of this strategy has been popularised in Japan as **Kaisen**: a strategy which seeks constant improvement in every aspect of operations and is manifested in suggestion schemes, productivity improvement circles and other techniques.

P2.2: Economies of scale. The technology we use may be subject to increasing returns to scale. It may be possible to increase output by X percent with a less-than-X-percent increase in inputs. As it happens, aeroplanes provide a good example of such effects since the volume of a cylinder (in

which the passengers travel) increases by more than the increase in the skin of the cylinder. Use of materials is proportional to total skin area and fuel use to the overall weight of the aircraft. Hence bigger planes tend to use less materials and less fuel per passenger. Capturing economies of scale, when they are present, is a classic strategy for getting the best from available technology.

P2.3: Capacity utilisation is a strategy based on the maximal usage of idle capacity. Productivity is improved if the plane travels full rather than half empty. Shiftwork is another example of the greater use of idle capacity. Still another is the effective use of inventories by carrying the minimal requirement consistent with required output levels (Kanban or just-in-time inventory systems)

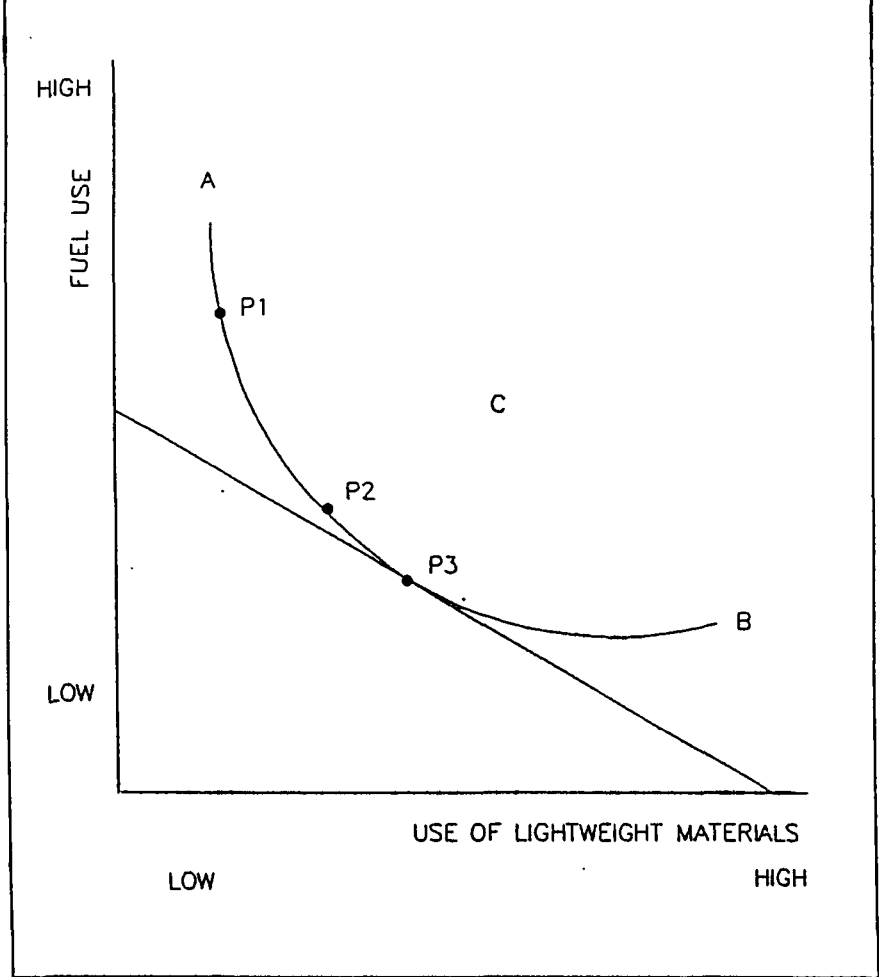
All of the above strategies can be used without moving beyond today's technology, beyond the choices offered by the machines and software available now. The essence of these strategies is to use today's technology, but smarter.

P3: Technical catch up

Not every enterprise in an industry will be using best-practice machines, methods and systems. Some of the inputs used will invariably be 'sunk', that is, not easily sold off even when they are no longer competitive with today's technology. In many cases, it will be cheaper to continue to use such inputs rather than take the loss on their disposal.

This implies that some enterprises will find themselves **inside** the technical frontier, at a point like C on Chart 4 on the next page. The aeroplane depicted by this point is inefficient in material use by comparison with aircraft P₂ and inefficient in fuel use by comparison with aircraft P₃. It may represent some obsolescent design of aircraft, part way between heavier, fuel-using planes and lighter fuel-saving designs. A most obvious strategy for productivity gain for enterprises like these is to replace old machines, systems and practices with the best-available technology; to move from C out to the frontier. This is the first of two sub-strategies of **technical catch up**:

CHART 4
CATCH-UP STRATEGIES



P3.1: Diffusion, the process whereby new techniques pass from one operator in an industry to another, gives its name to this strategy of getting our operation up to the best technology available.

There is another reason why a firm may find itself stuck with inappropriate technology, and therefore be able to improve productivity by changing its methods or machines. Suppose we are operating aeroplane P_3 . The straight line drawn through P_3 represents the costs to our competitor of operating that aircraft. If usage of either fuel or lightweight materials is above that shown on the cost line through P_3 , costs for that operation will be higher. Hence our costs of operating aircraft P_1 will be higher than our competitor's; because our plane uses too much fuel. Probably the plane was built in the days of cheaper fuel when it was economic to fly planes like that. Now that relative prices have changed, we can improve the price-efficiency of our operation by replacing P_1 with a plane which uses less fuel and more lightweight material. This is the second **catch up** strategy:

P3.2: Substitution of an inexpensive input for an expensive one by changing our machines or methods of operation.

A final word on **catch up** strategies. Both C and P_1 are inefficient methods of operation, but for slightly different reasons. P_1 is still the best available aircraft of its type. If fuel suddenly became cheap again, it would be the best plane to fly. Its only problem is that it has become inefficient for price reasons. **Substitution** is strategy to counter price-inefficiency. C , on the other hand is inefficient because it is technically dominated by planes available now: P_2 uses as much fuel but less material; P_3 as much material but less fuel. Using **diffusion** to catch up with the frontier is a strategy to counter technical-inefficiency.

SUMMARY OF PRODUCTIVITY STRATEGIES

P1:Technical innovation

Latest design

New design

P2:Technical development

Learning by doing/kaisen

Economies of scale

Capacity utilisation

P3:Technical catch up

Diffusion

Substitution

QP Strategies for Competitive Gain

A final, and crucial point. So far, we have examined single strategies for quality and productivity improvement, as if each could be implemented by itself. There are many times when this may be true. But often, one individual QP strategy will be impossible to implement, or uneconomic, unless it is combined with others in a mixed strategy.

For example, the development of wide-body jet airliners has in fact involved a mixture of:

Quality improvement through a product innovation which has greatly improved consumer benefits from flying (comfort, in-flight entertainment etc);

which in turn has required productivity gains from...

Economies of scale (bigger planes);

Substitution (use less fuel); and

Technical innovation (the first-time new design of wings and engines, using materials not formerly in use).

It is of interest to know whether the strategies for quality and productivity gain used by an enterprise are of this mixed type.

APPENDIX A2

QUALITY AND PRODUCTIVITY QUESTIONNAIRE

NOTES

Thank you for agreeing to take part in our study

The questionnaire will take one hour

EXHIBIT ONE

This is an outline of the questionnaire

The questionnaire is in four sections:

Section 1 seeks to establish the importance of quality and productivity (QP) to your business

Section 2 asks what strategies your business has used to improve QP

Section 3 asks for your opinion on other factors which have influenced your QP performance

Section 4 is an opportunity for us to get your ideas in a form that suits you, unconstrained by structured questions

EXHIBIT TWO

Please take a moment to read over our definitions of quality and productivity.....

.....to see if they work for you

Quality
affects products
and services
as perceived by
consumer

Productivity
affects their
production
A physical
measure
Not just labour
productivity

NOTES

1 We begin the questionnaire by asking some basic questions about your business and your job

a First your job: which of the following best describes your position?

- General Manager**
- Production/operations Manager**
- Marketing Manager**
- Other (specify) _____**

Check one

b We need to establish whether you wish to answer the questionnaire for your firm as a whole, or for your division?

firm division

Delete one

c What is the chief industry classification of your business?

- Retail**
- Wholesale**
- Manufacturing**
- Construction**
- Transport**
- Other Services**

Interviewer:
please
check one

d What other industry classifications is your firm involved in?

In the questionnaire we want you to focus on your firm or division's chief business

At several points in the questionnaire we will be interested in comparing the last 5 years or so with the next 5 years.

e Is 5 years a suitable time period for your business?
YES NO

Delete one

If NO, what period would suit your business better?

_____ **YEARS**

Use this time
period instead of
5 years

SECTION 1

THE IMPORTANCE OF QUALITY & PRODUCTIVITY TO YOUR BUSINESS

2 First we ask you how important **quality improvement** has been over the last 5 years, relative to other ways of improving profit

Scale: 1=one of the least important
5=one of the most important

1 2 3 4 5

3 Now would you estimate how important **productivity improvement** has been over the last 5 years, relative to other ways of improving profit

Scale: as for 2

1 2 3 4 5

If a measure of profit is needed suggest the ratio:
After-Tax Earning
Assets

EXHIBIT THREE

This Exhibit lists six ways in which overall profitability can be improved, or made worse

There are three factors subject to managerial influence:

And three factors largely determined by forces outside the firm

Please take a moment to ensure that **each** of the factors listed has a **distinct** meaning for you

NOTES
 most important =
 biggest impact:
 can improve or
 worsen profits

4a Would you please rank the importance of each of these six factors to the overall profitability of your business over the last 5 years:

Scale 1=most important (positive or negative)
 6=least important (positive or negative)
 It may be easiest to begin with the most important factor first, then work down

b What do you expect to be the ranking for the next five years

	(a) Last 5 Years Rank (+/-?)	(b) Next 5 Years Rank (+/-?)
Asset efficiency	_____	_____
Operating efficiency	_____	_____
Quality	_____	_____
Market prices	_____	_____
Financial costs	_____	_____
Capital gains/losses	_____	_____

5a Does your firm use any quantitative measures of quality and productivity performance (eg output per person etc)?

YES NO

Delete one
 If NO go to 6

b What measures do you use?

list measure(s)
 below

c If possible, what has been the average annual % improvement in these measures over the last 5 years?

Record replies
 below

(b) (c)

Define measures here:

Average Annual
 % Gain

_____ %pa
 _____ %pa
 _____ %pa

SECTION 2
STRATEGIES FOR QUALITY AND
PRODUCTIVITY IMPROVEMENT

6a In your own words, what QP strategy would you say was the key to achieving the quality/productivity gains you have made over the last 5 years?

b Which other strategies had to be introduced to support the key?

c What will be the key strategies over the next 5 years?

EXHIBIT FOUR

This exhibit lists a number of detailed QP strategies under three headings:

- Quality Improvement
- Operating Efficiency
- Asset Efficiency

7 For each heading please select those strategies which best describe your own strategies over the last 5 years (Please refer to number codes alongside each strategy)

a Quality Improvement Strategies

b Operating Efficiency Strategies

c Asset Efficiency Strategies

8 Now using the same headings, please select those strategies which best describe your own strategies over the next 5 years
(Please refer to number codes alongside each strategy)

a Quality Improvement Strategies

b Operating Efficiency Strategies

c Asset Efficiency Strategies

EXHIBIT FIVE

We would like to distinguish QP strategies according to whether they result in world standards of quality and productivity.

For each of quality and productivity, the Exhibit distinguishes three categories of QP strategy according to whether performance is

in front of world standards	=1
up to world standards	=2
or catching up with world standards	=3

9 Please indicate which category best describes the performance of your firm's current strategies

a Quality Improvement Strategies	1 2 3	Circle one
b Productivity Improvement Strategies	1 2 3	

SECTION 3
INFLUENCES ON QP PERFORMANCE

In this section we want to find out what factors have influenced your firm to adopt the QP strategies it has used over the last 5 years

and also any influences you expect in the future.

First we ask for some characteristics of your firm and industry;

then we ask for your judgement on the importance of factors influencing the QP performance in your firm.

10 Industry Characteristics

a Stage in product life cycle?

- 1=high growth
- 2=growth
- 3=mature
- 4=decline

eg
 Integrated circuit
 Computers
 Soap
 Railways

Circle one

1 2 3 4

b Average annual growth rate in the industry over last 5 years (volume of output)?

A volume measure please, not \$

- Scale:
- 1=decline
 - 2=low: up to 2% p.a.
 - 3=moderate: 3-5% p.a.
 - 4=high: 6-10% p.a.
 - 5=very high: more than 10% p.a.

"Industry"=Sales to consumer not domestic production

Circle one

1 2 3 4 5

c Average growth rate: next 5 years

Scale as for b

1 2 3 4 5

d Rate of technical change: last 5 years

Scale as for b (words only, not % p.a.)

1 2 3 4 5

e Rate of technical change: next 5 years

Scale as for b (words only)

1 2 3 4 5

11 Ownership

- a Has there been a significant change in your firm's ownership in the last 5 years? YES NO If NO go to 11d
- b How many years ago? _____ Years
- c Did it change control of the firm? YES NO
- d Which of the following best describes your enterprise?
(Check one)
- Public Company
Private C'pany
SOE
Partnership
Proprietorship
- e To what extent (% of equity) is your firm foreign owned? _____%

12 Competition

Currently, what proportion of the New Zealand market for your product or service

- a is met by foreign-owned competitors? _____%
- b the three biggest domestic suppliers? _____%
- c your firm? _____% Sensitive

How do you expect these proportions to look over the next 5 years?

- d foreign-owned competitors? _____%
- e the three biggest domestic suppliers? _____%
- f your firm? _____%

13 Markets

- a Over the last 5 years what proportion of your product or service was sold offshore? _____%
- b How do you expect this proportion to look over the next 5 years? _____%

14 Regulation

- a Have restrictions on access by foreign competitors to the New Zealand market for your product or materials (tariffs and quotas) been relaxed in the last 5 years? (delete one) YES NO
- b Have price controls to which you were subject been relaxed in the last 5 years? (delete one) YES NO
- c Have legal impediments to entry to your industry been lowered in the last 5 years? (delete one) YES NO
- d Have restrictions to the operation of your labour market been reduced in the last 5 years? (delete one) YES NO

15 Your firm

- a Size of your firm (no employed) _____
- b Workforce education: proportion of workforce with
 - Post-school qualifications _____%
 - Some school qualifications _____%
 - No school qualifications _____%
- c Proportion of the workforce unionised? _____%
- d Average age of plant and equipment? _____ Years
- e Size of your firm (\$ sales or turnover) _____ \$
- f Research & product development as % sales _____%

Degree
eg TradeCert,
eg SchoolC UE etc

Not buildings

Including labour

Now we would like your judgement on the importance of factors in the industry and business environment which may have encouraged your firm to improve its quality and productivity

EXHIBIT SIX

This is a list of some detailed factors which may have encouraged your firm to improve its QP performance

- 16a** From this list, and your own experience, which factors had the greatest influence on your firm over the last 5 years
-

Use number codes on Exhibit to record responses

- b** Which factors do you think will have the greatest influence on your firm over the next 5 years
-

Finally we would like your judgement on the importance of factors inhibiting your firm's QP performance

EXHIBIT SEVEN

This is a list of some detailed factors which may have acted as barriers inhibiting your firm's QP efforts

- 17a** From this list, and your own experience, which were the greatest barriers to QP gain in your firm over the last 5 years
-

Use number codes on Exhibit to record responses

- b** Which do you think will be the greatest barriers over the next 5 years
-

SECTION 4

OPEN ENDED QUESTIONS

for example:

Speaking of both your firm and the industry generally,

- 1 What major cases of QP improvement have you witnessed?**
- 2 What examples can you quote where management has improved QP?**
- 3 How do you get past the barriers to QP improvement that you noted?**

How was the questionnaire? Were we "on target",
talking about the QP issues that are important to your firm?
Or is there something you would like to add that we have not covered?

**INSTITUTE OF POLICY STUDIES
VICTORIA UNIVERSITY OF WELLINGTON
NEW ZEALAND INSTITUTE OF ECONOMIC RESEARCH**

**QUALITY AND PRODUCTIVITY
QUESTIONNAIRE**

- | | |
|------------------|--|
| SECTION 1 | THE IMPORTANCE OF QUALITY AND PRODUCTIVITY
TO YOUR BUSINESS |
| SECTION 2 | YOUR STRATEGIES FOR IMPROVING QUALITY AND
PRODUCTIVITY |
| SECTION 3 | INFLUENCES ON YOUR FIRM'S QP PERFORMANCE |
| SECTION 4 | OPEN-ENDED QUESTIONS |

SOME DEFINITIONS

Improved Quality

a change to the attributes of a product or service, which is perceived by consumers as an improvement relative to the products or services available from other suppliers

Improved Productivity

an improvement in the ability of an enterprise's real inputs to create products or services of a specified quality

**MAJOR FACTORS
IN CHANGING PROFITABILITY**

Factors Subject to Managerial Influence

For Example

Asset Efficiency

Capacity utilisation
Inventory turnover

Operating Efficiency

New work regimes which
economise on labour,
materials, energy etc

**Quality of the product or service,
as perceived by the consumer**

Marketing campaign
to gain premium price

Factors Determined Outside the Firm

**Changes to Market Prices for inputs
and outputs not related to managerial
effort**

Shortages
Depressed demand

Changes to Financial Costs

Interest Rates

Capital Gains and Losses

On disposal of a building

SOME DETAILED QP STRATEGIES

Quality Improvement Strategies

- 1 Complete redesign of product
- 2 Complete redesign of service
- 3 Style change to product
- 4 Change to presentation of service
- 5 Speed of service
- 6 Range of features included
to expand capabilities of the standard product/service
- 7 Range of options offered
to offer different forms of the standard product/service
- 8 Quality control:
programmes which deliver specified quality
- 9 Quality assurance:
programmes to assure customer of quality
- 10 Quality Management
devotion of whole firm to quality
- 11 Product availability
- 12 Service availability
- 13 Product presentation
- 14 Service presentation
- 15 New labour work-practices
- 16 Staff training
- 17 New arrangements with suppliers, distributors etc.
- 18 New management practices
specify: _____
- 19 New organisation structure
- 20 New marketing programmes
specify: _____
- 21 Other? _____

SOME DETAILED QP STRATEGIES

Operating Efficiency

- 1 New labour work-practices
- 2 Reduced staffing/hours
- 3 New composition of workforce
- 4 Changed use of subcontractors
- 5 Reduce materials use
- 6 Reduce energy use
- 7 Substitution: materials
- 8 Use new materials
- 9 Staff training
- 10 New computer systems
- 11 New arrangements with suppliers, distributors etc
- 12 New accounting systems
- 13 New management information systems
- 14 New organisation structure
- 15 New management practices: specify: _____
- 16 Other? _____

Asset Efficiency

- 1 New building
- 2 New location
- 3 Reduce average age of equipment
- 4 Buy new equipment
- 5 Buy used equipment
- 6 Sell old equipment
- 7 Retooling and other plant modifications
- 8 Change maintenance regime
- 9 Change output for economies of scale
- 10 New operating regime
shifts; redesign/reshedule workflow
- 11 Improve capacity utilisation
- 12 New inventory controls
- 13 Change warehousing systems
- 14 New organisation structure
- 15 New credits/collect'ns system
- 16 Controls on financial assets
- 17 Other? _____

STRATEGIES FOR QP GAIN

Relative to World Standards

Strategies for Quality Improvement

In Front:	world leadership in product/service quality
World Standard:	keeping up with world's best in product/service quality
Catch-up:	catching up to world standard of product/service quality

Strategies for Productivity Improvement

In Front:	world leadership in production/delivery of a product/service
World Standard:	keeping up with world's best in production/delivery of a product/service
Catch-up:	catching up to world standard in production/delivery of a product/service

**FACTORS ENCOURAGING
QP IMPROVEMENT**

- 1 Pressure from rapid growth**
- 2 Pressure from market decline**
- 3 Rate of technical change**
- 4 Change in ownership**
- 5 Foreign ownership**
- 6 Competition from offshore**
- 7 Domestic competition**
- 8 Greater price competition**
- 9 Contact with international markets
and managers**
- 10 Consumer pressure for quality gains**
- 11 Easier entry to your industry**
- 12 More flexible labour market**
- 13 Unionisation of workforce**
- 14 Effective tax rates**
- 15 Other_____**

BARRIERS TO QP GAIN

Barriers Outside Your Firm

- 1 Inadequate industry growth
- 2 Limited technical change
- 3 Change in ownership
- 4 Foreign ownership
- 5 Competition from offshore
- 6 Domestic competition
- 7 Greater price competition
- 8 Easier entry to your industry
- 9 Inflexible labour market
- 10 Tax rates
- 11 Imperfect information
- 12 Shortages of key inputs:*labour*
- 13 Shortages of key inputs:*materials*
- 14 Shortages of key inputs:*management*
- 15 Shortages of key inputs:*equipment*
- 16 Shortages of key inputs:*suppliers*
- 17 Shortages of key inputs:*technology*
- 18 Costs of over-regulation
- 19 Other _____

Barriers Inside Your Firm

- 20 Management resistance to change
- 21 Worker resistance to change
- 22 Time to adjust to change
- 23 High transaction costs of change
- 24 Lack of management experience offshore
- 25 Lack of market power by your firm
- 26 Lack of international market experience
- 27 Age of plant
- 28 Education of workforce
- 29 Unionisation of workforce
- 30 Inadequate investment in R&D
- 31 Size of your firm
- 32 Other _____

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