AN EXAMINATION OF THE RELATIONSHIP BETWEEN FIRM SIZE AND EXPORT ACTIVITY IN THE NEW ZEALAND LUMBER INDUSTRY

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ABSTRACT

This thesis explores the relationship between export activity and firm size, with specific reference to New Zealand's lumber industry. The main purpose of this investigation is to identify firm characteristics which link firm size to export behavior. This task basically involves exploring the literature to identify possible linking variables and conducting tests to determine whether or not these characteristics actually link export activity and firm size in New Zealand's lumber industry.

Two major areas of research were drawn upon to produce the hypotheses of this study: determinants of export activity and firm size-related variables in the lumber industry. The former body of literature is well-defined and very extensive. A great deal of empirical research has been done on firm-level export behavior (though unfortunately very little theoretical study has been done to link export behavior back to microeconomics. The second area of research is not very well-defined. Inferences on the relationship between various characteristics and firm size are drawn from the literature on lumber production in New Zealand. These inferences are supplemented by scattered pieces of research on the linkage between firm size and firm characteristics, as well as by sensible guesses as to how certain characteristics are associated with firm size. Using these two areas of research, hypotheses were drawn as to how firm size and export activity are linked.

Based upon these two areas of study then, nine characteristics were identified as possible links between firm size and export activity: proximity to a city, product quality, production cost, legal structure, foreign ownership, managerial experience and education, marketing skill, export-related information, and managerial attitudes and ambition. It was decided to test these hypotheses by conducting a survey of New Zealand's lumber industry. This particular industry was selected because it was felt that a greater understanding of the export dynamics of this sector would assist policymnakers in stimulating New Zealand's economy. In all, 26 lumber mills (out of 40 that were contacted) agreed to participate in the survey.

On the whole, it was found that some characteristics do link firm size to export activity. Specifically, legal structure, managerial experience and education, and managerial attitudes and ambition were found to be significantly related to both export activity and firm size. These results suggest that firm size can be indirectly linked to export activity. However, researchers should be aware that the nature of this link could possibly vary with industry, place and time. Hence, using firm size as a predictor of export activity should be avoided until more research is conducted.

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CHAPTER ONE

INTRODUCTION

1.1 Purposes and Approach

It is without dispute that a greater understanding of the nature of economic development will prove to be beneficial, both to developing and developed countries. It is for this reason that the field of economic development has received a great amount of attention by scholars in the post World War II period. One area which has been extensively researched has been the significance of export activity in the development process. Though the debate continues, it appears that higher levels of export activity often stimulate economic growth, which is an essential component of economic development.

A greater understanding of the determinants of export activity would thus be beneficial to development researchers and government policymakers. Extensive research has been done in this area since the 1960s. However, one important aspect of this topic, namely the significance of firm size as a predictor of export activity, has been neglected. This oversight in the literature is surprising.

Several researchers have empirically tested for a relationship between firm size and export activity (see for example Aaby and Slater, 1989). Also, firm size has been widely employed by government export promotion programs as a

criterion for identifying export-prone firms. Yet, very little has been written to explain how firm size is specifically related to export activity (Reid, 1985). This study represents an attempt to correct this oversight. The basic objective of this thesis then is to determine how firm size is related to export activity.

A number of steps are involved in meeting this objective. First, it is necessary to explore the literature to find out what other researchers have found about firm export behavior. Of particular interest are the speculations of other researchers about the role firm size plays in determining export behavior. These topics are discussed later in this chapter. From this review basic ideas are formulated as to how firm size affects export activity.

As it happens, the leading theory on how firm size and export behavior are related contends that firm size is linked to other variables which have a direct effect on export activity. Hence, the literature review is extended in chapters two and three to consider nine variables which possibly link export activity to firm size. Based on these results, hypotheses are formulated as to how firm size and export activity are linked.

Finally, these hypotheses are tested, using New Zealand's lumber industry as a case study. A methodology for testing these hypotheses is proposed in chapter four, and results from an empirical analysis are presented in chapter five. In this way, a clear picture emerges as to how firm size and export activity are related in New Zealand's lumber industry. Also,

these results should provide some insight into the reliability of firm size as a general predictor of export activity. These conclusions are elaborated in chapter six.

1.2 The Determinants of Firm Export Behavior

The literature examining the export behavior of firms is extensive but very uncoordinated. Researchers in this area generally seek out correlations between various indicators of export activity and a number of variables that could influence the export decisions of the firm. However, in most cases the authors make little attempt to explain why the variables they choose to examine might be expected to be related to export activity. Also, they tend to neglect to explain why they ignore other variables possibly related to export behavior. Consequently, numerous articles have been published describing various influences on export behavior at the firm level, but no clear picture has emerged as to which factors are important and why they are important.

This lack of coordination is largely the result of the fact that researchers have not adopted a common model of firm export behavior. From the standpoint of economics, the most reasonable approach to take in formulating such a model is to base it on the profit maximization theory of firm behavior. In fact, this is the approach adopted by Hirsch and Adar (1974), who have made an important contribution to the understanding of firm export behavior. The Hirsch and Adar analysis chiefly deals with applications of the discriminating

monopolist model. Shipping and marketing costs are assumed to be deducted from the appropriate demand curves. In this model, the firm acts to maximize its profits by price discriminating between the imperfectly competitive home market and a perfectly competitive foreign market. As a result, the firm's export behavior is determined by its cost function, the domestic demand function which the firm faces, and the foreign price level, and thus is explainable in terms of variables which influence these three factors.

Since it is based on the theory of the profit-maximizing firm, the Hirsch and Adar approach is a reasonable one to use in making hypotheses about export behavior. However, the ability for firms to price discriminate between home and foreign markets has been curtailed in recent years because of General Agreement on Tariffs and Trade (GATT) rules on anti-dumping. The spirit of the Hirsch and Adar approach remains unchanged by this, as does the central conclusion, that firm export behavior is determined by its cost function, the level of domestic demand, and the foreign price level. Nevertheless, a new model must be developed with the restriction that a firm which exports cannot charge a higher price in the domestic market than it charges in the foreign market. In the case of a firm that is perfectly competitive abroad but imperfectly competitive at home, this essentially means that if the firm exports, it must charge the same price in the home and foreign markets.

1.3 A Model of Firm Export Behavior

On the basis of the profit maximization theory of firm behavior, it may be argued that the export behavior of the firm is governed by how much profit it can make by exporting. In the case where a single-product firm cannot price discriminate between the home and foreign market, the firm faces two distinct options, with two different levels of welfare: exporting or not exporting. The situation is illustrated in Figure 1. If the firm supplies only the domestic market, it maximizes profits by producing quantity q_h^* and charging price p_h^*, earning producers surplus ABCD in the process. If the firm supplies both the domestic and foreign markets, and cannot engage in price discrimination, then it maximizes profits by charging price p_f in both markets and producing quantity Q^*. It can sell up to q_x on the home market[1], and $Q^* - q_x$ on the foreign market. In this case it earns a producers surplus of EGD. Consequently, the firm will export if the area of region EGD is larger than the area of region ABCD, and will not export if the area of ABCD is larger than the area of EGD. Obviously then, a firm's export behavior at any given time is determined by the firm's supply curve, the domestic demand curve that it faces, and the foreign price level.

It is appropriate to emphasize at this point that foreign price level (denoted as p_f) throughout this paper is taken to refer to the cost-adjusted foreign price level. That is, p_f is the price level in the foreign market, minus the per unit cost

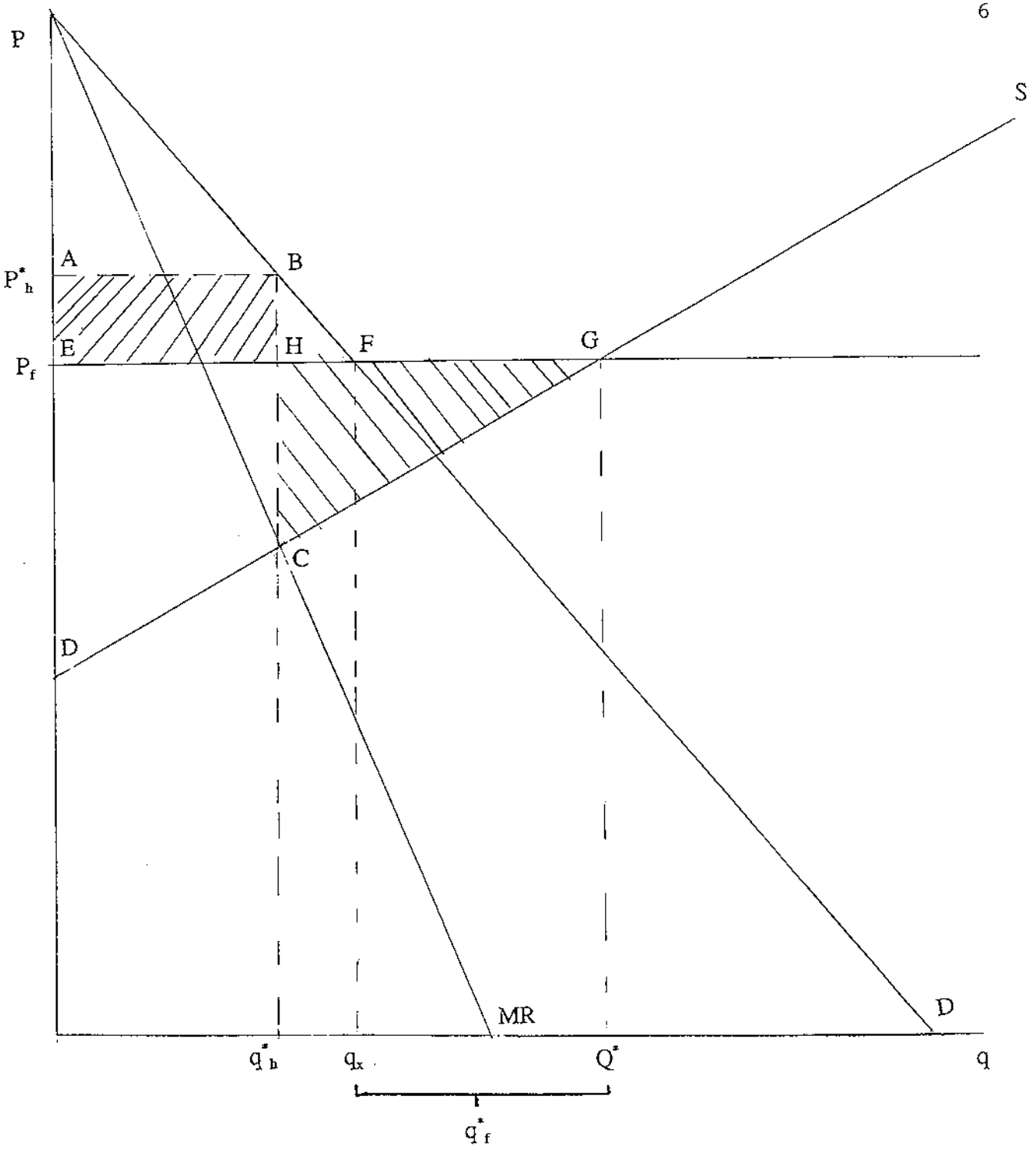

FIGURE 1 : Exporter surplus. Exporter surplus (denoted as X) is the difference between the area of EGD and the area of ABCD. Since the two areas share EHCD in commom, X reduces to the area of HGC minus the area of ABHE.

for a firm in the home market to ship and market its product in the foreign market. These costs include such things as transport costs, marketing costs and the costs of obtaining information that are above and beyond those the firm would face in selling to established domestic customers. These costs may vary considerably from firm to firm, thereby creating differences between firms in the level of p_f that they face. Thus, p_f cannot be treated as a given constant in this paper, but rather must be considered as a possible source of variation between firms in export behavior. As will be discussed in chapter two, a number of firm characteristics may influence exporting costs, thereby affecting p_f and the export behavior of the firm.

Changes in the domestic demand curve, the supply curve and the foreign price level can produce changes in the firm's export behavior by changing the relative amounts of producers surplus to be earned from exporting and from not exporting. Defining the difference between producers surplus from exporting and producers surplus from not exporting as the exporter surplus and denoting it as X, it follows that if $X > 0$, then the firm will export, and if $X < 0$ then the firm will not export. In this way, export behavior is determined by the level of exporter surplus.

In addition, it can be shown that under many circumstances exporter surplus decreases as domestic demand increases, that it increases as firm supply increases, and that it increases as p_f increases. Consequently, export behavior is directly affected by shifts in the supply and

domestic demand curves, and by changes in p_f. These results are detailed in appendix 1.

Clearly then, the firm's supply and domestic demand curves and the foreign price level determine the magnitude of exporter surplus at any given time. Therefore, any factor that causes a shift in the supply curve, demand curve, or foreign price level has an influence on the firm's export behavior. With this in mind, an analysis can be made as to how firm size is related to export activity.

1.4 Firm Size and Export Behavior

One factor examined extensively (but little understood) in the literature on export behavior is firm size. Firm size stands out from other variables in that it seems to attain significance through association with other factors, rather than having a direct influence over exporter surplus. A large number of studies have tested the significance of firm size as a predictor of export activity, but few have examined this variable in much detail. In particular, little has been written explaining why this variable should be significant. Moreover, empirical results on the explanatory power of firm size have been mixed. Hence, if public policy is to address the problem of stimulating exports by small-sized firms, much more research on the role which firm size plays in determining the export behavior of firms is needed.

1.4.1 Literature Review

A good starting point in examining the role of any variable in determining export behavior is to review the literature on it. A large number of empirical tests have been done on the significance of firm size, but interpretation of these results and speculation on the role firm size plays in exporting is lacking. In his survey of British hosiery manufacturers, Tookey found that larger firms tended to enjoy more success in exporting, owing to their "greater financial resources" (1964, 54). Bilkey and Tesar (1977) however, found that firm size was an insignificant factor after intercorrelation with management quality was considered. Bilkey (1978) indicates that just as many studies have found correlations between firm size and exporting as those that have not. Cavusgil *et al.* (1979) found that a significant differentiating factor between exporters and nonexporters was whether annual sales were greater than a million dollars. Moreover, Cavusgil and Nevin (1981) found sales volume to be a statistically significant determinant of exporting.

On the other hand, Kirpalani and Macintosh (1980) found no correlation between export success and a firm's number of employees. Also, Czinkota and Johnston (1983), in their study focusing primarily on the significance of firm size, concluded that no significant relationship existed with exporting. Empirical results from Cavusgil (1984) tend to confirm Czinkota and Johnston's conclusions.

Despite these findings, Yaprak (1985) found that both in terms of sales volume and number of employees, firm size was

correlated with exporting, at least for medium-sized firms. Burton and Schlegelmilch (1987) indicate that in a majority of studies firm size was shown to be significant to exporting, and conclude from their analysis that firm size is significantly related to export behavior. Burton and Schlegelmilch also found a high degree of correlation between the two variables commonly used to measure firm size, sales volume and number of employees. Further, Kau and Tan (1989) conclude that firm size is significantly correlated with exporting. Finally, Yang *et al.* (1992) concluded that firm size is a significant predictor of export intentions. Thus, as Aaby and Slater (1989) noted, it is difficult to come to any conclusions about the significance of firm size as a predictor of export behavior based upon the literature that exists today.

Many researchers have commented on the inconclusiveness of the literature on the statistical significance of firm size (see for example Aaby and Slater, 1989; Yaprak, 1985; Cavusgil, 1984; Bilkey, 1978; Czinkota and Johnston, 1983; Burton and Schlegelmilch, 1987). Despite this, few explanations have been offered as to why this is the case. Bilkey (1978) hypothesized that firm size is correlated with exporting only over certain size ranges, particularly middle-sized firms. Bilkey also implies that a certain minimum size is needed for any firm to export, and that very large firms have other options in foreign markets besides exporting (e.g. foreign investment) (Yaprak, 1985). Results from Yaprak tend to confirm this hypothesis. Cavusgil (1984) hypothesizes that

firm size may affect entry into the export market, but not a firm's volume of exports. On the whole, though, the literature has not actively sought an explanation for the contradictory results obtained by various empirical analyses.

1.4.2 Theoretical Extensions

One possible reason for the paucity of discussion on empirical results related to firm size is that no widely accepted view on how firm size is connected to export behavior exists. Little discussion has taken place on why firm size should, in principle, have an influence over the inclination of a firm to export. Reid in particular notes that the lack of an explanation as to how firm size should affect export behavior inhibits research on this point (Reid, 1985). Czinkota and Johnston (1983), in their study focusing directly on sales volume, make no effort to discuss why firm size might be considered a significant factor in the first place (for a full critique, see Reid, 1985). Other researchers have dealt with firm size only in a cursory way. Suffice it to say then, the literature has not given thorough attention towards explaining how firm size is related to exporting, despite the wide array of empirical tests done and contradictory results obtained.

Perhaps the best way to consider firm size is not as a factor directly affecting export behavior, but rather as a factor that affects and/or is correlated with other factors which affect the export behavior of firms. Cavusgil (1984)

and Aaby and Slater (1989) both conclude that this could be the case. Cavusgil writes:

> ...it may be more appropriate to view firm size as a concomitant variable (associated with export activity) rather than a causative factor. Since larger size usually implies greater availability of production, financial, and managerial resources, the true relationship it seems is not between size and export behavior, but it is between various advantages which accrue from larger size, and export behaviour. In this sense, firm size serves as a proxy for various advantages associated with size. (1984, 7)

Aaby and Slater echo this viewpoint, writing "...company size by itself is not an important factor unless it is linked to aspects such as financial strength or variables related to economies of scale" (1989: 21).

Moreover, other researchers have considered the possibility that firm size is correlated with other factors. For example, Tookey (1964) indicates that larger firms have greater access to financial resources and that larger firms can afford to hire or train staff for handling export orders. Bilkey and Tesar (1977) found that firm size was linked to managerial quality and ambition. Czinkota and Johnston (1983) hypothesized that managerial attitudes and perceptions were associated with exporting, but rejected this hypothesis in empirical tests. Yang *et al.* (1992) argue that changes in firm size are indicative of a variety of factors which are associated with exporting. Excepting Czinkota and Johnston however, none of these researchers have actually empirically

tested these proposed links between firm size and export activity.

In addition, many other firm characteristics associated with exporting can be hypothesized to be related to firm size. For example, firm size might be linked to locational factors. A model proposed by Juarez and Romero (1986) indicates that firms may choose their size and location together in such a way as to minimize the delivered cost of its product. The model suggests that larger firms will be biased towards locations with greater population density, e.g. cities, which in turn implies less costly access to information and finance and, assuming ports and other transshipment facilities tend to be located in cities, lower international transport costs.

Firm size could also be related to a variety of product and production-related factors. For example, product quality might be associated with firm size. In general, smaller firms may tend to skimp on quality control, but in some industries some production processes associated with smaller firms result in higher quality. For example, in lumber manufacturing a single headrig, used by smaller firms, allows the operator to produce a higher quality cut on each pass, but a gang headrig saws the entire log at one pass, producing lower grade lumber (Spencer and Luy, 1975 87).

Moreover, a firm's production costs are likely to be highly associated with firm size. Larger firms can take advantage of scale economies in production and administration. The degree of this advantage of course depends on the degree to which scale economies exist in the industry.

In addition, organization-related factors are probably highly associated with firm size. For instance, firm size and legal structure may be related. Partnerships and corporations will both tend to be larger than proprietorships, owing to the greater amount of financial backing in these types of enterprises. Moreover, enterprises where there is foreign-held equity will probably be larger than those that are totally locally owned because larger domestic firms are more likely to attract the attention of foreign investors than small ones, and because foreign participation results in an additional source of financing and information, both of which tend to cause growth in firms (see Kau and Tan, 1989).

Furthermore, several factors related to information may be related to firm size. The size of a firm's management force is directly related to the firm's size. The larger the number of managers a firm has, the greater is the amount of their collective knowledge and experience, and hence the greater the amount of information available to the firm. Consequently, larger firms are likely to have a more information and skill in any given subject than smaller firms simply because larger firms have more managers.

Clearly then, it is possible that many factors link firm size to export behavior. As a result, there is good reason for believing that firm size is related to export behavior because it is associated with determinants of export activity.

Notes

1. It is assumed in this thesis that the firm satiates the home market by selling quantity q_x on it before exporting.

CHAPTER TWO

FIRM CHARACTERISTICS AND EXPORT ACTIVITY IN THE LITERATURE

The literature on the export behavior of firms has examined numerous variables to determine what conditions motivate firms to export. The list of factors examined is very long (see for example Bilkey, 1978 and Aaby and Slater, 1989). Many of these variables are considered in several studies, and frequently contradictory results have been obtained as to their significance. For the purposes of this study, however, it is not necessary to consider every factor that has been hypothesized to be related to export activity in the literature. Rather, consideration need only be given to those factors that could also be related to firm size. In all, nine factors that were identified in the literature as being possibly related to export activity also held the possiblity of being related to firm size. These factors are:

1. Proximity to a city
2. Product quality
3. Production cost
4. Legal structure
5. Foreign ownership
6. Managerial experience and education
7. Marketing skill
8. Export-related information
9. Managerial attitudes and ambition

The literature on how each of these factors is related to export activity is discussed below. The relationship of these factors to firm size is considered chapter three.

2.1 Proximity to a City

Distance from a city to a large extent may affect the export costs of a firm. For the most part however, this factor has been neglected by researchers. Nevertheless, a few authors have noted its significance. For example, the closer a firm is to an international port, the lower its total export transport cost, other things being equal. Ward (1993) produced a model demonstrating this point for island economies. Wiedershiem-Paul *et al.* (1978) also note the significance of location with respect to transport costs. Hirsch (1967), in a case study of the Israeli glass products industry, found that proximity of a plant to port significantly lowered the plant's overall exporting costs and added to its competitive advantage. Finally, Wiedersheim-Paul *et al.* (1978) indicate that a firm's proximity to cities may affect the cost to it of acquiring information and the overall level of information to which it has access, and thereby influence the cost to it of exporting. Consequently, the firm's distance from a city is likely to affect its cost of production and exporting, thereby affecting its supply curve and level of p_r and hence its level of exporter surplus.

2.2 Product Quality

Another factor related to export activity identified in the literature is product quality. This factor affects all three of the determinants of exporter surplus: the firm's

supply curve, the demand curve the firm faces, and p_e. Products of lesser quality tend to be cheaper to produce than those of high quality. Hence, lower quality implies a rightward-shift of the supply curve. Lower quality also implies lower domestic and foreign demand, however. Lower domestic demand encourages exporting, but lower foreign demand discourages exporting (by causing a lower level of p_e). Hence, the impact of quality on the level of exporter surplus is ambiguous without specific information on consumer preferences in the home and foreign markets and on production costs.

It might be expected, however, that higher quality products are cheaper to ship, per unit value, than lower quality products. This is because it will take more units of the lower quality product to equal the value of a given number of units of the higher quality product. Assuming each unit of the product has the same bulk, regardless of quality, the lower quality product will take up more room, in terms of value, than the higher quality product. Consequently, transport costs per unit value of the lower quality good will be higher than for the higher quality good.

On the whole, the literature indicates that product quality is significantly associated with exporting. Yaprak (1985), Burton and Schlegelmilch (1987), and Yang *et al.* (1992) confirm this. Tookey (1964) also tentatively concludes in his empirical analysis that product quality is correlated with exporting. Aaby and Slater (1989) cite several studies that found a significant relationship between product quality and exporting, though they also note a study by Malekzadeh and

Nahavandi (1985) which found no such relationship. Christensen *et al.* (1987) found that product quality is a highly significant discriminator between exporters and nonexporters. Dominguez and Sequeira (1993) also note that several studies have found that product quality is a good predictor of export behavior, and they find more evidence of this in their empirical analysis of Central American manufacturers. Overall, it may be concluded that while the effect of product quality on exporter surplus depends on home and foreign market consumer preferences, product quality has generally been found to be positively associated with export activity.

2.3 Production Cost

Several researchers have investigated the significance of production cost as a determinant of export activity. Production cost itself, of course, is directly related to the firm's supply curve. Higher production cost shifts the supply curve leftward, and hence lowers the level of exporter surplus. Thus, high production cost discourages export activity. The literature on export behavior tends to confirm this conclusion. For instance, Yang *et al.* (1992) indicate that production cost is a significant element in determining a firm's level of competitive advantage. Hirsch (1967) indicates that low production costs were an important element in the success of the Israeli glass products industry in penetrating the U.S. market. However, Kirpalani and Macintosh

(1980) found that a firm's per unit labor costs were not significantly correlated with export success. Though this result does not necessarily contradict Yang *et al.* and Hirsch, it does suggest that more research is needed on the effect of production costs on export behavior, particularly for labor-intensive industries.

2.4 Legal Structure

Legal structure refers to whether the firm is a sole proprietorship, a partnership, a corporation, a cooperative, or a state-owned enterprise. The legal construct and the general goals and operating nature of each of these types of firms have a number of implications for firm export behavior, since they affect the firm's risk averseness, access to capital and incentives for efficiency and success.

First, a firm's legal structure affects the number and degree of liability of owners for the firm's debt. The unlimited liability and small number of owners of a sole proprietorship or a partnership often makes such firms more risk averse. On the other hand, a corporation's limited liability for debt and larger number of owners may make the firm more willing to face risk (Yang *et al.*, 1992). In other words, risk is more costly for the proprietorship than for the corporation.

Any export venture carries risks for the firm over and above those associated with selling on the domestic market (Kau and Tan, 1989; Korth, 1991). These risks include

unfavorable changes in the exchange rate and the risk of nonpayment for the export order, either through bankruptcy of the firm or political instability (Korth, 1991). Both of these types of risks can be ameliorated. Exchange rate risk may be mitigated through the purchase of currency futures, and the risk of nonpayment may be covered by insurance.

Both these options, however, involve cost. This cost will be higher for more risk averse than less risk averse firms; that is firms better able to undertake risk will face lower costs than one less able to handle risk. Consider two firms choosing an amount of export insurance to buy. Each firm purchases that amount of insurance at which its marginal benefit equals its marginal cost. For the firm with greater ability to handle risk, such as a corporation (which has limited liability), the benefits of having insurance tend to be less, so it purchases less insurance. The firm less able to accept risk (say a proprietorship, where the single owner has unlimited liability for debts) will purchase more insurance. The cost of risk to these firms is thus reflected in p_e. In this way a firm's ability to risk affects its export behavior.

In general, the literature supports the conclusion that firms which are more able to undertake risk are more likely to export than other firms. Bauerschmidt *et al.* (1985) conclude from their survey that risk is at least a moderate barrier to exporting. Tookey (1964) notes that many managers see exporting as unprofitable because of the risks involved. Glover (1983), cited in Bauerschmidt *et al.* (1985), and Rabino

(1980) also indicate that risk is a significant export barrier for many firms. Korth (1991) concedes that risk is a significant barrier to exporting for many firms, though he notes that its importance often tends to be exaggerated. Only Sharkey *et al.* (1989) indicate that risk is not a barrier, though their analysis examines risk as part of an index of factors related to cultural differences. On the whole then, it seems reasonable to conclude that a firm's ability to undertake risk has a significant influence on its export behavior.

A firm's legal structure also affects the firm's access to financial capital. Corporations can always sell equity and usually can issue their own debt in order to raise funds for new ventures. Government enterprises in principle have access to state funds to finance additional operations. These options are either not available or are costlier for proprietorships and partnerships. New ventures for these types of firms generally must be financed from personal savings, reinvested profits, or bank loans. Selling equity may be possible too, but is more troublesome than for a corporation since a buyer with sufficient funds must be sought out and legal considerations settled. In this way then, a firm's legal structure affects the cost of funding export activity.

In turn, the cost of finance may affect a firm's export behavior. Financing may be required for an export venture for a number of reasons. Typically, export orders require much more time for payment than domestic orders, and so purchase of the raw materials and labor for production might require

short-term financing (Tookey, 1964). Secondly, if the firm develops a long-run commitment to exporting and foresees higher levels of output in its future, it may require financing to expand its production capacity. Hence, having access to financial capital may be a necessary condition for exporting. Consequently, the cost to the firm of obtaining financing may influence its decision to export.

Furthermore, the literature tends to indicate that a firm's ability to finance export ventures is a significant determinant of export behavior. Kau and Tan (1989) and Tookey (1964) indicate that an ability to extend credit to foreign customers for a long period of time is important for export success. Bilkey (1978), Kedia and Chhokar (1986), and Bauerschmidt *et al.* (1985) all cite literature indicating that limited financing is a constraint to exporting for many firms. Sharkey *et al.* (1989) come to the same conclusion in their empirical analysis. Consequently, it is clear that access to financial capital is important for exporting to be feasible, and that the cost of gaining this access could therefore be significant.

Finally, a firm's legal structure affects the basic goals of the firm and hence its incentive to earn profits. For a state-owned enterprise or a non-profit corporation or for a proprietor operating a business as a hobby, earning profit may not be a major goal for the firm. In this case, profit maximization may no longer be a valid assumption, and the notion of exporter surplus ceases to be a useful concept for explaining export behavior. In these ways then, the firm's

legal structure affects export behavior.

Surprisingly, the impact of the legal structure of firms on export behavior has received scant attention in the literature. Yang *et al.* (1992) indicate that firms with a larger number of owners are less risk averse than other firms. They therefore hypothesize that this factor is significantly correlated with exporting. Extensive empirical analysis of this point, however, is nonexistent. The need for more study to confirm these conclusions is clear.

2.5 Foreign Ownership

Foreign ownership, i.e. whether the firm is owned entirely by locals, by foreigners, or is a joint venture, is also relevant to export behavior. This aspect of firm ownership may affect exporter surplus in two ways: by affecting the amount of information the firm has on foreign markets and by affecting the cost to the firm of establishing a foreign marketing network. Firms which are foreign-owned presumably have access to all of the information and business contacts of their foreign owners, thereby saving the firm the cost of gathering this information and establishing these contacts itself. Foreign owners are also likely to be more familiar with the legalities and technicalities of exporting. This information saves the firm the cost of seeking out this information through other sources. These cost savings to the firm raise the effective foreign price level faced by the firm, thereby increasing its level of exporter surplus.

Research on the impact of foreign ownership, however, is scarce. Wiedershiem-Paul *et al.* (1978) indicate that foreign-owned firms are very likely "subject to a different array of forces than are their domestic counterparts" (47). The only empirical analysis done so far on this point has been by Kau and Tan (1989), who found in a survey of Singaporean manufacturing firms that over seventy-five percent of nonexporting manufacturers were wholly locally owned, whereas almost half of all exporters were at least partly foreign owned. Kau and Tan indicate that information and financial capital provided by foreign owners may be responsible for the greater degree of exporting in firms with some degree of foreign ownership. Though more research on this point is needed, existing literature leads to the tentative conclusion that whether or not foreign interests control some equity in the firm has an impact on export behavior.

2.6 Managerial Experience and Education

The level of managerial experience and education is an important measure of management's ability to gather, understand, and act on information in such a way as to optimally achieve the firm's objectives. In this way, managerial experience and education affect export behavior in two ways. First, since it affects the manager's ability to interpret information, the level of managerial experience and education determines whether or not the firm will respond to market forces. A certain minimal level of managerial

competence is needed in order for the profit maximization theory of firm behavior to hold. Secondly, since managerial experience and education affect the firm's productive efficiency, they also affect production cost and hence the firm's supply curve. Hence, firms with more experienced and better educated management should tend to have higher levels of export activity than other firms.

In general, the literature supports these conclusions. Bilkey and Tesar (1977) found that whether or not firms experimented with exporting depended directly on the quality of the firm's management. Bilkey (1978), in his comprehensive literature review, found that numerous studies have shown that the quality of management is a significant determinant of export behavior. Also, the education level of management has been found to be a significant factor in determining whether or not firms export (Reid, 1981). A study by Simpson and Kujawa (1974) found that the education level of management was a differentiating factor between exporters and nonexporters (Reid, 1981; Kau and Tan, 1989). This result is confirmed empirically by Burton and Schlegelmilch (1987) and Kau and Tan (1989). Hence, the level of experience and education of management has a significant influence on export behavior.

2.7 Marketing Skill

A related factor to managerial knowledge and competence is the level of skill and experience of the firm in marketing. In order for a firm to enter a foreign market, or for that

matter any new market, it must know how to go about finding out what customers want and promoting and distributing its product in a new environment. If the firm does not have this knowledge, then it must be acquired. Firms with more marketing experience will need to acquire less general marketing information in order to export than other firms. Assuming that the acquisition of this information is costly (for example, in terms of needing to hire new staff or to contract export marketing services), then a firm with more marketing expertise will face lower marketing costs and hence will face a higher level of p_r and greater level of exporter surplus, other things being equal.

The literature employs a number of variables to measure the influence of a firm's marketing knowledge and experience on propensity to export. Two of the most commonly used variables are the size of the firm's marketing department and the prior experience of the firm in entering new markets. In general, the literature confirms the conclusion that the firm's level of marketing skill and experience influences its export behavior.

Burton and Schlegelmilch (1987) postulate a positive relationship between the proportion of a firm's employees involved in marketing and its commitment to exporting. Tookey (1964) indicates that the marketing and distribution methods employed by the firm in the domestic market influence the size of the firm's marketing department and hence the firm's ability to gather and analyze information on possible export markets. Denis and Depelteau (1985) found a significant

relationship between the number of distribution methods employed by the firm and its average propensity to export. Burton and Schlegelmilch (1987) found that exporters tend to make a significantly greater effort to promote their product, tend to use wholesalers rather than deal directly with retailers, and in general are better equipped to gather and interpret market information than nonexporters. On the whole then, the size of marketing staff and variety of marketing techniques employed by the firm have been found to be significantly correlated with exporting.

Moreover, several researchers have found that prior experience of the firm in entering new markets is a factor which differentiates exporters from nonexporters. As Yang *et al.* (1992) note, much of the knowledge and experience gained by a firm in entering a new domestic market is useful and necessary in order to enter the export market. Welch and Wiedersheim-Paul (1980) found that "failed" exporters (that is, firms that found exporting unprofitable and gave it up) tended to expand in the domestic market much more slowly than successful exporters. Snavely *et al.* (1964), cited in Bilkey (1978), found that firms which distributed their product nationwide tended to be exporters. Cavusgil *et al.* (1979), Wiedersheim-Paul *et al.* (1978), and Yang *et al.* (1992) have all conducted empirical tests showing a relationship between whether or not a firm distributes its product to a large portion of the domestic market and whether or not the firm is an exporter. Clearly then, the literuature indicates that marketing experience and skill have a significant effect on

export activity.

2.8 Export-Related Information

Another group of factors deals with the information which the firm has on exporting, particularly information on foreign cultures, consumer preferences, and market conditions and opportunities. This factor is of interest since the amount of information that a firm possesses to start with determines the cost the firm must meet to acquire the information it needs to export. The more information the firm already has, the less it must seek out. In this way, export-related information affects p_f, since firms with more information have fewer costs to exporting than firms with less information. The literature examines the significance of this variable in detail.

Two basic types of export-related information are considered here: information on language, culture and general consumer preferences, and information on current foreign market conditions and opportunities. Both types of information affect exporter surplus through p_f: firms with more information of this type face lower exporting costs than firms with less information, since firms with less information face the cost of acquiring additional data. In this way, information on foreign cultures, market conditions, and opportunities affects export behavior.

Much evidence exists in the literature to support this conclusion. Several researchers have investigated the relationship between managerial knowledge and experience with

foreign cultures (for example through language training and travel) and firm export behavior. The results generally show this relationship to be significant, though the evidence is not yet conclusive. Dichtl, Koeglmayr and Mueller (1990) indicate that a major inhibitant to exporting is a lack of personnel fluent in foreign languages, and they advocate increased language training in schools and more international exchange programs for students and management trainees. Kedia and Chhokar (1986) note that several studies have come to the conclusion that a lack of familiarity with foreign cultures is detrimental to export success. Burton and Schlegelmilch (1987) found that exporting firms tend to have more personnel fluent in foreign languages than nonexporting firms. Langston and Teas (1976), cited in Reid (1981), and Bilkey and Tesar (1977) found that managers who had received foreign language training or had spent a significant period of time abroad tended to have more favorable impressions of exporting than managers without this experience.

On the other hand, Reid (1984) finds no significant relationship between export entry and an index of variables representing foreign cultural influences on management (e.g. foreign birth, foreign language study). Bauerschmidt *et al.* (1985) found that firms tended to give very low weight to language and cultural differences as a barrier to exporting. However, Reid's study focused on firms in Ontario, Canada, and hence in terms of the influence of foreign parentage, spouses and birth, most respondents indicating that they had such foreign familial connections probably were referring to

relatives from the United States, whose culture is very similar to that of Canada's. Hence, these respondents would have received very little additional information with respect to culture through their relatives or their foreign birth or parentage. This explains Reid's anomalous finding. Bauerschmidt *et al.* concentrated entirely on the U.S. paper industry. Until a more general survey is done, their result on this point should be regarded as tentative. On the whole then, the literature tends to support the conclusion that the exposure of management to foreign culture and language significantly affects export behavior.

Numerous researchers have also investigated the significance of information on foreign market conditions and opportunities on the export behavior of firms. For the most part, their results support the conclusion that information on foreign market conditions and opportunities is a significant determinant of export behavior. Wiedersheim-Paul *et al.* (1978) contend that knowledge of foreign market opportunities is an important though not sufficient factor for exporting. Bilkey (1978), Johanson and Vahlne (1978), and Kedia and Chhokar (1986) all conclude that a lack of information about foreign market opportunities is a significant barrier to exporting. Czinkota and Johnston (1983) found that successful exporters tend to have managers who are constantly seeking out new market information. Denis and Depelteau (1985) conclude from the literature that the amount of market intelligence held by a firm is an important determinant of exporting. Reid (1984) discovered a positive correlation between exporting and

whether or not the firm's managers read international news publications. Korth (1991) indicates that firms which are not aware of market opportunities will not export. Finally, Yang *et al.* (1992) found that lack of export market information is a statistically significant barrier to exporting. Only Yaprak (1985) comes to a contradictory conclusion, finding that both exporters and nonexporters tended to suffer from a lack of foreign market information. Therefore, it can be concluded that the amount of information which a firm has on foreign cultures, markets and opportunities has a significant influence on its export behavior.

From these results then, it can be concluded that a lack of knowledge about foreign institutions and market conditions present significant export barriers to firms. Overcoming these barriers by acquiring necessary information is costly to a firm, and hence has an effect on export behavior.

2.9 Managerial Attitudes and Ambition

The final factor examined here deals with managerial attitudes and level of ambition. Managerial attitudes and ambition generally may be represented in the export behavior model as part of p_f. In a model describing firm behavior, the perceived costs and benefits of an action matter just as much as real ones. Firms which perceive benefits in exporting above and beyond a realistic profit give export orders a premium or a higher value than is indicated by the foreign price level. Firms which perceive costs with exporting above

and beyond realistic risk and cost levels discount export orders. This functions as an additional cost of exporting. Managerial attitudes and ambition therefore affect p_r.

Managerial attitudes and ambition specifically affect exporting through the management's general level of drive, ambition, and willingness to change, and through the priority management gives to long-term growth and stability relative to short-term profit. These factors have been well studied in the literature, and the general conclusion is that they do indeed have a significant influence over managerial attitudes about exporting and over firm export behavior.

Consider first the research done on the impact of the general level of management drive, ambition and willingness to change on export behavior. Bilkey and Tesar (1977) indicate that for firms at certain stages in their development, the dynamism of management is a significant explanatory factor in whether or not the firm had explored the feasibility of exporting. Cavusgil *et al.* (1979) found that firms with low profit and growth goals tended not to be exporters. Czinkota and Johnston (1983) conclude that a significant characteristic of successful exporters was a dynamic and innovative management. The literature leads Cavusgil (1984) to conclude that the level of ambition, creativity, and aspirations for profit and growth among management significantly affects managerial decisions about exporting. Burton and Schlegelmilch (1987) found that managers of exporting firms were significantly more adaptable to change than managers of nonexporting firms. Korth (1991) indicates that "limited

ambition" and "managerial inertia" are root causes of the persistent U.S. trade deficit. These results show that managerial ambition and willingness to change have a significant influence on export behavior.

In addition, research has generally shown that the degree of priority given by management to long-term growth and stability over short-term profit significantly relates to the export behavior of the firm. Aaby and Slater (1989) note a number of studies concluding that exporting is largely motivated by managerial aspirations for long-term growth and profits. Burton and Schlegelmilch (1987) found that nonexporting firms tended to be more oriented towards short-run rather than long-run returns. Cavusgil (1984) found that exporting is positively associated with firms seeking long-run security of investment, but not with aspirations for growth. Cavusgil and Nevin (1981), however, did find a significant correlation between exporting and managerial aspirations for growth. Rabino (1980) found that Massachusetts exporters considered market diversification, as a hedge against recession, to be a major advantage of exporting. Finally, Bilkey cites two British studies indicating that long-term growth and stability was a more important motivator for exporting than short-run profit. Thus, much evidence exists that managerial emphasis on growth and stability over the long-run tends to bias firms towards exporting. On the whole then, general managerial attitudes and perceptions influence the level of export activity.

A related point investigated by some researchers is the

relationship between export activity and managerial perceptions of the firm's competitiveness. Bilkey and Tesar (1977) found a significant relationship between a firm's perception of its competitive advantage and whether or not it had explored the feasibility of exporting. Bilkey (1978) concludes from the literature that a significant determinant of exporting is the perception by management of the firm's competitiveness. Burton and Schlegelmilch (1987) came to the same conclusion in their empirical analysis. A contradictory result, however, was obtained by Kau and Tan (1989) in their analysis of Singaporean firms. They found no significant differences between exporters and nonexporters in their self-perceptions on a range of factors related to the competitive advantage of firms. Hence, though it seems likely that there is a relationship between exporting and management's perceptions of the firm's competitiveness, given the results above it seems that more research is needed on this point. On the whole though, the literature clearly shows that managerial attitudes and ambition are significantly associated with export activity.

Clearly then, the literature shows that the above nine factors are possible predictors of export activity. Moreover, predictions can be made based upon the firm export behavior model outlined in appendix 1 on how each factor affects export activity. Still, it remains to be demonstrated that these factors are related to firm size. This will be shown in chapter three.

CHAPTER THREE

FIRM CHARACTERISTICS AND SIZE IN NEW ZEALAND'S LUMBER INDUSTRY

Chapter two presented a set of factors which are possible predictors of firm export activity. Moreover, in chapter one it was hypothesized that firm size is associated with export activity through its relationship with more direct predictors of firm behavior. Thus, if for any given predictor analyzed in chapter two it can be shown that this predictor is also associated with firm size, then it can be hypothesized that the given predictor links firm size to export activity.

In this way then, hypotheses can be made as to how firm size is linked to export activity. Evidence exists that each of the nine export activity predictors examined in chapter two is associated with export activity. This evidence can be analyzed in the context of the New Zealand lumber industry to produce a set of nine hypotheses on the linkage between firm size and export activity in New Zealand's lumber industry. In this chapter these hypotheses are formulated. The empirical analysis of the New Zealand lumber industry follows in chapters four and five.

3.1 Hypothesis One

The first of these hypotheses is that proximity to a city links firm size to export activity. As discussed earlier, a

firm's location may affect the costs of transport, labor, gathering information and obtaining financing. In particular, firms closer to cities will face lower costs than firms elsewhere, owing to the fact that transport, communications, and financial infrastructure are better near cities and that labor is more plentiful. This in turn affects the cost of exporting for the firm, and hence its export behavior.

Advantages accrued from transport costs are especially important for firms in New Zealand's lumber industry. New Zealand's isolated location makes transport to customers in Japan and elsewhere very expensive, and hence constitute a substantial competitive disadvantage (New Zealand Forest Owners' Association, 1985(?) 14; New Zealand Forest Service, 1980 57; Bourke and Aldwell, 1983 5, 8). Transport costs even to Australia present a substantial export barrier for New Zealand mills, owing to the high freight rates of New Zealand shippers (Theron, 1988 86; New Zealand Trade Development Board, 1992 7-8). Consequently, savings on internal transport costs are all the more significant for New Zealand producers (Bourke and Aldwell, 1983 5). For example, New Zealand gains a transport cost advantage from the fact that a sizable portion of New Zealand's log output is within 100 kilometers of an export port (NZFS, 1980 58). Thus, a significant correlation is likely to exist between a lumber mill's proximity to a city and export activity.

Moreover, firm size and proximity to a city are likely to be related to each other, though the theoretical relationship between firm size and location is not very well explored in

the literature on industrial location. One model proposed to describe the relationship is that of Francisco Juarez and Carlos Romero (1986). The basic premise of the model is that a firm will choose its size and location simultaneously in such a way that average production cost is minimized. A firm's size and location are both significant factors in determining a firm's long-run average cost. Size determines the extent to which a firm takes advantage of scale economies and the amount of raw material that it needs to operate at full capacity. The model implicitly assumes that the firm intends to operate the plant at full capacity all the time. A firm's location defines the density of raw material supply around the firm. The larger the firm, the lower its production costs, but the higher its raw material transport costs, given that the more raw material the plant uses, the further away from the plant is the location of the marginal unit of raw material. A firm's location determines the distance of the marginal unit of raw material from the plant for any given plant size. Seen in this way then, Juarez and Romero conclude that size and location decisions are highly interrelated, being "like the head and tail of a coin, making up a whole system" (1986, 72).

Moreover, as Juarez and Romero note, this model is easily extended to include consideration of output transport costs (1986, 76). This cost is exactly analogous to raw material transport cost, with a firm's size determining its level of output and its location giving the distance which the marginal unit of output must be shipped. Conceptually the model takes

the form of an unconstrained optimization problem, with the firm choosing its size and location so as to minimize the sum of its average production and distribution costs. All in all, the model's flexibility and simplicity make it a reasonable framework to use in considering location and plant size decisions.

Unfortunately, the Juarez-Romero model has been largely neglected by the literature, and so far no implications have been drawn from it regarding the characteristics of a location that would sustain an optimally-sized and -located large firm. Intuitively, however, it can be expected that, other things being equal, the larger the firm the larger its raw material supply radius and the larger its output demand radius. That is, the larger the firm, the further out it must ship in inputs and ship out outputs. As a result, the larger the firm, the more important is the density of raw material supply and final product demand at increasing distances from the plant. To understand this, consider Figure 2. R_s^d denotes the output demand radius for a small firms and R_L^d denotes the output demand radius for a large firm. For the small firm, only the density of demand within B is important, and the denser B is, the smaller is R_s^d and the lower are transport costs. For the larger firm, the density of demand within A is also important, since it is this density that determines the length of $R_L^d - R_s^d$, the extra distance that the large firm must go to sell its marginal unit of output. This in turn is a measure of the average output transport cost faced by the large firm compared to the small one. A similar conclusion

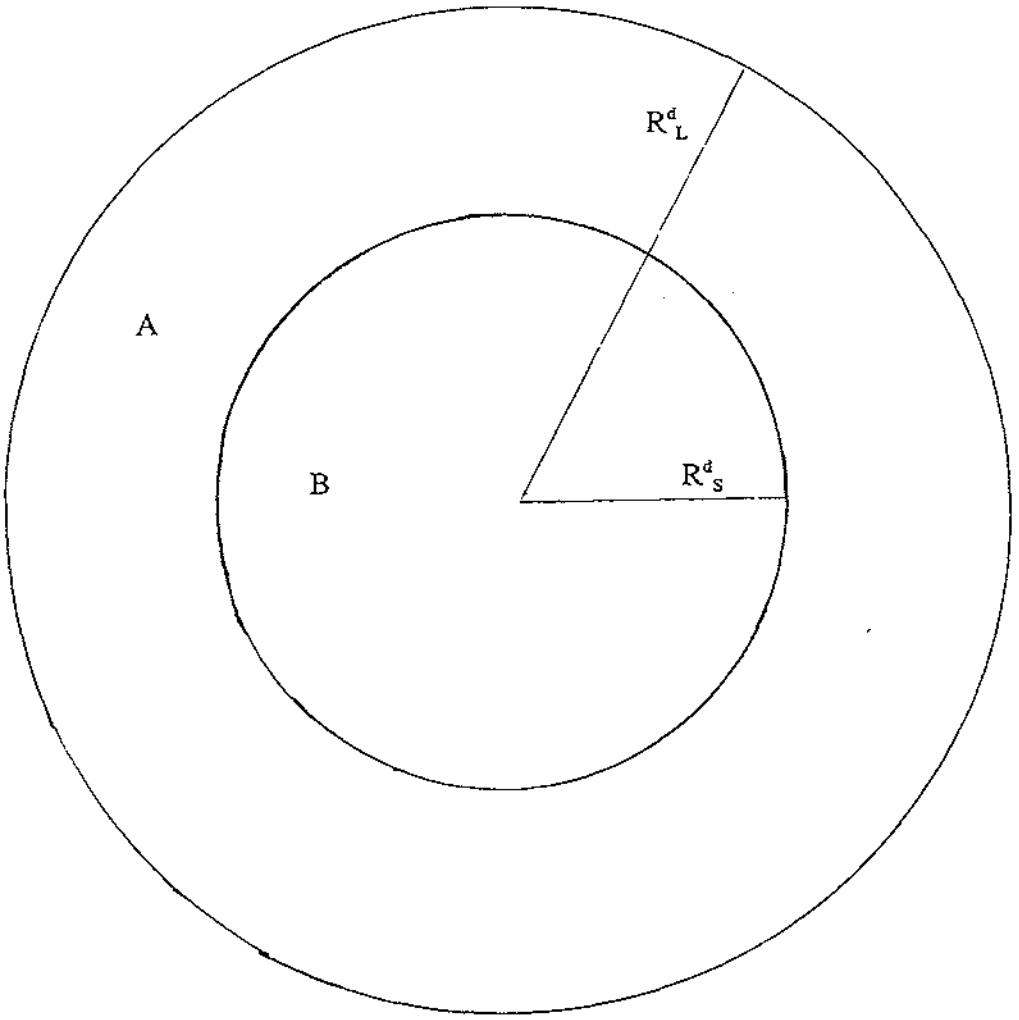

Figure 2: Output demand radii for large and small firms.

holds when the density of input supply is considered. Thus, as firm size increases firms become increasingly biased towards locations with high levels of raw material and/or demand concentration. For labor-intensive industries and industries where demand is found mainly in urban areas then, larger and larger firms are biased more and more to locations near cities.

Though the Juarez-Romero model was originally intended to describe location and size decisions for food processing firms, it is also particularly well-suited for the lumber industry. Lumber manufacturing involves relatively few economies of scale, and transport costs for both timber and final product make up a large portion of a firm's cost. As a result, the trade-off in terms of plant size between at-plant production costs and average raw material and final product transport costs is far more accentuated in the sawmilling industry than in an industry where scale economies are so large that they dwarf the effect of increased output on transport costs.

The importance of transport costs in the sawmilling industry is reflected in the fact that mills don't tend to be located at random, but rather tend to be near an adequate source of raw material and/or an adequately-sized demand center. Young notes that in the U.S., "the location of sawmills is determined primarily by the availability of timber," and Gregory notes that "a lack of available forest land may limit entry" by new mills into the industry (Young, 1982 474; Gregory, 1972 112 (footnote 4)). Final product

transport costs also appear to be significant in the sawmilling industry. Young and Gregory both emphasize the importance of market size for wood products firms (Young, 1982 491; Gregory, 1972 526-527). Gregory also indicates that a tendency for mills in the U.S. to move further away from urban areas has resulted in higher prices and lower demand as a result of the higher transport costs (1972, 117). Thus, it is reasonable to conclude that in the sawmilling industry, raw material and final product transport costs are a significant factor affecting production and marketing costs.

Consequently then, it seems likely that firm size and proximity to a city are related in the lumber industry. Larger mills require the larger output demand and the larger labor markets that are to be found in urban areas. Though smaller mills are not disadvantaged by an urban location, a small-sized mill can survive and prosper in less densely populated areas too. On the whole then, mill size and proximity to a city are likely to be correlated. In addition, urban areas also tend to provide advantages to exporting firms which translate into cost savings in export marketing. These advantages include proximity to ports and easy access to the necessary financial and information services. Thus, it is reasonable to hypothesize that firm size is associated with exporting through proximity to a city.

3.2 Hypothesis Two

The second hypothesis is that firm size is associated

with exporting through product quality. As discussed earlier, to a certain degree the effect of quality on exporter surplus depends upon the industry under consideration. In most cases however, higher quality products will be cheaper to transport, per unit value, than lower quality products. Consequently, producers of high quality goods are, other things being equal, likely to be more export oriented than low quality producers.

In addition, the relationship between firm size and product quality may vary with the industry. Some production processes associated with firm size might produce higher quality products. On the whole however, larger firms tend to have more resources to devote to quality control than smaller firms. Thus, it might be expected that larger firms will produce higher quality products than smaller firms.

In the lumber industry, product quality has a significant influence over demand and price, and hence over exporter surplus. Grading is the process by which the quality of a piece of lumber is assessed, and the classification given to a piece based on the quality is called its grade. Separate standards are usually set for softwood lumber and hardwood lumber, owing to their different characteristics and uses (Spencer and Luy, 1975 88, 112-114). Also, grading rules and procedures vary from country to country (Williston, 1988 269). In general, softwood lumber is graded according to how the piece can be used (i.e. general purpose, structural, or shop lumber), how much processing was done on the piece, and its size (Spencer and Luy, 1975 88-91). Hardwood lumber is graded based upon "the size and number of clear cuttings which

can be obtained" from the piece, "based on observation of the worst side of the board" (Spencer and Luy, 1975 92-93). Thus, well-defined quality standards exist for lumber production.

The literature indicates that price and demand tend to be lower for low-quality lumber than for high quality lumber. On the whole, "lumber is priced, sold and used according to the various grades assigned to the different quality groups" (Spencer and Luy, 1975 88). Lower grade lumber is, by definition, weaker, more difficult to use, or less attractive than higher grades, and hence on the whole has fewer uses (Spencer and Luy, 1975 102-104). This in turn implies lower prices and demand. Williston also indicates that the quality of a mill's product is directly related to its price, to customer satisfaction, and to the mill's profits, and hence the mill must carefully balance the costs of producing high quality lumber against the market price for quality (Williston, 1988 281). Williston notes that "tens of thousands of dollars can be lost every year even in a modestly-sized mill in the form of wasted fiber or falldown in grade" (1988, 292). Thus failure to monitor quality in a mill can result in substantial losses of profit as a result of more limited demand for the goods.

Quality is a particularly important factor affecting exporting in New Zealand's lumber industry. Overall, buyers in both Japan and Australia view New Zealand lumber as typically being of low quality, which has a negative affect on demand (Maplesden, 1988 57; NZTDB, 1992 7). Moreover, the

exporting of low grade lumber is likely to become less and less attractive in the years to come. Australian buyers have a definite preference for higher quality lumber, and can generally obtain it from North America (NZTDB, 1992 7, 11). Higher demand and real prices for high grade lumber are expected in the years to come, while prices for low grade lumber are expected to be stagnant (Theron, 1988 78-84). Moreover, greater competition and less demand in world markets for low grade lumber are anticipated for the foreseeable future (Theron, 1988 85-86). Additionally, exports of low grade lumber are very sensitive to freight rates, owing to the fact that, per unit value, low grade lumber takes more space than high grade lumber (Theron, 1988 79). Hence, a rising trend in freight rates could make exporting low-grade lumber unprofitable (Theron, 1988 85). In this way then, producers of low grade lumber in New Zealand are likely to be less export-oriented than high grade producers.

It is not clear, however, whether product quality is associated with firm size in the lumber industry. Several authors imply that small mills tend to produce proportionately more low quality lumber (see for example FAO, 1967 73; Gregory, 1972 101; Abel, 1977 27). However, Williston states that good quality control and high efficiency are as easy, if not easier, for small mills to obtain as for large ones (1988, 266-267). In some ways, less capital-intensive production methods may result in higher quality lumber, and in other ways lower. For example, the more capital-intensive gang (multiple head) saw method of cutting timber tends to

result in lower equality lumber than the more labor-intensive single headrig, since with the latter the operator can turn the log at each pass so that the best face is shown (Spencer and Luy, 1975 87). On the other hand, the more capital-intensive kiln method of drying tends to result in lumber with fewer defects than lumber that is air-dried, since with kiln drying the environment can be controlled to minimize damage to the wood (Spencer and Luy, 1975 99). Consequently, the relationship between product quality and firm size is unclear.

Testing hypothesis two requires showing that product quality and exporting are related, and that firm size and product quality are related. With respect to the former, the literature indicates that in the case of the lumber industry a positive relationship should hold. With respect to the latter, the literature is less clear. Consequently, no *a priori* guess can be made as to the validity of hypothesis two in the case of the lumber industry.

3.3 Hypothesis Three

The third hypothesis is that firm size is associated with export activity through production cost. As noted earlier, cost of production is a factor that is directly related to the firm's supply curve, and hence has a direct effect on exporter surplus. Moreover, production costs are directly related to firm size through economies of scale. However, the significance and nature of scale economies may vary from industry to industry. Thus, *ceteris paribus* larger firms can

be expected to have lower production costs and to be more export oriented than smaller firms, but the degree to which costs are lower depends on the industry under consideration.

With respect to the lumber industry, production cost has a direct effect on a firm's competitive advantage and hence its export behavior. In particular, New Zealand's lumber industry can ill afford high production costs, given the degree of competition in Australia's lumber market (Theron, 1988 86; NZTDB, 1992 6, 7). Of greater interest, however, is the significance of scale economies in the lumber industry. The literature as a whole does not give a clear indication of the degree to which sawmilling is characterized by scale economies. However, the general trend seems to be that more and more scale economies are being discovered over time. Moreover, most scale economies in sawmilling appear to derive from labor-saving technologies, and hence are more significant for operations in developed countries. Thus, it is likely that there are significant cost advantages for larger-sized firms in New Zealand's lumber industry.

In general, it appears that as late as the 1970s lumber manufacturing was considered to be an industry with few scale economies. The FAO's 1967 report on the world's wood industries indicates that there were few scale economies to be had in sawmilling, and to some degree there were diseconomies of scale (FAO, 1967 67). Gregory writes that "There is little to suggest that lumber production has important scale economies beyond very modest mill sizes" (1972, 98). Gregory also indicates that the sawmilling industry comes close to

being perfectly competitive, owing to the large number of small-sized firms (112). The Asian Development Bank also indicates that sawmilling tends to have a remarkable "insensitivity" to scale economies (1981, 24). Moreover, Young indicates that the lumber industry is very close to being perfectly competitive, and the entry barriers in the industry are low because of low capital requirements (1982, 474). Consequently, there is much to suggest that until recently the sawmilling industry had few economies of scale.

However, technological developments over the years have created greater scale economies in the lumber industry, particularly for countries where the industry is capital-intensive. This trend towards greater scale economies in the industry was noted as far back as the 1960s. The FAO's 1967 report, for example, notes that greater scale economy advantages were resulting in fewer and larger plants in labor-scarce countries such as Canada (69). Gregory indicates that in the U.S. the degree of concentration in the lumber industry, while relatively low, was rising (1972, 112). Abel notes that New Zealand's lumber industry is characterized by a significant degree of scale economies, and notes a significant trend in New Zealand over the years to larger mill sizes (1977, 17-28). This trend has also been noted by the New Zealand Forest Service (1980, 15). Finally, Tillman (1985) details numerous technological advances in the wood industries, including sawmilling, many of which are associated with larger firm size. For example, production of pulp chips and advanced sawmilling control systems are both innovations

in sawmilling that may be considered to be scale economy advantages. On the whole, Tillman notes that wood products firms are increasingly becoming larger, more capital-intensive, and more horizontally and vertically integrated in order to achieve lower unit production costs. Scale economies in the sawmilling industry have therefore become increasingly significant with time.

Nevertheless, these increasing scale economy advantages have largely been confined to countries in which the industry is relatively capital-intensive. The lumber industry has a large range of possible production methods to choose from, ranging from very labor-intensive to very capital-intensive (FAO, 1967 68-69; Asian Development Bank, 1981 24). But, the FAO indicates that scale economy considerations tend to be significant only in countries where labor costs are high or rising (1967, 69). Moreover, Abel (1977) found that in New Zealand's lumber industry, economies of scale advantages were derived almost entirely from savings in labor costs (20-21). The ADB points out that labor-intensive production methods remain profitable in labor-abundant developing countries despite capital-biased technological innovations adopted in capital-intensive developed countries (1981, 24). Moreover, Tillman indicates that the changing technology in sawmilling is capital-intensive in nature (1985). Thus, economies of scale considerations tend to be more significant in labor-scarce than in labor-abundant countries.

Consequently then, since New Zealand is a relatively labor- scarce/capital-abundant country, a significant

relationship may be expected between firm size and production costs in the lumber industry. Thus, production cost may be expected to link export activity and firm size.

3.4 Hypothesis Four

The fourth hypothesis is that firm size is associated with export activity through the legal structure of the firm. As noted earlier, a firm's legal structure affects its ability to undertake risk and its access financial capital. Moreover, legal structure is directly related to the size of the firm, since a firm's legal structure influences the range of sources of financial capital available to the firm.

Unfortunately, little has been written about the effect of legal structure on either export behavior or firm size with specific reference to the lumber industry. Nevertheless, Houghton and Caskey (1984) did find that most small wood manufacturers in the Otago region of New Zealand were sole proprietorships or partnerships, and that in these firms the owners were significantly and directly affected financially by the debt incurred by the business. Consequently, it is reasonable to suppose that owners of these firms will be more wary about undertaking exporting than other firms. Indeed, Houghton and Caskey (1985) found that most small West Coast wood manufacturers were not interested in expanding their business if that meant undertaking risk. Thus, it is reasonable to hypothesize that in New Zealand's lumber industry, a firm's legal structure is related to both firm

size and export activity.

3.5 Hypothesis Five

The fifth hypothesis that can be made is that foreign ownership links firm size and export activity. As discussed earlier, a firm in which some of the equity is owned by foreigners will probably have access to all of the information which the foreign owners have, including information on foreign technology, market intelligence, business practices, and exporting procedures. New Zealand sawmills can gain technological information from foreign partners, thereby reducing production costs (NZFS, 1980 23). Access to market intelligence may also be useful since competitiveness is vital to survival in the lumber industry (Tillman, 1985 28). It is significant to note that the first three sawmills in New Zealand to become entirely export oriented (exporting 100% of output) were joint ventures with foreign firms (NZFS, 1980 23). Thus, because market intelligence is vital to export success in the lumber industry, it can be expected that foreign investment gives mills an advantage in competing abroad, and hence increases their level of exporter surplus.

Moreover, firms which are at least partly foreign-owned are likely to be larger, on the average, than locally-owned firms. This is because larger firms are more likely to be noticed by foreign investors than smaller firms, and because local firms, when considering exporting, may choose to expand their size by inviting foreign investment in the firm (Kau and

Tan, 1989 37). For some firms in New Zealand's wood products industry, joint ventures have been an important source of financing (NZFS, 1980 23). Thus, foreign investment may link firm size to export behavior in the lumber industry.

3.6 Hypothesis Six

The sixth hypothesis that can be made is that mangerial experience and education link firm size and export activity. More experienced and better-educated managers are more likely to have the ambition and the skill to manage export orders. In addition, the competitive nature of the lumber industry makes managerial skill an essential component of export success. Good management lowers production costs and improves product quality (Theron, 1988 86, 87).

Moreover, better management implies higher levels of growth in the firm, and hence larger firm size. Further, larger firm size implies a larger number of managers, and hence a greater probability of someone in the firm having an education level sufficient to manage export orders. Thus, managerial experience and education are likely to be correlated with firm size. In this way, managerial experience and education may link export activity and firm size.

3.7 Hypothesis Seven

The seventh hypothesis that can be made is that firm size is associated with export behavior through the firm's level of

marketing skill. Information and experience in marketing are important for export success for most industries, though perhaps less vital for the lumber industry, where many elements of marketing, such as advertising, are unimportant. Nevertheless, even for the lumber industry some elements of marketing are crucial for export success, including contacting with buyers and working under a foreign distribution system.

Marketing skill and experience are particularly important in New Zealand's lumber industry. One of the chief competitive advantages of New Zealand mills in the Australian market is familiarity with the needs of Australian buyers (NZTDB, 1992 1, 10). Nevertheless, a greater marketing effort is needed in order for New Zealand firms to remain competitive in its export markets, particularly in the areas of promotion and distribution (NZFS, 1980 53, 57, 60; Theron, 1988 86-87; NZTDB, 1992 8). Houghton and Caskey (1984 and 1985) found that Otago and West Coast small wood manufacturers displayed a significant shortage of marketing skills and did not frequently employ advertising. Thus, the development of marketing skill and experience can enhance the competitiveness of New Zealand mills in export markets.

Moreover, firm size is likely to be correlated with a firm's marketing expertise. When firms grow, they enter new markets, and the experience gained from this growth will assist then in entering foreign markets (Yang *et al.*, 1992). Also, a direct correlation may be expected between a firm's size and the size of its marketing department. Because of specialization then, larger firms should be more adaptable to

the different marketing circumstances of a foreign country than smaller firms. Consequently, marketing skill may be expected to link firm size and export activity in New Zealand's lumber industry.

3.8 Hypothesis Eight

The eighth hypothesis that can be made is export-related information links firm size to export activity. As discussed earlier, the acquisition of information on the mechanics of exporting and of other information directly related to the execution of export orders is a prerequisite to exporting. Firms which already have this information are saved the cost of obtaining it, hence making them more export oriented. Moreover, access to additional information, such as data on consumer preferences, can enhance export success. For instance, one of New Zealand's major advantages in the Australian lumber market has been familiarity with market conditions and buyers' needs (NZTDB, 1992 1, 10). Thus, the amount of export-related information a firm has is likely to influence export activity.

Furthermore, export-related knowledge is likely to be associated with firm size. Larger firms may be expected to employee more managers and hence benefit from the combined education and experience of this larger staff. In addition, results from O'Rourke (1985) suggest that a lack of export information is a more significant export barrier to smaller firms than to larger firms. O'Rourke (1985) found that

smaller firms had less export experience than larger firms and tended to perceive lack of export-related information as a more significant problem than larger firms. Thus, export-related information can be expected to link firm size to export activity.

3.9 Hypothesis Nine

Finally, the ninth hypothesis that can be made is that firm size is associated with export behavior through managerial drive, ambition and willingness to change. As discussed earlier, it is very likely that the general level of managerial ambition is directly related to whether or not a firm exports. Firms with highly ambitious management may place a premium on exporting, or at least are less apt to unduly discount it. Thus, managerial ambition and export activity may be associated.

Furthermore, managerial ambition might be linked with firm size. Firms with ambitious, innovative managers will probably tend to experience higher levels of growth than firms with indifferent managers. Hence, these firms will tend to be larger than firms with less ambitious staff. This hypothesis can be tested by asking managers to assess their firm's prospects for the next few years, and whether or not any specific plans have been made for new venture. Replies can then be examined for correlations between firm size and export behavior. In this way then, managerial attitudes and ambition may link export behavior and firm size.

3.10 Conclusions

Consequently then, nine hypotheses can be made as to how export activity and firm size are related. To summarize, these hypotheses are:

Hypothesis One: Firm size is associated with export activity through proximity to cities;

Hypothesis Two: Firm size is associated with export activity through product quality;

Hypothesis Three: Firm size is associated with export activity through production cost;

Hypothesis Four: Firm size is associated with export activity through legal structure;

Hypothesis Five: Firm size is associated with export activity through foreign ownership;

Hypothesis Six: Firm size is associated with export activity through managerial experience and education;

Hypothesis Seven: Firm size is associated with export activity through marketing skill;

Hypothesis Eight: Firm size is associated with export activity through export-related information;

Hypothesis Nine: Firm size is associated with export activity through managerial attitudes and ambition.

Testing these hypotheses requires application to a specific industry in a specific country. The New Zealand lumber industry has been selected for this purpose. The methodology employed in testing these hypotheses and the results of these tests are covered in chapters four and five.

CHAPTER FOUR

METHODOLOGY

Each of the nine hypotheses discussed in chapter three involves the relationship between a particular firm characteristic and the firm's size and level of export activity. Because this sort of information is firm-specific and therefore difficult or impossible to obtain from secondary sources, it was decided that a survey would be the most appropriate and effective means of gathering data. It was also felt that a lack of data from respondents would make a time series analysis impossible, so a cross-sectional approach was adopted for testing the hypotheses. Moreover, in order to add credibility to the results, it was decided to use a couple of different measures of firm size, export activity and, where possible, the particular firm characteristic concerning the hypothesis. Details are given below on the methods used in the survey and analysis.

4.1 Definitions of Variables

Before formulating questionnaire questions, it is necessary to clearly define the variables to be used in testing the hypotheses. Two variables were chosen to represent export activity. The first of these is whether or not the firm exports, denoted as Exporting. The second is the

proportion of the mill's softwood lumber output that is exported, denoted as %exp. Hardwood output is not considered since its exportation is illegal in New Zealand. In analyzing %exp, only exporting firms were considered. Both of these variables have been widely used in the literature as measures of export activity.

In addition, two variables were chosen to represent mill size. The first of these is the number of employees, denoted as Emp. The second of these is total lumber sales in 1992, in thousands of New Zealand dollars, denoted TLSales. In some cases in the analysis, the softwood lumber sales level (SLSales) was substituted for total lumber sales because it more accurately represented mill size for the purposes of the regression. Both number of employees and sales level are widely employed in the literature as measures of firm size.

Choices of variables to represent firm characteristics (hereafter referred to as characteristic variables) were a bit more subjective, guided mostly by an attempt to keep the questions as understandable and convenient for respondents as possible. Each of the characteristic variables is discussed below, under headings denoting each firm characteristic. A copy of the survey questionnaire is in appendix 3.

4.1.1 Proximity to a City

1. Distance from nearest major city (Dist): as discussed earlier, the proximity of a firm to a city can influence export activity and mill size (see pp. 16, 35-41). A major city is defined here to be one with a population of

30,000 or greater. Greymouth and Westport are also added to this list since they are principal cities in a relatively isolated part of New Zealand. These cities, according to the New Zealand Official Yearbook 1993 (p. 67) are:

Auckland
Wellington
Christchurch
Hamilton
Dunedin
Palmerston North
Tauranga
Hastings
Rotorua
Napier
Invercargill
New Plymouth
Nelson
Whangerei
Wanganui
Gisborne

For each respondent, the distance was calculated based on the most direct highway route from the town where the mill was addressed (question 2, appendix 3) to the nearest city on the above list (or Westport or Greymouth). For calculating this distance, Wises Map of New Zealand was used.

4.1.2 Product Quality

2. Proportion of softwood lumber output that is #1 framing or better (PQ): In question number 9 on the survey questionnaire (see appendix 3) the respondent was asked to estimate the proportion of its softwood and hardwood output that fell into various grades commonly used in the New Zealand lumber industry. The list of softwood lumber grades used in the questionnaire came from Maplesden (1988). Though these categories were altered somewhat in 1988 by the Standards Association of New Zealand (see Standards Association of New

Zealand, 1991), these terms are still in common use in the industry. It was assumed that the list from Maplesden ranged from high quality to low quality. Hence, the following grades were considered to be #1 framing or better: #1 clears, #2 clears, #1 cuttings, factory, F8, F5, and #1 framing. In addition, if the respondent indicated that the mill produced grades not on the list, the respondent was asked to place the grades in the range in question 9, and those grades falling above #1 framing were included in the category "#1 framing or better".

Very little clear information could be found about the grades used to classify hardwood lumber. Since only two respondents producing hardwood answered question 9 and since both mills produced mainly softwood lumber, it was felt that ignoring quality of hardwood output would not seriously bias the results.

4.1.3 Production Cost

3. Production cost per cubic meter of softwood lumber output in 1992 (in New Zealand dollars, and including log cost) (Cost): From the literature review, it seems reasonable to hypothesize that production cost is related to both mill size and export activity (see pp. 18-19, 45-49). Two measures of production costs are possible in the lumber industry: straight milling cost, and milling cost including the cost of procuring the log. The latter is represented by Cost. In preparing the questionnaire, the distinction between these two figures was accidentally overlooked. After the error was

discovered, respondents were asked to give both the milling cost and the milling cost including log cost in response to question 10. Upon completion of the survey, responses in which it was unclear whether log cost was included were assumed to include log cost if the response was $200/m^3$ or greater and not to include log cost if the response was $120/m^3$ or lower. These guidelines were established based on the fact that the highest known level of cost excluding log cost was $180/m^3$ and the lowest known level of cost including log was $140/m^3$. In each case a $20/m^3$ margin of error was included for good measure. As it turns out, all of the unclear responses fell in the range $0 - 120/m^3$ or the range $200+ /m^3$, so no unclear responses went unclassified.

Though the questionnaire asked for hardwood lumber production costs as well, only two responses were obtained, and it was felt that ignoring these responses, particularly in light of the restriction against exporting New Zealand hardwoods, would not affect the results in any significant way.

4. Production cost per cubic meter of softwood lumber in 1992 (in New Zealand dollars and excluding log cost) (MCost): Most of what is written about Cost applies here. MCost is simply the straight milling cost, excluding the cost of procuring the log, given in response to question 10. Since it was not clear from the literature which was the better measure of production cost fro the purposes of this research, both Cost and MCost are considered.

4.1.4 Legal Structure

5. Whether or not the firm identifies itself as a corporation (LS): As indicated earlier, several aspects of legal structure may affect export behavior and firm size (see pp. 19-23, 49-50). The most important distinctions were believed to exist between corporations on the one hand and partnerships and sole proprietorships on the other. Hence, the variable LS is dichotomous, with 1 being entered if the firm identified itself in question 11 as a corporation or limited liability firm and 0 if it identified itself as a partnership or sole proprietorship. No respondents indicated that they were cooperatives or state-owned enterprises.

4.1.5 Foreign Ownership

6. Whether or not at least one of the firm's owners is a foreigner (FO): As noted earlier, the literature indicates that foreign ownership may be related to both export activity and mill size (see pp. 23-24, 50-51). FO is based on question 12 and is a dichotomous variable, with 1 being entered if there was some foreign ownership in the firm (i.e. the respondent answered "no" to question 12), and 0 if the firm is owned entirely by New Zealanders.

4.1.6 Managerial Experience and Education

The literature, it will be recalled, indicated that managerial experience and education can have a significant influence on export activity and may be significantly related to firm size (see pp. 24-25, 51). A set of six characteristic

variables was used to test this hypothesis, three measuring various aspects of managerial experience and three measuring managerial education. These variables are presented below. It should be noted that in cases where a mill was part of a larger firm, the interviewee was asked to take chief executive officer as referring to the mill's site manager.

7. Number of managers with greater than twenty years of experience in the lumber industry (ManX): the response to this variable was taken to be simply the response to question 13a.

8. Proportion of managers with greater than twenty years of experience in the lumber industry (%ManX): Calculated by dividing the response to 13a by the response to 7b.

9. Number of years of experience of the mill's chief executive officer (or site manager) (CEOX): Response taken as the response to question 14.

10. Number of managers with a university degree (ManEd): Taken to be the response to question 13b.

11. Proportion of managers with a university degree (%ManEd): Calculated by dividing the response to 13b by the response to 7b.

12. Whether or not the mill's chief executive officer

(or site manager) has a university or polytechnic degree (CEOEd): CEOEd is a dichotomous variable, with 1 entered for a yes response to question 15 and 0 entered for a no response.

4.1.7 Marketing Skill

As indicated in the literature review, the amount of marketing knowledge and skill that a firm possesses may be significantly correlated with both export activity and firm size (see pp. 25-28, 51-53). Two measures of marketing knowledge seemed particularly appropriate for use in this study in light of the literature on determinants of export activity. They are:

13. Number of employees dealing with marketing (MEmp): taken to be the response to question 17.

14. Whether or not the firm markets in more than one district (MArea): In this case, a district refers to one of the semi-political divisions used in New Zealand (for example, Manawatu). If the mill indicated that it sold in more than one district (i.e. answered "d" or "e" in question 18), a 1 was entered. If the firm responded "a", "b", or "c" to question 18, a 0 was entered.

4.1.8 Export-Related Information

As noted earlier, the amount of export-related information possessed by a firm may influence its level of export activity and may also be associated with firm size (see

pp. 28-31, 53-54). A variety of measures of this variable have been employed in the literature, and four are selected for use here. These four were selected mainly because they could be easily understood by respondents and because they represent a range of different kinds of export information.

15. Number of managers who have studied a foreign language (Lang): Typically when a language is studied, cultural information is imparted in addition to language skill itself. Foreign language in this case refers to a language other than English and Maori. Data for this variable comes directly from question 13c.

16. Number of managers who have studied or lived abroad for more than three months (FStud): Another measure of the amount of cultural information a firm possesses about foreign countries. Data for this variable comes directly from question 13d.

17. Number of managers who read a foreign new or business publication on a regular basis (FNews): A measure of the amount of information a firm possesses on current economic and political conditions in foreign markets. Data for this variable comes directly from question 13e.

18. Number of times managers have travelled abroad in the past five years (Trav): This serves as a measure of the cultural information a firm possesses on foreign markets, as

well as information on economic/political conditions and information on potential clients. Data for this variable comes directly from question 16.

4.1.9 Managerial Attitudes and Ambition

As discussed above, managerial attitudes and ambition can have a significant influence on export activity and may be associated with mill size. Two measures were used to represent this characteristic, one focusing more on attitudes, the other on ambition.

19. The personal outlook of the interviewee on the firm's prospects for the next two years (Out): This is a dichotomous variable, with 1 being entered if the respondent indicated that his/her outlook was excellent (i.e. responded "a" to question 19), and 0 if s/he indicated otherwise (i.e. responded with "b", "c", "d", or "e" to question 19).

20. Whether the firm has plans to expand its market or to introduce a new product within the next year (Expand): This, too, is a dichotomous variable, intended to measure managerial ambition. A 1 was entered if the interviewee answered yes to question 20, and a 0 if s/he answered no.

In this way then, all the information needed to rigorously test the hypotheses could be obtained through a short, easily understood questionnaire. Before the main survey was started, however, a short pilot survey was conducted. The pilot questionnaire was substantially longer

and more complicated than the one used for the main survey (31 questions and eight pages as opposed to the 20 questions and five pages of the revised questionnaire). However, the results from the pilot were useful in producing the simpler and shorter questionnaire that was ultimately used.

4.2 Survey Methodology

The next step after drafting the pilot questionnaire for the pilot survey was to select a population and sample. It was determined that it would be too time consuming to compile a list of every sawmiller in New Zealand, and so it was decided to take the population as those mills which are members of the New Zealand Timber Industry Federation (NZTIF). A list of mills along with addresses, phone numbers, and fax numbers was easily obtained from the NZTIF. Each individual mill, rather than each firm, was taken to be a single element in the population. Mills without telephone numbers on the NZTIF list were excluded from the population. In all, the population consisted of 81 sawmills.

From this population, four mills were selected for the pilot survey. Since these mills were not randomly selected, the results from the pilot survey were not imported into the main survey results. Each firm in the pilot sample was mailed a copy of the pilot questionnaire, addressed to the mill's president, along with an introductory letter explaining the purpose of the survey and that an interviewer would ring within the week to schedule a telephone interview in which the

interviewer would go through the questionnaire with the respondent. It was felt that a posted questionnaire followed by a telephone interview was the best approach to take in conducting this survey. Many of the survey questions involved information which it might take the respondent some time to gather, so it seemed necessary to give advance notice of what questions would be asked. Asking respondents to post the questionnaire back to the researcher was ruled out as a possibility because of a lack of time and the notoriously low response rate to postal surveys. On the other hand, a personal visit by the interviewer would have proved costly and time consuming and seemed unnecessary when the questions could be asked just as easily over the telephone, particularly since the respondent would have a copy of the questionnaire in front of him. Hence, it was decided to gather the information through a telephone interview.

For the pilot survey, questionnaires and introductory letters were mailed out on September 14th, 1993, and the telephone interviews were conducted on September 21st and 22nd. Of the four mills contacted, two agreed to an interview, one refused, and the fourth asked to be contacted in two weeks. As this was beyond the time limit set for conducting the pilot, this firm was not contacted again for the pilot, but was left in the population for the main survey. Of the two respondents, both were in management-level positions in the mill. From these responses, it was determined that the pilot questionnaire was too lengthy and complex to be easily completed by a mill manager, and so an

effort was made to revise the questionnaire to shorten and clarify it. Some questions were found to be redundant or unnecessary and were dropped. Others were clarified to make the meaning clearer. In all, the questionnaire was reduced in size from 31 questions to 20, and from eight pages to five.

The revised questionnaire was mailed out to a random sample of forty mills selected from the NZTIF list on October 4th. The two participants and one nonparticipant in the pilot survey were excluded from the population. Mills were selected for the sample by assigning a number from 1 to 78 to each mill in the sample, and generating a three digit random number using the random number function on a Casio fx-991n calculator. If the first two digits matched the number assigned to a mill, that mill was assigned to the sample. This process was repeated until forty mills were in the sample. Each mill in the sample was mailed a copy of the revised questionnaire and an introductory letter signed by both myself and my primary thesis supervisor (see appendices 2 and 3), again explaining the purpose of the survey and that an interviewer would contact them within a week to schedule an appointment to got through the questionnaire with them over the phone. I conducted all of the interviews for both the pilot and the main survey. The telephone interviews occurred over the period form October 7th to October 26th. In 92 percent of the cases the respondent was in a management-level position. The format for the telephone interview was the same as for the pilot. The interviewee was simply asked the questions on the questionnaire mailed to him/her. When

necessary, questions were clarified for the respondent.

In all, 26 of the 40 mills in the sample responded, for a response rate of 65 percent. The nonrespondents represented a fairly random mix of mills, and it is not felt that their nonparticipation significantly biased the results. Of the fourteen nonrespondents, four refused to participate outright; four were unreachable by phone, owing to phone number changes, name changes, or plant closures since the NZTIF list was last updated; four were unable to schedule an interview time before the survey deadline of October 26th; and the remaining two promised to post their responses, but these were never received. Half of the nonrespondents were North Island mills and half were South Island mills. Five of the nonrespondents were known to be part of a larger firm. The remaining seven were independently owned, and one of these indicated to the interviewer that his mill was very small. Hence, it can be guessed that a full range of sizes of firms were among the nonrespondents. However, no speculation at all can be offered as to the levels of export activity represented by the nonrespondents. Still, there is no particular reason to believe that they differ significantly in that respect from the respondents. Hence, it can be concluded that the nonparticipation has not significantly biased the results.

4.3 Analysis Methodology

Testing each of the nine hypotheses involved two steps: a) testing for a correlation between the appropriate firm

characteristic and export activity; and b) testing for a correlation between that firm characteristic and mill size. If it was determined that a significant correlation existed in both cases, then the hypothesis was considered verified.

In testing for a correlation between a firm characteristic (e.g. managerial experience and education) and export activity, a bivariate linear regression was done between each relevant characteristic variable and each export activity variable. The Minitab statistics program was used to accomplish this. The regression result was considered significant if the regression coefficient was significantly greater than (or less than) zero at the 95 percent level of confidence using Students t-test. It was considered insignificant if the regression coefficient was not significantly greater than (or less than) zero at the 90 percent level of confidence. The result was considered ambiguous otherwise. A one-tailed test was used whenever a prediction of the relationship between the two variables was possible based on the literature review, and a two-tailed test was used otherwise. A similar procedure was used for testing correlations between characteristic variables and mill size variables.

Interpreting regression results to come to conclusions as to whether a significant relationship existed between a particular characteristic and export activity or mill size was more complicated and somewhat subjective. For each characteristic variable, four regressions were done: two with export activity variables and two with mill size variables.

Moreover, in testing some hypotheses several characteristic variables were used. For example, in testing hypothesis eight four different characteristic variables were used. In general, if a significant correlation was found to exist between a characteristic variable and one of the export activity variables (or one of the mill size variables), and the correlation between that characteristic variable and the other export activity variable (or mill size variable) showed some level of significance (i.e. $t > 1$), then it was concluded that a significant correlation existed between that characteristic variable and export activity (or mill size, as the case may be). In cases where several characteristic variables were employed to test the hypothesis, conclusions were drawn about the relationship between the firm characteristic and export activity (or mill size) based on conclusions about the significance of the relationship between each characteristic variable and export activity (or mill size). In this way then, conclusions were drawn about the relationship between each firm characteristic and export activity and mill size, and from these conclusions the validity of each hypothesis could be determined.

CHAPTER FIVE

RESULTS

The results of each bivariate linear regression are given in this chapter. For each regression, the predicted relationship, the regression equation found by Minitab, the t-test result from Minitab, the critical t-values, and an interpretation of the results are given. Based upon this data, conclusions can be drawn about the relationship between each characteristic variable, export activity and mill size. In this way, the validity of each hypothesis can be evaluated.

5.1 Hypothesis One

The first hypothesis postulates that distance from nearest major city links mill size to export activity. The reasoning behind this hypothesis was discussed earlier on pages 35-41. However, the results in Table 1 indicate that hypothesis one should be rejected, though a possible relationship exists between proximity to a city and export activity. From Table 1, it is clear that no statistically significant relationship exists between Dist and Exporting. However, a significant correlation does appear to exist between %exp and Dist. This results suggests that a mill's location has no effect on a decision to export, but may affect the amount that an exporting firm decides to export. Thus, it

Table 1: Regression Results for Proximity to a City

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
Dist vs. Exporting	b < 0	Exporting = 0.591 + 0.00217*Dist	25	-1.708 -1.316	0.99
Dist vs. %exp	b < 0	%exp = 0.638 - 0.00312*Dist	14	-1.761 -1.345	-2.15
Dist vs. Emp	b < 0	Emp = 47.6 + 0.071*Dist	25	-1.708 -1.316	0.27
Dist vs. TLSales	b < 0	TLSales = 12279 - 24.5*Dist	21	-1.721 -1.323	-0.29

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

is not clear from these results whether Dist is an adequate predictor of export activity.

Moreover, it is clear from Table 1 that Dist has no relationship to firm size. No statistically significant relationship exists between either Dist and Emp or Dist and TLSales. Hence, it can be concluded that proximity to a city is unrelated to firm size, and hence hypothesis one must be rejected. Thus, it can be concluded that firm size does not influence export activity through proximity to cities.

5.2 Hypothesis Two

Hypothesis two raises the possibility of a link between product quality, export activity and firm size, as discussed on pages 41-45. However, the results outlined in Table 2 do not support this hypothesis. First, consider the relationship between PQ and export activity. The relationship between PQ and Exporting is significant at the 90 percent level of confidence, but not at the 95 percent level. Thus, the significance of the relationship between Exporting and PQ is ambiguous by the standards adopted by this study. However, PQ and %exp are not significantly correlated. Thus, it must be concluded that PQ and export activity are not related, though the fact that t_b is significantly greater than 1 does suggest that future studies may find a relationship.

Moreover, it is clear from Table 2 that no statistically significant relationship exists between firm size and export activity. PQ is not significantly correlated with either Emp

Table 2: Regression Results for Product Quality

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
PQ vs. Exporting	b > 0	Exporting = 0.023 + 0.857*PQ	19	1.729 1.328	1.69
PQ vs. %exp	b > 0	%exp = -0.098 + 0.769*PQ	10	1.812 1.372	1.24
PQ vs. Emp	b ≠ 0	Emp = 96.5 - 72.3*PQ	19	±2.093 ±1.729	-1.32
PQ vs. SLSales	b ≠ 0	SLSales = 20758 - 18356*PQ	17	±2.110 ±1.740	-1.05

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

or SLSales. Nevertheless, the fact that the regression coefficient is less than zero and t_b is less than -1 for both Emp and SLSales suggests the possibility that a negative relationship exists between mill size and product quality in New Zealand's lumber industry. Hence, on the whole hypothesis two must be rejected, though it would not be surprising if future studies verified it.

5.3 Hypothesis Three

The third hypothesis made in this study is that production cost links firm size to export activity. Two characteristic variables were used to represent production cost: production cost including the cost of raw material (Cost) and milling cost (MCost). However, neither measure showed a significant negative correlation with either measure of export activity (see Table 3). In fact, contrary to expectations developed earlier (see pp. 18-19, 59-61), evidence exists that production cost and export activity may be positively related. The correlation between Cost and %exp is particularly strong, with $t_b = 4.84$. Also, the correlations between Cost and Exporting and MCost and %exp are also strong, with t_b well above 1 in both cases. Clearly then, the expected negative relationship between production cost and export activity does not exist.

Furthermore, it is clear from Table 3 that production cost and firm size are not significantly correlated. Neither Cost nor MCost is significantly correlated with firm size.

Table 3: Regression Results for Production Cost

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
Cost vs. Exporting	b < 0	Exporting = 0.295 + 0.00209*Cost	13	-1.771 -1.350	1.33
Cost vs. %exp	b < 0	%exp = -0.325 + 0.00324*Cost	9	-1.833 -1.383	4.84
MCost vs. Exporting	b < 0	Exporting = 0.814 + 0.00011*MCost	16	-1.746 -1.337	0.04
MCost vs. %exp	b < 0	%exp = 0.082 + 0.00492*MCost	10	-1.812 -1.372	1.45
Cost vs. Emp	b < 0	Emp = 36.5 + 0.068*Cost	13	-1.771 -1.350	0.37
Cost vs. SLSales	b < 0	SLSales = -4920 + 65.7*Cost	12	-1.782 -1.356	1.24
MCost vs. Emp	b < 0	Emp = 38.44 + 0.066*MCost	16	-1.746 -1.337	0.19
MCost vs. SLSales	b < 0	SLSales = 10676 - 17*MCost	13	-1.771 -1.350	-0.10

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

Thus, hypothesis three must be rejected, and it can be concluded that production cost does not link export activity to firm size in New Zealand's lumber industry.

5.4 Hypothesis Four

The fourth hypothesis in this study attempts to link export activity to firm size through legal structure (see pp. 19-23, 49-50). In this case, only one characteristic variable, LS, is used. From Table 4, it can be seen that the results are mixed as to whether LS is correlated with export activity. On the one hand, it appears that corporations are significantly more likely to export than partnerships and sole proprietorships, but on the other hand, among exporters legal structure has little bearing on how much a firm exports. Possibly then, unincorporated exporting firms are very much like exporting corporations in their ability to cope with risk and their access to financial capital. At any rate, it can be tentatively concluded that export activity is related to legal structure by conferring advantages to corporations in a decision to export, but has no advantages beyond this.

Furthermore, the data indicate that LS is a significant predictor of firm size. LS is significantly correlated with both Emp and TLSales at the 95 percent level of confidence. On the whole then, hypothesis four can be tentatively accepted, and it can be concluded that legal structure is a link between export activity and firm size in New Zealand's lumber industry.

Table 4: Regression Results for Legal Structure

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
LS vs. Exporting	b > 0	Exporting = 0.538 + 0.308*LS	25	1.708 1.316	1.73
LS vs. %exp	b > 0	%exp = 0.517 - 0.090*LS	14	1.761 1.345	-0.56
LS vs. Emp	b > 0	Emp = 25.8 + 50.4*LS	25	1.708 1.316	2.59
LS vs. TLSales	b > 0	TLSales = 5047 + 13257*LS	21	1.721 1.323	1.97

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

5.5 Hypothesis Five

As indicated in chapters two and three, foreign ownership is a possible link between export activity and firm size. In order to test this hypothesis, one characteristic variable (FO) was regressed against the variables used to represent export activity and firm size. The results of these regressions are presented in Table 5. It seems clear from these results that FO is not a significant predictor of export activity. FO is neither significantly correlated with Exporting nor with %exp. On the basis of these results then, hypothesis five can be rejected. Still, it should be noted that FO appears to be a significant predictor of firm size, since FO is significantly correlated with both TLSales and Emp, as expected from chapter three.

5.6 Hypothesis Six

The sixth hypothesis of this study is that managerial experience and education link firm size to export activity. To test this hypothesis, six characteristic variables were examined, three representing managerial experience (ManX, %ManX and CEOX) and three representing managerial education (ManEd, %ManEd and CEOEd). The results of the statistical analysis are presented in Table 6. First, it seems clear from these results that no significant positive relationship exists between managerial experience and export activity, despite the predictions made earlier (see pp. 24-25, 51). Neither ManX

Table 5: Regression Results for Foreign Ownership

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
FO vs. Exporting	b > 0	Exporting = 0.607 + 0.133*FO	25	1.708 1.316	0.56
FO vs. %exp	b > 0	%exp = 0.515 - 0.170*FO	14	1.761 1.345	-0.96
FO vs. Emp	b > 0	Emp = 36.7 + 74.1*FO	25	1.708 1.316	3.16
FO vs. TLSales	b > 0	TLSales = 6694 + 19266*FO	21	1.721 1.323	2.53

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

Table 6: Regression Results for Managerial Experience and Education

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
ManX vs. Exporting	b > 0	Exporting = 0.720 - 0.0130*ManX	25	1.708 1.316	-0.21
ManX vs. %exp	b > 0	%exp = 0.582 - 0.0498*ManX	14	1.761 1.345	-1.07
%ManX vs. Exporting	b > 0	Exporting = 0.885 - 0.309*%ManX	25	1.708 1.316	-1.09
%ManX vs. %exp	b > 0	%exp = 0.591 - 0.215*%ManX	14	1.761 1.345	-0.95
CEOX vs. Exporting	b > 0	Exporting = 1.03 - 0.0121*CEOX	25	1.708 1.316	-1.30
CEOX vs. %exp	b > 0	%exp = 0.977 - 0.0191*CEOX	14	1.761 1.345	-4.27
ManEd vs. Exporting	b > 0	Exporting = 0.655 + 0.147*ManEd	24	1.711 1.318	1.22
ManEd vs. %exp	b > 0	%exp = 0.347 + 0.183*ManEd	14	1.761 1.345	2.37
%ManEd vs. Exporting	b > 0	Exporting = 0.657 + 0.800*%ManEd	24	1.711 1.318	1.22
%ManEd vs. %exp	b > 0	%exp = 0.313 + 1.29*%ManEd	14	1.761 1.345	3.73
CEOEd vs. Exporting	b > 0	Exporting = 0.739 - 0.406*CEOEd	25	1.708 1.316	-1.43
CEOEd vs. %exp	b > 0	%exp = 0.437 + 0.483*CEOEd	14	1.761 1.345	1.65
ManX vs. Emp	b > 0	Emp = 2.9 + 22.3*ManX	25	1.708 1.316	3.93
ManX vs. TLSales	b > 0	TLSales = -415 + 5265*ManX	21	1.721 1.323	2.58
%ManX vs. Emp	b > 0	Emp = 90.9 - 64.0*%ManX	25	1.708 1.316	-2.05

Table 6 cont.

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
%ManX vs. TLSales	b > 0	TLSales = 25296 - 22576*%ManX	21	1.721 1.323	-2.34
CEOX vs. Emp	b > 0	Emp = 76.1 - 0.90*CEOX	25	1.708 1.323	-0.81
CEOX vs. TLSales	b > 0	TLSales = 31488 - 721*CEOX	21	1.721 1.323	-2.31
ManEd vs. Emp	b > 0	Emp = 32.2 + 40.4*ManEd	24	1.711 1.318	3.21
ManEd vs. TLSales	b > 0	TLSales = 2672 + 16710*ManEd	20	1.725 1.325	5.70
%ManEd vs. Emp	b > 0	Emp = 43.6 + 81.0*%ManEd	24	1.711 1.318	1.01
%ManEd vs. TLSales	b > 0	TLSales = 7399 + 42700*%ManEd	20	1.725 1.325	1.76
CEOEd vs. Emp	b > 0	Emp = 48.6 + 20.8*CEOEd	25	1.708 1.316	0.61
CEOEd vs. TLSales	b > 0	TLSales = 10170 + 6623*CEOEd	21	1.721 1.323	0.63

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

nor %ManX is significantly related to either measure of export activity. Further, the strength of the negative relationship between Exporting and CEOX suggests that CEO experience may actively discourage export activity. This finding could possibly indicate that older and more experienced CEOs are more risk averse and wary of change, particularly when these CEOs have a financial stake in the mill and are nearing retirement. On the whole then, it seems that managerial experience does nothing to enhance export activity, and may actually hinder it.

On the other hand, managerial education seems to be positively related to export activity, as expected from chapter two (see pp. 24-25). Significant positive relationships were found between ManEd and %exp, %ManEd and %exp, and (at the 90 percent level of confidence) between CEOEd and %exp. Also, $t_b > 1$ for the remaining correlations, with the notable exception of CEOEd and Exporting, for which $t_b < -1$. Taken together, however, the results seem to confirm that managerial education and export activity are significantly related. Thus, it seems clear that managerial experience and education have a significant effect on export activity, though not in the way that was expected in the case of experience.

Moreover, the results generally indicate that managerial experience and education are related to firm size. From the results in Table 6, it can be seen that the number of experienced managers increases with firm size, but the proportion decreases with firm size, thus suggesting that the

number of experienced managers in a mill increases with size but at a decreasing rate. Moreover, it appears that the experience of mill CEOs increases as firm size decreases. However, neither ManX nor %ManX was found to be significantly related to either measure of export activity. Hence, it can be concluded that managerial experience, acting through the experience level of the CEO, has a significant influence on export activity through firm size. As mill size increases, the experience of the CEO decreases and hence level of export activity increases. Note that this is the converse of expectations derived from the literature, in which it was predicted that as mill size increase, the experience of the CEO increases, resulting in an increase in export activity (see p. 51).

In addition, it appears that managerial education and firm size are significantly correlated, as expected from chapter three (see p. 51). Correlations between ManEd and %ManEd and the mill size variables suggest that, overall, managerial education is a good predictor of mill size. Moreover, as noted above, ManEd and %ManEd are positively correlated with export activity. Hence, on the whole it can be concluded that the presence of educated managers (i.e. those with a university degree) and the proportion of educated managers in a mill affect the level of export activity of the mill through firm size. Moreover, the level of experience of the CEO significantly affects export behavior through mill size. Taken as a whole then, hypothesis six may be accepted.

5.7 Hypothesis Seven

As indicated earlier, evidence exists in the literature which suggests that a firm's level of marketing skill is related both to export activity and firm size (see pp. 25-28, 51-53). However, the empirical analysis of this study does not confirm this evidence. From Table 7, it seems clear that no significant positive correlation exists between marketing skill and export activity, despite the use of two different variables to represent marketing skill. In fact, a strong negative relationship appears to exist between MArea and %exp.

Furthermore, results are mixed as to whether marketing skill and firm size are significantly related. MEmp appears to be significantly correlated with firm size, thereby indicating that larger firms have larger marketing departments. But, MArea and firm size do not seem to be strongly linked (though MArea and Emp are significantly correlated at the 90 percent level of confidence). Hence, no conclusion can be drawn about the relationship between marketing skill and firm size in this study. On the whole then, hypothesis seven must be rejected, and it is concluded that marketing skill does not linked firm size to export activity.

5.8 Hypothesis Eight

The eighth hypothesis made in this study is that export-related information serves as a link between firm size and

Table 7: Regression Results for Marketing Skill

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
MEmp vs. Exporting	b > 0	Exporting = 0.506 + 0.0750	24	1.711 1.318	1.09
MEmp vs. %exp	b > 0	%exp = 0.569 - 0.0326*MEmp	13	1.771 1.350	-0.61
MArea vs. Exporting	b > 0	Exporting = 0.500 + 0.250*MArea	25	1.708 1.316	1.15
MArea vs. %exp	b > 0	%exp = 0.820 - 0.438*MArea	14	1.761 1.345	-2.74
MEmp vs. Emp	b > 0	Emp = -5.0 + 21.8*MEmp	24	1.711 1.318	3.89
MEmp vs. TLSales	b > 0	TLSales = -4843 + 6823*MEmp	20	1.725 1.325	3.62
MArea vs. Emp	b > 0	Emp = 23.0 + 36.3*MArea	25	1.708 1.316	1.45
MArea vs. TLSales	b > 0	TLSales = 7682 + 4663*MArea	21	1.721 1.323	0.57

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

export activity. As noted in chapters two and three, much evidence exists that the amount of export-related information possessed by a firm has a significant effect on export behavior and is correlated with firm size (see pp. 28-31, 53-54). Four characteristic variables are used to analyze this significance of this factor: Lang, FStud, FNews, and Trav. The results of this analysis are given in Table 8. From Table 8, it can be seen that for the most part export-related information is not a good predictor of export activity. FStud and FNews are correlated with neither Exporting nor %exp. Further, though Lang is significantly correlated with %exp, it is not correlated with Exporting. However, Trav is significantly correlated with both Exporting and %exp. These results suggest that certain types of export-related information may have a more significant effect in determining export activity than others. Specifically, information gathered while travelling, such as data on customers and foreign distribution systems, may be much more important in determining export activity than cultural and social information gathered through language training and foreign study.

Moreover, it seems that only certain types of export-related information are correlated with firm size. From Table 8, it is easily seen that FStud and FNews are very strongly correlated with firm size. However, no significant correlation exists between Trav and firm size. On the whole then, hypothesis eight should be rejected. Trav is correlated with export activity but not firm size, and FStud and FNews

Table 8: Regression Results for Export-Related Information

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
Lang vs. Exporting	b > 0	Exporting = 0.763 - 0.132*Lang	23	1.714 1.319	-1.13
Lang vs. %exp	b > 0	%exp = 0.413 + 0.293*Lang	13	1.771 1.350	2.07
FStud vs. Exporting	b > 0	Exporting = 0.636 + 0.102*FStud	23	1.714 1.319	1.19
FStud vs. %exp	b > 0	%exp = 0.434 + 0.0597*FStud	13	1.771 1.350	0.95
FNews vs. Exporting	b > 0	Exporting = 0.634 + 0.0403*FNews	23	1.714 1.319	1.30
FNews vs. %exp	b > 0	%exp = 0.432 + 0.0231*FNews	13	1.771 1.350	1.07
Trav vs. Exporting	b > 0	Exporting = 0.528 + 0.0243*Trav	23	1.714 1.319	1.83
Trav vs. %exp	b > 0	%exp = 0.203 + 0.0265*Trav	13	1.771 1.350	2.69
Lang vs. Emp	b > 0	Emp = 44.8 - 0.7*Lang	23	1.714 1.319	-0.06
Lang vs. TLSales	b > 0	TLSales = 10042 - 5228*Lang	19	1.729 1.328	-0.89
FStud vs. Emp	b > 0	Emp = 21.0 + 32.9*FStud	23	1.714 1.319	5.32
FStud vs. TLSales	b > 0	TLSales = 1321 + 11767*FStud	19	1.729 1.328	7.21
FNews vs. Emp	b > 0	Emp = 24.4 + 10.9*FNews	23	1.714 1.319	4.38

Table 8 cont.

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
FNews vs. TLSales	b > 0	TLSales = 3324 + 3638*FNews	19	1.729 1.328	4.83
Trav vs. Emp	b > 0	Emp = 41.2 + 0.44*Trav	23	1.714 1.319	0.29
Trav vs. TLSales	b > 0	TLSales = 8742 + 35*Trav	19	1.729 1.328	0.08

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

are correlated with firm size but not export activity. Lang is correlated with neither firm size nor export activity. These results show that the types of export information that are important in determining export behavior are not related to mill size, and the types of export information related to mill size are not related to export activity. Consequently, hypothesis eight must be rejected.

5.9 Hypothesis Nine

The final firm characteristic hypothesized to link firm size to export activity in this study is managerial attitudes and ambition, as discussed on page 54 . Two characteristic variables were used in the analysis of this hypothesis, on representing attitudes (Out) and the other measuring ambition (Expand). From Table 9 it can be seen that both Out and Expand significantly differentiate exporters from nonexporters, but have no bearing on the quantity that a firm exports., Hence, it can be tentatively concluded that managerial attitudes and ambition have a significant influence on export activity, at least insofar as is separates exporters from nonexporters.

Moreover, it can be tentatively concluded that managerial attitudes and ambition are related to firm size. The correlations between Out and Emp, Out and TLSales, and Expand and TLSales are all significant at the 90 percent level of confidence, but not at the 95 percent level of confidence. The fourth correlation, which is between Expand and Emp, is

Table 9: Regression Results for Managerial Attitudes and Ambition

Correlation (x vs. y)	Predicted Relationship (y = a + bx)	Regression Equation	df	t_c a = .05 a = .10	t_b
Out vs. Exporting	b > 0	Exporting = 0.500 + 0.417*Out	25	1.708 1.316	2.47
Out vs. %exp	b > 0	%exp = 0.450 + 0.029*Out	14	1.761 1.345	0.17
Expand vs. Exporting	b > 0	Exporting = 0.000 + 0.900*Expand	25	1.708 1.316	7.06
Expand vs. %exp	b > 0	None; Expand is constant in this regression	na	na	na
Out vs. Emp	b > 0	Emp = 36.7 + 30.9*Out	25	1.708 1.316	1.46
Out vs. TLSales	b > 0	TLSales = 5370 + 11406*Out	21	1.721 1.323	1.66
Expand vs. Emp	b > 0	Emp = 30.2 + 27.0*Expand	25	1.708 1.316	1.06
Expand vs. TLSales	b > 0	TLSales = 2455 + 11850*Expand	21	1.721 1.323	1.52

df denotes degrees of freedom
t_c denotes the critical t-values
t_b denotes the t-ratio for the regression coefficient

not statistically significant, but its t_b is greater than 1. Thus, it can be tentatively concluded that managerial attitudes and ambition are correlated with firm size. Hence, hypothesis nine can be accepted, and it can be concluded that managerial attitudes and ambition link firm size to export activity.

In summary then, of the nine hypotheses derived from the literature on how firm size affects export activity, three were accepted and six were rejected. The survey results indicated that hypotheses four, six and nine could be tentatively accepted, but that hypotheses one, two, three, five, seven and eight should be rejected. These results indicate that in New Zealand's lumber industry, mill size could be associated with export activity because of associations between mill size and legal structure, managerial experience and education, and managerial attitudes and ambition. However, proximity to a city, product quality, production cost, foreign ownership, marketing skill and export-related information are either not associated with mill size or not with export activity in New Zealand's lumber industry. The implications of these results will be discussed in the upcoming chapter.

CHAPTER SIX

CONCLUSIONS

The results of the analyses in chapter five showed that three firm characteristics are correlated with both export activity and mill size in New Zealand's lumber industry and that six other characteristics which were expected to be correlated were not. Two main results follow from these facts. First, these results provide support for Cavusgil's (1984) hypothesis that firm size is indirectly related to export activity (see pp. 11-12). The results did indicate that some firm characteristics are related to both mill size and mill export activity.

Secondly though, the results of this study, when compared to the results of other researchers, indicate that the specific characteristics related to export activity vary with industry and region. Each of the nine characteristics tested in this study were examined by other researchers and found to be important predictors of export activity. Of these, however, only six were found to be significant or possibly significant in this study. Similarly, some support could be found to contend that each of these nine characteristics could be related to firm size, but only six were found to be at least possibly significant. Thus, whether a particular firm characteristic correlates firm size to export activity may depend on which industry in which country is being considered.

These results form the basis for drawing conclusions about how firm size is related to export activity.

6.1 Firm Characteristics, Export Activity and Firm Size in New Zealand's Lumber Industry: Conclusions

From chapter five it is known that three firm characteristics link mill size and export activity in New Zealand's lumber industry: legal structure, managerial experience and education, and managerial attitudes and ambition. Six other characteristics, however, were expected to be links, but did not turn out to be significantly correlated with export activity or mill size. These deviations of empirical results from predicted results are examined here, and possible explanations for the discrepancies are given. On the whole, it is expected that these deviations are the result of normal variations between industries in the influence that different characteristics have on export activity or firm size.

6.1.1 Proximity to a City

a. Proximity to a city and export activity: As noted in chapters two and three, the distance of a firm from a city can have a significant influence on its export behavior by affecting transport costs and access to information and financial services. Some previous research offers support for this hypothesis (e.g., Hirsch, 1967). Also, to some degree the results of this research indicate that proximity to a city affects export activity. It was found that the closer a firm

was to a city, the more likely it was to be an exporter. However, distance from a city was not a significant factor in predicting how much an exporting firm exported (in terms of proportion of output). These results tend to conform to the predictions made in chapter two.

b. Proximity to a city and firm size: In chapter three it was found that much evidence exists to support the supposition that mill size and proximity to a city are likely to be related in New Zealand's lumber industry. This conclusion follows directly from a model proposed by Juarez and Romero (1986) and it accords with observations made on the U.S. lumber industry on the locational aspects of mill competitiveness. However, no evidence could be found that mill size and location are related in New Zealand's lumber industry. The results of this study give no indication as to why this result occurred. However, it might be speculated that most mills in New Zealand are located close enough to cities so that transport costs are not a significant source of competitive advantage or disadvantage. Since New Zealand is a relatively small country, most places are probably relatively close to a city.

6.1.2 Product Quality

a. Product quality and export activity: Chapters two and three showed that a number of studies found correlations between product quality and export activity, and that product quality in the lumber industry is strictly assessed and has a

substantial impact on prices. However, the results of this study are less certain as to whether product quality and export activity are related. The results are not statistically significant, but come close to being so for the two measures of export activity used. Thus, it is not appropriate to say that these results challenge results obtained by other researchers, but on the other hand they do not lend clear support.

b. Product quality and firm size: The empirical analysis in this study did not reveal a statistically significant relationship between mill size and product quality. This result is in line with the conclusion drawn in chapter three that no prediction could be made as to how mill size might influence product quality in the lumber industry.

6.1.3 Production Cost

a. Production cost and export activity: On the whole, the literature indicated that production costs should be a significant predictor of export activity in New Zealand's lumber industry. A couple of studies indicated that production cost was a critical component of a firm's competitive advantage, made even more crucial for export success by the competitive nature of Australia's lumber market. However, the results obtained in this study do not indicate that there is a negative relationship between export activity and production cost. Production cost, including or excluding raw material costs, seems to have no bearing on the

level of export activity in New Zealand's lumber industry.

This result is not the predicted result, which was based upon the export behavior model set out in appendix 1. According to this model, a firm should undertake more and more export activity the further to the right that its supply curve is located. However, it will be recalled that this result depended upon certain conditions holding, particularly that the industry be characterized by inelastic demand or that international marketing and shipping costs be low relative to the foreign price level for the commodity. These conditions may not hold for New Zealand's lumber industry with respect to the Australian market. The competitive nature of the Australian lumber market and the relatively high shipping costs New Zealanders face make it unlikely that the proper conditions will hold for low production costs to increase export activity by New Zealand producers.

b. Production cost and firm size: In chapter three, it was noted that technological advances over the years have made scale economies more important in the lumber industry, especially in countries where the industry is capital-intensive. Abel (1977) notes that New Zealand's lumber industry is characterized by a significant degree of scale economies. These findings suggest a relationship between production cost and mill size. However, no correlation could be found between mill size and export activity in this study. This result is puzzling since it directly contradicts Abel, and suggests that more research is needed as to the nature of

scale economies in the lumber industries of capital-intensive countries.

6.1.4 Legal Structure

a. Legal structure and export activity: In chapters two and three it was speculated that legal structure and export activity might be significantly correlated. Certain legal forms (e.g., corporations) have a greater variety of ways of raising capital and are better suited to risk-taking than other forms. Little research, however, has been done on this point. Nevertheless, the results of this study seem to support these speculations. The results indicate that the legal form that a firm takes has a significant influence on whether or not it exports.

b. Legal structure and firm size: It was also predicted in chapter three that legal structure and mill size would be related, owing of the fact that corporations have a wider array of methods for raising capital than other firms. These speculations, too, were verified by the results of this survey. Incorporated mills were found to be significantly larger than unincorporated mills.

6.1.5 Foreign Ownership

a. Foreign ownership and export activity: The literature has not generally considered the relationship between foreign ownership and export activity, but what does exist suggests a significant degree of correlation. Joint or

total foreign ownership can provide a firm with valuable information on foreign cultures and markets, as well as important technical information. Some evidence was found suggesting that these advantages are particularly valuable in New Zealand's lumber industry. Nevertheless, no evidence could be found in this study that suggests that joint or total foreign ownership has any influence on export activity. This result could indicate that much of the information available from foreign owners may not be important to successful exporting in the lumber industry. More research is necessary before any definite conclusions can be made as to how foreign ownership relates to export activity.

b. Foreign ownership and firm size: It was predicted in chapter three that larger firms were more likely to be jointly or wholly foreign-owned than smaller firms, since larger firms are more likely to attract the attention of foreign investors and since foreign investment must increase the size of a firm. This expectation has been verified by the results obtained in this survey. Thus, it seems that mills that are jointly or wholly foreign-owned tend to be larger than locally-owned firms.

6.1.6 Managerial Experience and Education

a. Managerial experience and education and export activity: As noted in chapter two, managerial quality, as reflected by experience, has been found to be an important predictor of export activity by many researchers. Managers

with higher levels of experience would tend to have more skill in managing business and would be more knowledgable about the industry as a whole, thereby making them more competitive and better able to compete in foreign markets. Hence, it was expected that firms with more experienced managers would show higher levels of export activity.

In fact, if anything the opposite was found to be true. It was found in this survey that firms with a more highly experienced chief executive were significantly less likely to export than firms with a less experienced CEO. This result suggests that as CEOs gain experience, they may become more risk averse and hence less likely to approve export ventures. This would especially be true if the CEO had a financial stake in the firm, since s/he would become more concerned about the security of his/her retirement income as s/he grew older and gained more experience.

Also in chapter two it was noted that the level of managerial education might be significantly related to export activity since several studies had shown this to be a significant differentiating factor between exporters and nonexporters. This result is largely supported by the results of this study. Thus, it seems clear that managerial education level has a significant influence on a firm's level of export activity. Firms with a better educated managerial staff show higher levels of export activity than firms with less-educated managers.

b. Managerial experience and education and firm size:

In chapter three it was hypothesized that firm size and managerial experience and education are likely to be related. It was thought that more experienced and better educated managers were likely to increase the efficiency of firms, resulting in higher levels of firm growth and over time resulting in larger firm size. Also, larger firms tend to involve more complex operations and hence require more highly skilled managers.

However, it was found that mill size and CEO experience are negatively related. That is, smaller mills tended to have more experienced CEOs than larger mills. This result might be explained as follows. Larger mills might have a chief executive who has less experience in the lumber industry because at the CEO level in a large mill, industry experience is not as critical to success as general experience in business administration. Hence, people with little lumber mill experience but plenty of administrative experience in other industries might be more qualified to run a large mill than someone with many years of experience in the lumber industry but no administrative experience. On the other hand, operating a smaller mill successfully might require a lot of technical skill, for which working experience in the industry is essential. Hence, CEOs at larger mills might require less actual working experience in the industry than CEOs at smaller mills.

On the other hand, managerial education and mill size were found to be positively correlated, as expected from the literature reviewed in chapter three. Thus, it can be

concluded that larger mills tend to have managers who are better educated but less experienced than those at smaller mills.

6.1.7 Marketing Skill

a. Marketing skill and export activity: The issue of whether marketing skill affects export behavior has been widely explored in the literature. In terms of size of marketing staff, size of domestic market area, and the extent to which the firm uses market research, the literature has generally concluded that marketing skill and export activity are directly related. Moreover, it appears that these skills are necessary in order for New Zealand mills to compete in Australia's lumber market. Thus, it is very surprising that no correlation could be found between marketing skill and export activity in this study. It may be that marketing skill is not as critical to exporting success by New Zealand mills as originally thought. In any case, the fact that numerous other researchers have found a direct relationship between marketing skill and export activity suggests that more research on this point is needed.

b. Marketing skill and firm size: It was speculated in chapter three that firm size and marketing skill were likely to be correlated. This is because larger firms were believed to have larger marketing staffs and hence a marketing staff with a broader range of skills and experience. Also, larger firms are expected to have a history of growth, and to have

gained marketing experience as a result of entering new market areas and attracting new customers. However, no empirical relationship could be found between firm size and size of market area, though larger mills did tend to have larger marketing staffs. Hence, the results of the empirical analysis are unclear, and no conclusions can be drawn.

6.1.8 Export-Related Information

a. Export-related information and export activity: How export-related information influences export activity has also been analyzed by numerous researchers. In particular, two types of data seem important: information on foreign culture, consumer preferences and ways of doing business; and information on economic conditions and opportunities in foreign markets. A third type of data, information on the technical aspects of exporting, also was analyzed in the literature but is not considered here. The empirical results indicated that cultural information, as measured by language training and foreign study by managers, was not a very significant predictor of export activity in New Zealand's lumber industry. Information on customers and economic conditions, however, as measured by the number of times managers travelled abroad over the past five years, was significant. These results are not surprising since cultural information is probably far less critical to the marketing of lumber than to the marketing of consumer goods. However, familiarity with the needs of buyers and with the distribution system may be crucial even in the lumber industry.

b. Export-related information and firm size: In chapter three it was speculated, in part based on results from O'Rourke (1985), that the amount of data that a firm has on export-related matters depends to a large degree on firm size. Larger firms tend to have more managers and hence a greater pool of knowledge and experience. Hence, it was supposed that larger firms would tend to have a greater range of export-related information because of the previous experience and education of managers. Indeed, it turns out that larger firms do have more managers who have lived abroad and who read foreign periodicals. However, at least for New Zealand's lumber industry, the information provided from these sources is not very useful in encouraging exporting. Still, in other industries such information might be useful. Thus, it can be concluded that larger firms do tend to have a greater amount of export-related information than smaller firms, owing to the larger size of the managerial staff.

6.1.9 Managerial Attitudes and Ambition

a. Managerial attitudes and ambition and export activity: Many researchers have studied how managerial attitudes and ambition affect the level of export activity of the firm. In general, it was found that firms with a dynamic management team concerned more with long-run profits and stability than with short-run gains were more frequently exporters than firms with a sluggish managerial staff. These expectations were verified for the New Zealand lumber industry in this study. Thus, it can be concluded that managerial

attitudes and ambition are significantly associated with export behavior.

b. Managerial attitudes and ambition and firm size: It was also supposed that managerial attitudes and ambition affected firm size. Firms with more dynamic managers on the whole are expected to be more efficient and to react more intelligently to market opportunities than other firms. Thus, they are expected to experience higher levels of growth and thus on the whole be larger than other firms. As it happens, these speculations largely held true for New Zealand's lumber industry. Thus, it can be concluded that managerial attitudes and ambition are related to firm size.

6.2 Using Firm Size as a Predictor of Export Activity

Consequently then, for the most part expectations about how various firm characteristics are related to export activity and firm size held, with acceptable and explainable deviations owing to the uniqueness of the lumber industry in New Zealand. In some cases, there is need for more research with more rigorous testing, but for the most part it seems clear that firm size has an indirect association with export activity in New Zealand's lumber industry through at least three firm-level characteristics. This result supports the contention of Cavusgil (1984) that firm size is best considered as being indirectly related to export activity, related to export activity through links with other factors.

However, this result does not mean that firm size could or should be used by researchers and policymakers as a predictor of export activity. Firm size is at best a secondary indicator of export activity since it has its influence through relationships with other variables. This presents two problems with using firm size as a predictor of export activity. The first problem results from the fact that correlation does not imply causation. In some cases, firm size may be a determinant of the value of a firm characteristic, in others it may be determined by the value of the variable, and in still other cases the two variables may determine each other in a nonlinear fashion. Thus, though in many, if not most, cases firm size and export activity are correlated, very little more can be said about the relationship between these two variables without extensive analysis involving an examination of all the variables that might possibly be related to export activity and firm size, an analysis much the same as that conducted in this study.

The second problem related to using firm size as a predictor of export activity is that the variables linking firm size and export activity may vary with industry, place and time. In the analysis conducted in this paper for example, nine variables were examined for which a case could be made that they related both to export activity and firm size. In the end however, only three of these variables were found to actually link firm size and export activity in New Zealand's lumber industry. To a large extent, the failure of the other six variables to be links between export activity

and firm size results from the fact that the New Zealand lumber industry in October 1993 represents a specific industry at a specific place and time, and that as these parameters are changed the significance of these variables to firm size and export activity may change. Differences in time, place and industry studied may account for many of the contradictory results obtained in the literature on the significance of different variables in predicting export activity. In this way too then, very little can be said about the relationship between firm size and export activity without conducting a thorough analysis, holding industry, time and place constant.

Consequently then, it is the recommendation of this study that firm size should largely be discarded by policymakers and scholars as a general predictor of export activity. Since firm size affects export activity only through other variables, and since the nature of these relationships vary with time, place and industry, the nature of the relationship between firm size and export activity can only be described through an analysis of the type used in this paper. This type of analysis involves looking at every firm characteristic that can be related to export activity and firm size for a specific industry at a specific time and place. General conclusions on how firm size affects export activity, transcending time, place and industry, are impossible to draw. On the whole then, for most purposes firm size is an unreliable and meaningless predictor of export activity.

APPENDIX 1

THE FIRM EXPORT BEHAVIOR MODEL

Sufficient conditions can be found for an increase in demand to cause a decrease in exporter surplus, and for increases in supply and in foreign price level to cause increases in export surplus. Most of these conditions turn out to be reasonable enough that they can be provisionally accepted as applying to most situations. The remaining conditions do not invalidate the hypotheses made about the dynamics of the model, but their complete analysis and interpretation are beyond the scope of this paper. For the purposes of this research then, it will suffice to assume that all the sufficient conditions derived below hold.

First, it is necessary to discuss what is meant by exporter surplus. Exporter surplus in this research serves as an indicator of export behavior, and is defined as the difference between the producers surplus a firm could earn by exporting, and the producers surplus it could earn by not exporting. In Figure 1 (p. 6), producers surplus in the exporting case is the area of region EGD, and producers surplus in the nonexporting case is area ABCD. These two areas share area EHCD in common. Hence, exporter surplus X can be said to be:

$$X = A(HGC) - A(ABHE)$$

where A(x) = area of region x in Figure 1.

Thus, it is sufficient to show that A(HGC) increases and A(ABHE) decreases in order to conclude that exporter surplus increases. Likewise, in order to conclude that X decreases, it is sufficient to show that A(HGC) decreases and A(ABHE) increases.

Now, consider the effect of a shift in the demand curve on exporter surplus, as shown in Figure A1. From Figure A1, it appears that the area of ABHE increases and the area of HGC decreases as a result of the shift in the demand curve. In the case of Figure A1 then, exporter surplus appears to decrease as a result of the shift in the demand curve.

However, this observation does not constitute a complete mathematical analysis of the dynamics of an increase in demand. It merely suggests that we are on the right track. Suppose then that the inverse domestic demand function faced by the firm is

$$p_h = D(q_h, \hat{x})$$

where $\hat{x} = \langle x_1, x_2, \ldots, x_n \rangle$ (a set of factors affecting domestic demand, such as consumer tastes),

q_h = quantity sold on the home market,

p_h = home market price

and that the firm's cost function is $C = C(Q, \hat{y})$,

where $Q = q_h + q_f$,

q_f = quantity sold on the foreign market,

$\hat{y} = \langle y_1, y_2, \ldots, y_n \rangle$ (a set of factors affecting cost, such as input prices).

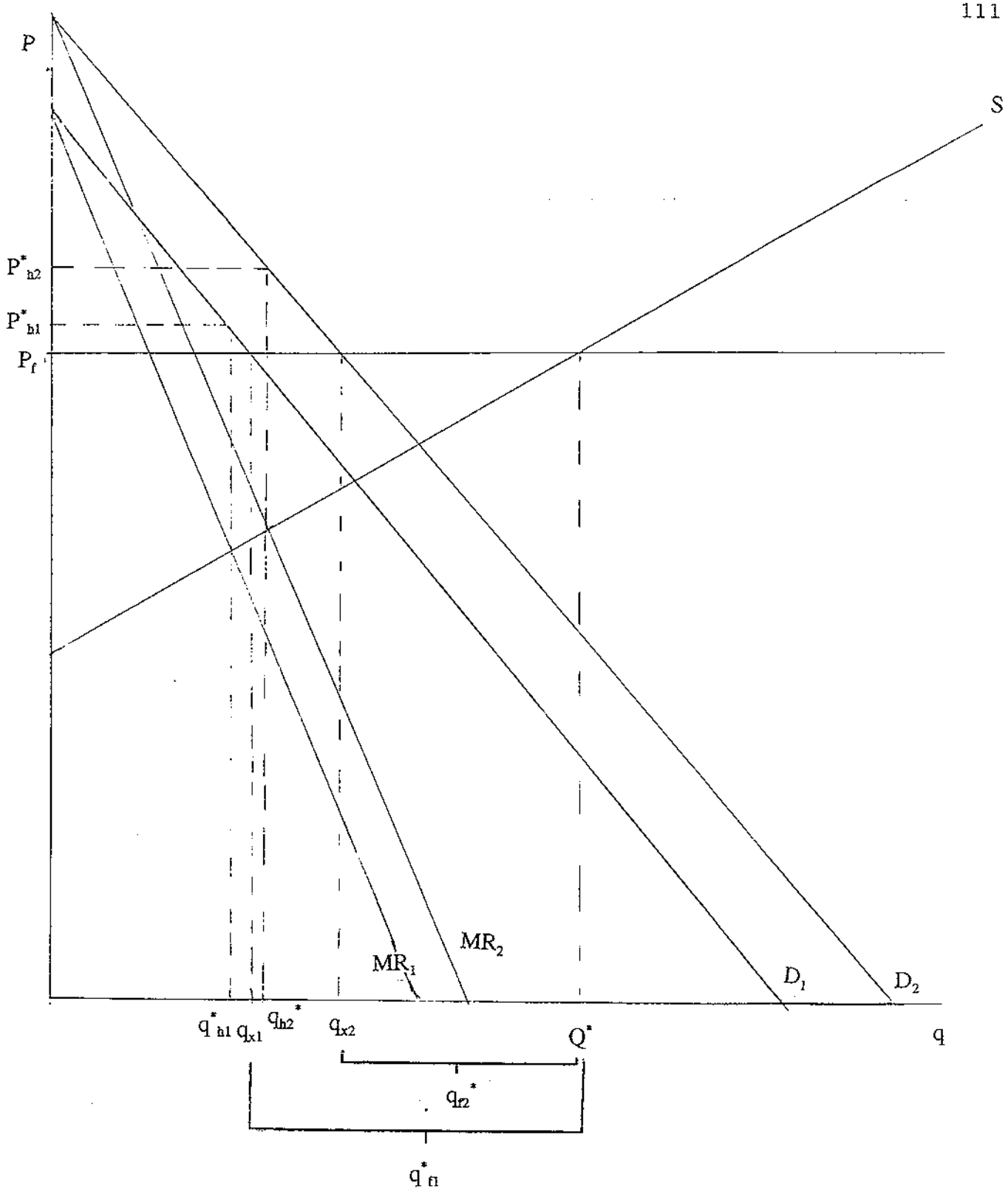

FIGURE A1 : Increase in domestic demand and a change in exporter surplus

Moreover, it is assumed that $x_1, \ldots, x_n, y_1, \ldots, y_n, p_f$, and q are all independent of each other, so that

$$\frac{\partial x_i}{\partial y_j} = 0 \quad \text{and} \quad \frac{\partial y_j}{\partial x_i} = 0 \quad \text{for all } i \text{ and } j$$

$$\frac{\partial x_i}{\partial x_j} = 0 \quad \text{and} \quad \frac{\partial y_i}{\partial y_j} = 0 \quad \text{for all } i \neq j$$

$$\frac{\partial x_i}{\partial p_f} = 0, \quad \frac{\partial y_j}{\partial p_f} = 0, \quad \frac{\partial p_f}{\partial x_i} = 0, \quad \text{and} \quad \frac{\partial p_f}{\partial y_j} = 0 \quad \text{for all } i \text{ and } j$$

$$\frac{\partial x_i}{\partial q} = 0, \quad \frac{\partial y_j}{\partial q} = 0 \quad \text{and} \quad \frac{\partial p_f}{\partial q} = 0 \quad \text{for all } i \text{ and } j$$

With these definitions and assumptions made, we can define areas ABHE and HGC in Figure 1 as follows:

$$A(ABHE) = q_h^*(x, y)[D(q_h^*(x, y), x) - p_f]$$

$$A(HGC) = \int_{D^{-1}(p_f, \hat{x})}^{Q^*(p_f, \hat{x}, \hat{y})} \int_{\frac{\partial C(Q, \hat{y})}{\partial Q}}^{p_f} dp\, dQ = \int_{D^{-1}(p_f, \hat{x})}^{Q^*(p_f, \hat{x}, \hat{y})} [p]_{\frac{\partial C(Q, \hat{y})}{\partial Q}}^{p_f} dQ = \int_{D^{-1}(p_f, \hat{x})}^{Q^*(p_f, \hat{x}, \hat{y})} p_f\, dQ - \int_{D^{-1}(p_f, \hat{x})}^{Q^*(p_f, \hat{x}, \hat{y})} \frac{\partial C(Q, \hat{y})}{\partial Q}\, dQ$$

$$= p_f(Q^*(p_f, \hat{x}, \hat{y}) - D^{-1}(p_f, \hat{x})) - [C(Q, \hat{y})]_{Q = D^{-1}(p_f, \hat{x})}^{Q = Q^*(p_f, \hat{x}, \hat{y})} = p_f(Q^*(p_f, \hat{x}, \hat{y}) - D^{-1}(p_f, \hat{x}))$$

$$- (C(Q^*(p_f, \hat{x}, \hat{y}), \hat{y}) - C(D^{-1}(p_f, \hat{x}), \hat{y})) = p_f D^{-1}(p_f, \hat{x}) + p_f q_f^*(p_f, \hat{x}, \hat{y}) - p_f D^{-1}(p_f, \hat{x}) - C(Q^*(p_f, \hat{x}, \hat{y}) + C(D^{-1}(p_f, \hat{x}), \hat{y})$$

$$= p_f q_f^*(p_f, \hat{x}, \hat{y}) + C(D^{-1}(p_f, \hat{x}), \hat{y}) - C(Q^*(p_f, \hat{x}, \hat{y}), \hat{y})$$

where $q_h^*(\hat{x}, \hat{y})$ is the value of q_h which maximizes profit if the firm chooses not to export;

$D^{-1}(p, \hat{x})$ is the domestic demand function ($D(q, \hat{x})$ is assumed to be one-to-one and onto in the p-q plane);

$q_f^*(p_f, \hat{x}, \hat{y})$ is the value of q_f that maximizes profit if the firm chooses to export;

$$Q^*(p_f, \hat{x}, \hat{y}) = q_x + q_f^*(p_f, \hat{x}, \hat{y}) = D^{-1}(p_f, \hat{x}) + q_f^*(p_f, \hat{x}, \hat{y}); \text{ and}$$

q_x is the amount sold on the home market when the firm exports (assumed to be $D^{-1}(p_f, \hat{x})$, i.e. the firm satiates the home market before exporting).

Thus,

$$X(p_f, \hat{x}, \hat{y}) = p_f q_f^*(p_f, \hat{x}, \hat{y}) + C(D^{-1}(p_f, \hat{x}), \hat{y}) - C(Q^*(p_f, \hat{x}, \hat{y}), \hat{y}) - q_h^*(\hat{x}, \hat{y})[D(q_h^*(\hat{x}, \hat{y}), \hat{x}) - p_f].$$

Now, suppose that domestic demand increases. That is, the domestic demand curve shifts out. This can be represented mathematically by assuming that for some $x_i \in x_1, \ldots, x_n$,

$$\frac{\partial D(q_h, \hat{x})}{\partial x_i} > 0 \quad \text{and} \quad \frac{\partial D^{-1}(p_h, \hat{x})}{\partial x_i} > 0$$

The effect on exporter surplus can then be found by finding $\frac{\partial X(p_f, \hat{x}, \hat{y})}{\partial x_i}$. If $\frac{\partial X}{\partial x_i} > 0$, then an increase in domestic demand increases exporter surplus, and if $\frac{\partial X}{\partial x_i} < 0$, then an increase in domestic demand decreases exporter surplus. If the result is ambiguous, then conditions may be found which, if applicable, would make $X > 0$ or $X < 0$.

As it turns out, direct analysis of $\frac{\partial X(p_f, \hat{x}, \hat{y})}{\partial x_i}$ does not lend itself to easy interpretation. However, in order to show that

$\frac{\partial X(p_f, \hat{X}, \hat{Y})}{\partial X_i} < 0$, it is sufficient to show that $\frac{\partial A(HGC)}{\partial X_i} < \frac{\partial A(ABHE)}{\partial X_i}$.

The proof of this is simple:

$$X(p_f, \hat{X}, \hat{Y}) = A(HGC) - A(ABHE) \Rightarrow \frac{\partial X}{\partial X_i} = \frac{\partial A(HGC)}{\partial X_i} - \frac{\partial A(ABHE)}{\partial X_i}$$

$$\Rightarrow \frac{\partial X}{\partial X_i} < 0 \quad \text{iff} \quad \frac{\partial A(HGC)}{\partial X_i} - \frac{\partial A(ABHE)}{\partial X_i} < 0$$

$$\text{ie: } \frac{\partial A(HGC)}{\partial X_i} < \frac{\partial A(ABHE)}{\partial X_i}$$

Further, in order to show that $\frac{\partial A(HGC)}{\partial X_i} < \frac{\partial A(ABHE)}{\partial X_i}$, it is sufficient to show that $\frac{\partial A(HGC)}{\partial X_i} < 0$ and $\frac{\partial A(ABHE)}{\partial X_i} > 0$. Making certain assumptions, this can be shown to be the case.

Partially differentiating A(ABHE) and A(HGC) with respect to x_i, we get

$$\frac{\partial A(ABHE)}{\partial X_i} = \frac{\partial q_h^*(\hat{X}, \hat{Y})\, D(q_h^*(\hat{X}, \hat{Y}), \hat{X})}{\partial X_i} - \frac{\partial p_f q_h^*(\hat{X}, \hat{Y})}{\partial X_i}$$

$$= q_h^*(\hat{X}, \hat{Y}) \frac{\partial D(q_h^*(\hat{X}, \hat{Y}), \hat{X})}{\partial X_i} + D(q_h^*(\hat{X}, \hat{Y}), \hat{X}) \frac{\partial q_h^*(\hat{X}, \hat{Y})}{\partial X_i} - p_f \frac{\partial q_h^*(\hat{X}, \hat{Y})}{\partial X_i}$$

$$\frac{\partial A(HGC)}{\partial X_i} = p_f \frac{\partial q_f^*(p_f, \hat{X}, \hat{Y})}{\partial X_i} + \frac{\partial C(D^{-1}(p_f, \hat{X}), \hat{Y})}{\partial X_i} - \frac{\partial C(Q^*(p_f, \hat{X}, \hat{Y}), \hat{Y})}{\partial X_i}$$

$$= p_f \frac{\partial q_f^*(p_x, \hat{X}, \hat{Y})}{\partial X_i} + \frac{\partial C(q, \hat{Y})}{\partial q} \frac{\partial D^{-1}(p_f, \hat{X})}{\partial X_i} - \frac{\partial C(q, \hat{Y})}{\partial q} \frac{\partial (D^{-1}(p_f, \hat{X}) + q_f^*(p_f, \hat{X}, \hat{Y}))}{\partial X_i}$$

$$= p_f \frac{\partial q_f^*(p_f, \hat{X}, \hat{Y})}{\partial X_i} - \frac{\partial C(q, \hat{Y})}{\partial q} \frac{\partial q_f^*(p_f, \hat{X}, \hat{Y})}{\partial X_i} = \left(p_f - \frac{\partial C(q, \hat{Y})}{\partial q}\right) \frac{\partial q_f^*(p_f, \hat{X}, \hat{Y})}{\partial X_i}$$

By assumption, relevant prices and quantities are all nonnegative, so

$$q_h^*(x, y) > 0$$

$$D(q_h^*(x, y), x) > 0$$

and $p_f > 0$.

Moreover, from Figure A1 we see that $\frac{\partial q_h^*(\hat{X}, \hat{Y})}{\partial X_i} > 0$ if the supply

curve is upward sloping. Hence, if we assume that $\frac{\partial D(q_h^*(\hat{x},\hat{y}),\hat{x})}{\partial x_i} > 0$ and that $D(q_h^*(\hat{x}, \hat{y}) > p_f$, then $\frac{\partial A(ABHE)}{\partial x_i} > 0$. These assumptions amount to assuming that the profit maximizing domestic price level in the nonexporting case rises as demand increases, and that the profit-maximizing domestic price level in the nonexporting case is greater than the foreign price level.

Further, we can see from Figure A1 that $\frac{\partial q_{hf}^*(p_f, \hat{X}, \hat{Y})}{\partial x_i} < 0$ since p_f is a horizontal line. Hence, if we assume that $p_f > \frac{\partial C(q, \hat{y})}{\partial q}$ over all relevant q, then $\frac{\partial A(HGC)}{\partial x_i} < 0$. This amounts to assuming that values of q beyond Q^* are irrelevant, e.g. that the shift in the demand curve does not go beyond Q^*. How A(HGC) and exporter surplus are affected if the increase in domestic demand does shift beyond Q^* is unclear, and analysis of this point is beyond the scope of this paper. Consequently then, if $\frac{\partial D(q_h^*(\hat{x},\hat{y}),\hat{x})}{\partial x_i} > 0$, $D(q_h^*(\hat{x}, \hat{y}), \hat{x}) > p_f$, and $p_f > \frac{\partial C(q,\hat{y})}{\partial q}$ over all relevant values of p and q, then an increase in domestic demand will unambiguously decrease area HGC and increase area ABHE and hence decrease exporter surplus.

Next, it can be shown that under many conditions, an increase in supply will increase exporter surplus. Suppose that supply increases. Figure A2 shows this situation, but provides no unambiguous clues as to whether X increases or decreases. But, since the supply curve is the marginal cost function, this situation can be represented mathematically by assuming that $\frac{\partial^2 C(Q,\hat{Y})}{\partial Q, \partial Y_j} < 0$ for some $y_j \in y_1, \ldots, y_n$. Thus, in order to determine

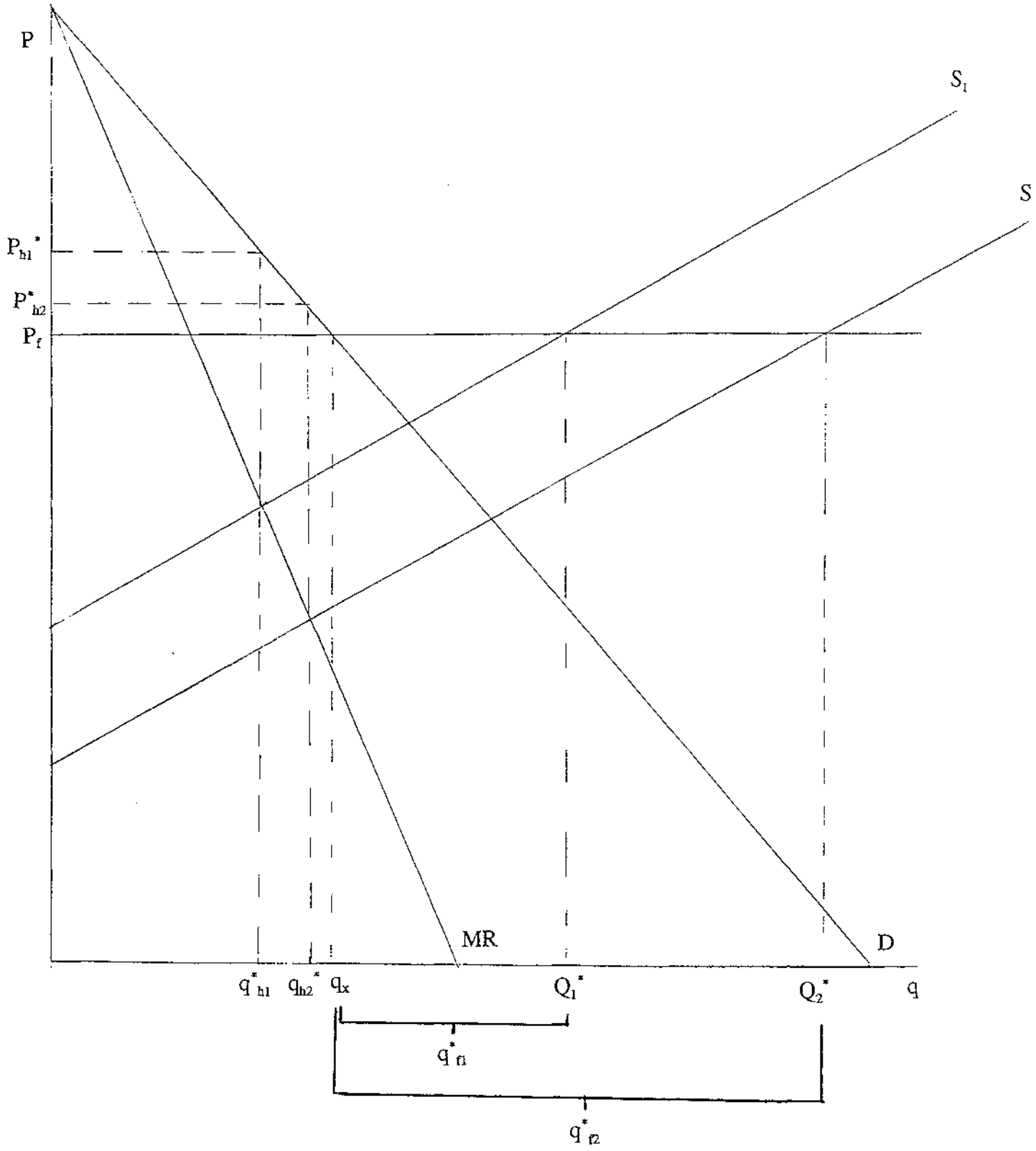

FIGURE A2 : Increase in supply and change in exporter surplus

whether $X(p_f, \hat{x}, \hat{y})$ increases with an increase in supply, it is only necessary to differentiate $X(p_f, \hat{x}, \hat{y})$ with respect to y_j and determine whether it is greater than zero.

As noted earlier, a sufficient condition for $\frac{\partial X(p_f, \hat{X}, \hat{Y})}{\partial Y_j} > 0$ is that $\frac{\partial A(MQC)}{\partial Y_j} > 0$ and $\frac{\partial A(ABHE)}{\partial Y_j} < 0$. Hence, sufficient conditions for an increase in supply to increase exporter surplus can be found by analyzing $\frac{\partial A(MQC)}{\partial Y_j}$ and $\frac{\partial A(ABHE)}{\partial Y_j}$.

$$\frac{\partial A(ABHE)}{\partial Y_j} = q^*_{fh}(\hat{X},\hat{Y}) \frac{\partial D(q^*_{fh}(\hat{X},\hat{Y}),\hat{X})}{\partial Y_j} + D(q^*_{fh}(\hat{X},\hat{Y}),\hat{X}) \frac{\partial q^*_{fh}(\hat{X},\hat{Y})}{\partial Y_j} - \frac{p_f \partial q^*_{fh}(\hat{X},\hat{Y})}{\partial Y_j}$$

$$= q^*_{fh}(\hat{X},\hat{Y}) \frac{\partial D(q,\hat{X})}{\partial q} \frac{\partial q^*_{fh}(\hat{X},\hat{Y})}{\partial Y_j} + \frac{\partial q^*_{fh}(\hat{X},\hat{Y})}{\partial Y_j} (D(q^*_{fh}(\hat{X},\hat{Y}),\hat{X}) - p_f)$$

$$= \frac{\partial q^*_{fh}(\hat{X},\hat{Y})}{\partial Y_j} (D(q^*_{fh}(\hat{X},\hat{Y}),\hat{X}) + q^*_{fh}(\hat{X},\hat{Y}) \frac{\partial D(q,\hat{X})}{\partial q} - p_f$$

From Figure A2, we see that since the domestic marginal revenue and demand curves slope downwards and MR is below D, $\frac{\partial q^*_{fh}(\hat{X},\hat{Y})}{\partial Y_j} > 0$. Thus, $\frac{\partial A(ABHE)}{\partial Y_j} < 0$ if $D(q^*_{fh}(\hat{X},\hat{Y}),\hat{X}) - p_f + q^*_{fh}(\hat{X},\hat{Y}) \frac{\partial D(q,\hat{X})}{\partial q} < 0$.

Note that it was assumed above that $D(q_h^*(\hat{x}, \hat{y}), \hat{x}) > p_f$, and hence $D(q_h^*(\hat{x}, \hat{y}), \hat{x}) - p_f > 0$. Also, $q_h^*(\hat{x}, \hat{y}) > 0$ and $\frac{\partial D(q,\hat{X})}{\partial q} < 0$ for all relevant q, so $q^*_{fh}(\hat{X},\hat{Y}) \frac{\partial D(q,\hat{X})}{\partial q} < 0$.

$$D(q^*_{fh}(\hat{X},\hat{Y}),\hat{X}) - p_f + q^*_{fh}(\hat{X},\hat{Y}) \frac{\partial D(q,\hat{X})}{\partial q} < 0$$

$$\Leftrightarrow \quad 1 - \frac{p_f}{D(q^*_{fh}(\hat{X},\hat{Y}),\hat{X})} + \frac{q^*_{fh}(\hat{X},\hat{Y})}{D(q^*_{fh}(\hat{X},\hat{Y}),\hat{X}} \frac{\partial D(q,\hat{X})}{\partial q} < 0$$

Recall that $p_h = D(q_h, x)$ and that price elasticity of demand is defined as $\varepsilon = \frac{p}{q} \cdot \frac{\partial q}{\partial p}$

Hence, $D(q^*_{fh}(\hat{X}, \hat{Y}), \hat{X}) - P_f + q^*_{fh}(\hat{x}, \hat{y}) \frac{\partial D(q, \hat{X})}{\partial q} < 0$

iff $1 - \frac{P_f}{D(q^*_{fh}(\hat{X}, \hat{Y}), \hat{X})} + \frac{1}{\varepsilon|_{q = q^*_{fh}(\hat{x}, \hat{y})}} < 0$

iff $1 + \frac{1}{\varepsilon|_{q = q^*_{fh}(\hat{x}, \hat{y})}} < \frac{P_f}{D(q^*_{fh}(\hat{X}, \hat{Y}), \hat{X})}$

It is well known that for a firm facing a downward sloping demand curve that $\varepsilon < -1$. Moreover, $D(q_h^*(\hat{x}, \hat{y}), \hat{x}) > p_f$, and so it is possible that $1 + \frac{1}{\varepsilon|_{q = q^*_{fh}(\hat{x}, \hat{y})}} < \frac{P_f}{D(q^*_{fh}(\hat{x}, \hat{y}), \hat{x})}$. On the whole then, it can be concluded that $\frac{\partial A(ABNE)}{\partial y_j} < 0$ iff $1 + \frac{1}{\varepsilon|_{q = q^*_{fh}}} < \frac{P_f}{D(q^*_{fh}(\hat{x}, \hat{y}), \hat{x})}$.

Now, consider $\frac{\partial A(HGC)}{\partial y_j}$

$$\frac{\partial A(HGC)}{\partial y_j} = \frac{\partial P_f q^*_{fh}(P_f, \hat{x}, \hat{y})}{\partial y_j} + \frac{\partial C(D^{-1}(P_f, \hat{x}), \hat{y})}{\partial y_j} - \frac{\partial C(Q^*(P_f, \hat{x}, \hat{y}), \hat{y})}{\partial y_j}$$

$$= P_f \frac{\partial q^*_{fh}(P_f, \hat{x}, \hat{y})}{\partial y_j} + \frac{\partial C(q, \hat{y})}{\partial y_j}\Big|_{q = D^{-1}(P_f, \hat{x})} - \left[\frac{\partial C(q, \hat{y})}{\partial q} \frac{\partial D^{-1}(P_f, \hat{x}) + q^*_{fh}(P_f, \hat{x}, \hat{y})}{\partial y_j}\right.$$

$$\left. + \frac{\partial C(q, \hat{y})}{\partial y_j}\Big|_{q = Q^*(P_f, \hat{x}, \hat{y})}\right]$$

$$= (P_f - \frac{\partial C(q, \hat{y})}{\partial q}) \frac{\partial q^*_{fh}(P_f, \hat{x}, \hat{y})}{\partial y_j} - \frac{\partial C(q, \hat{y})}{\partial q} \frac{\partial D^{-1}(P_f, \hat{x})}{\partial y_j}$$

$$+ \frac{\partial C(q, \hat{y})}{\partial y_j}\Big|_{q = D^{-1}(P_f, \hat{x})} - \frac{\partial C(q, \hat{y})}{\partial y_j}\Big|_{q = Q^*(P_f, \hat{x}, \hat{y})}$$

$$= (P_f - \frac{\partial C(q, \hat{y})}{\partial q}) \frac{\partial q^*_{fh}(P_f, \hat{x}, \hat{y})}{\partial y_j} + \frac{\partial C(q, \hat{y})}{\partial y_j}\Big|_{q = D^{-1}(P_f, \hat{x})} - \frac{\partial C(q, \hat{y})}{\partial y_j}\Big|_{q = Q^*(P_f, \hat{x}, \hat{y})}$$

Recall that it was assumed earlier that $p_f - \frac{\partial C(q, \hat{Y})}{\partial q} > 0$ for all relevant q. In addition, note that $\frac{\partial q_f^*(p_f, \hat{X}, \hat{Y})}{\partial Y_j} > 0$ since q_x (which is $= D^{-1}(p_f, \hat{x})$) remains unchanged and Q^* increases as the supply curve shifts right (see Figure A2). Thus, assuming that $D^{-1}(p_f, \hat{x}) < Q^*(p_f, \hat{x}, \hat{y})$ (which is the same thing as assuming that $q_f^*(p_f, \hat{x}, \hat{y}) > 0$ or that the supply curve is always to the right of q_x) and that $\frac{\partial C(q, \hat{Y})}{\partial Y_j} < 0$ (i.e. that cost per unit output falls as Y_j (and hence supply) increases), then since

$$\frac{\partial^2 C(q, \hat{Y})}{\partial q \, \partial Y_j} < 0 \quad , \quad \left.\frac{\partial C(q, \hat{Y})}{\partial Y_j}\right|_{q = D^{-1}(p_f, \hat{X})} > \left.\frac{\partial C(q, \hat{Y})}{\partial Y_j}\right|_{q = Q^*(p_f, \hat{X}, \hat{Y})}$$

and consequently $\frac{\partial A(HGC)}{\partial Y_j} > 0$. Thus, if it can be assumed that $D(q_h^*(\hat{x}, \hat{y}), \hat{x}) > p_f$, $\left|1 + \frac{1}{\varepsilon l_{q = q_h^*}}\right| < \frac{p_f}{D(q_h^*(\hat{X}, \hat{Y}), \hat{X})}$, $D^{-1}(p_f, \hat{x}) < Q^*(p_f, \hat{x}, \hat{y})$, and that $\frac{\partial C(q, \hat{Y})}{\partial Y_j} < 0$, than a significant shift in the supply curve (i.e. a decrease in marginal cost) will unambiguously increase exporter surplus.

Similarly, sufficient conditions can be found for an increase in p_f to increase exporter surplus by analyzing $\frac{\partial A(ABHE)}{\partial p_f}$ and $\frac{\partial A(HGC)}{\partial p_f}$ (see Figure A3).

$\frac{\partial X(p_f, \hat{X}, \hat{Y})}{\partial p_f} > 0$ if $\frac{\partial A(ABHE)}{\partial p_f} < 0$ and $\frac{\partial A(HGC)}{\partial p_f} > 0$.

$\frac{\partial A(ABHE)}{\partial p_f} = -q_{fh}^*(\hat{X}, \hat{Y})$. Since $q_{fh}^*(\hat{X}, \hat{Y}) > 0$ then, $\frac{\partial A(ABHE)}{\partial p_f} < 0$.

$$\frac{\partial A(HGC)}{\partial p_f} = p_f \frac{\partial q_{ff}^*(p_f, \hat{X}, \hat{Y})}{\partial p_f} + q_{ff}^*(p_f, \hat{X}, \hat{Y}) + \frac{\partial C(D^{-1}(p_f, \hat{X}), \hat{Y})}{\partial p_f} - \frac{\partial C(Q^*(p_f, \hat{X}, \hat{Y}), \hat{Y})}{\partial p_f}$$

$$= p_f \frac{\partial q_{ff}^*(p_f, \hat{X}, \hat{Y})}{\partial p_f} + q_{ff}^*(p_f, \hat{X}, \hat{Y}) + \frac{\partial C(q, \hat{Y})}{\partial q} \frac{\partial D^{-1}(p_f, \hat{X})}{\partial p_f} - \frac{\partial C(q, \hat{Y})}{\partial q} \frac{\partial (D^{-1}(p_f, \hat{X}) + q_{ff}^*(p_f, \hat{X}, \hat{Y}))}{\partial p_f}$$

$$= p_f \frac{\partial q_{ff}^*(p_f, \hat{X}, \hat{Y})}{\partial p_f} + q_{ff}^*(p_f, \hat{X}, \hat{Y}) - \frac{\partial C(q, \hat{Y})}{\partial q} \frac{\partial q_{ff}^*(p_f, \hat{X}, \hat{Y})}{\partial p_f}$$

$$= q_{ff}^*(p_f, \hat{X}, \hat{Y}) + \frac{\partial q_{ff}^*(p_f, \hat{X}, \hat{Y})}{\partial p_f} \left(p_f - \frac{\partial C(q, \hat{Y})}{\partial q}\right).$$

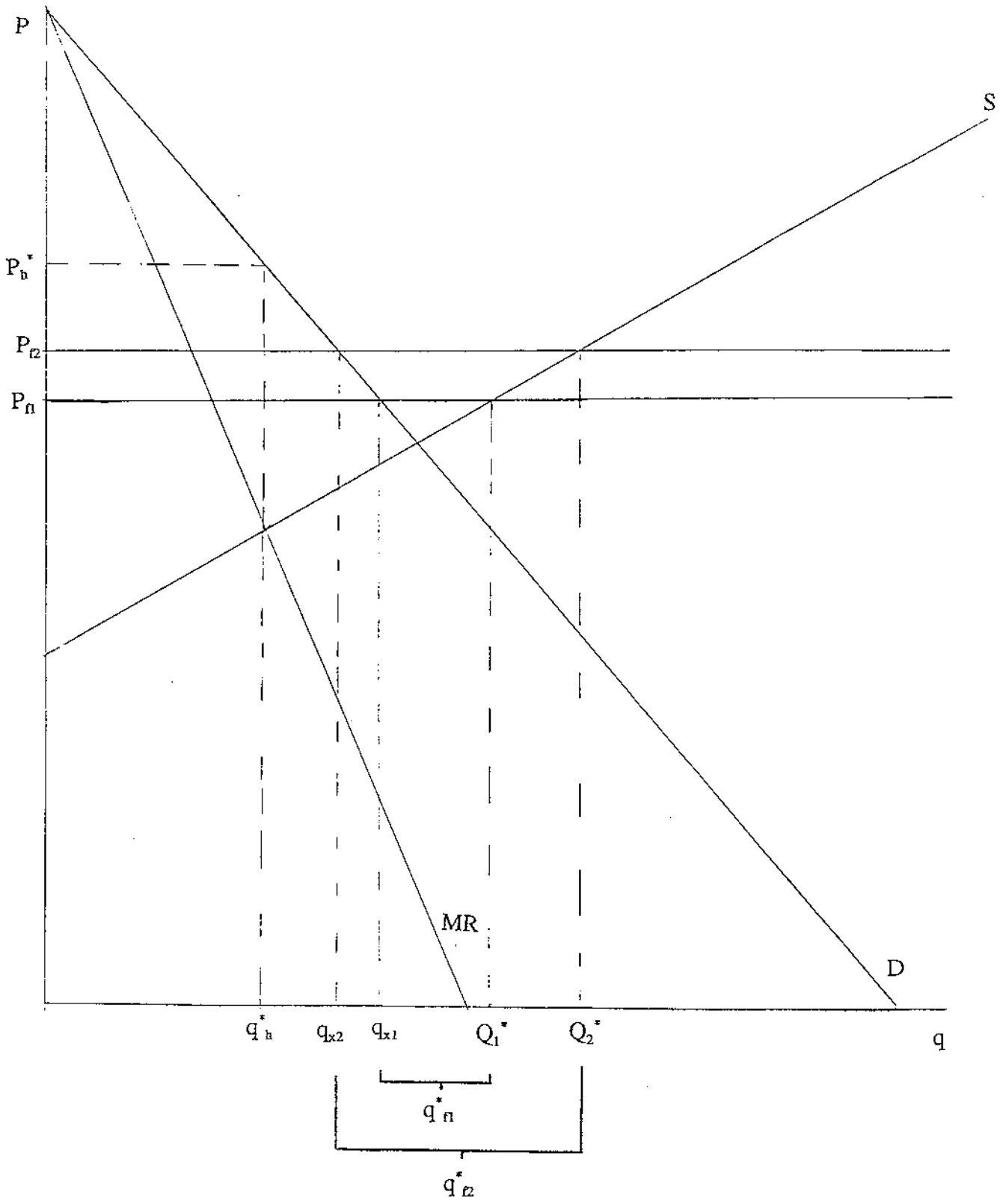

FIGURE A3 : Increase in P_f and change in exporter surplus

Note that we assumed earlier that $p_f > \frac{\partial c(q, \hat{y})}{\partial q}$ and $q_f^*(p_f, \hat{x}, \hat{y}) > 0$. Hence, $\frac{\partial A(MAC)}{\partial p_f} > 0$. Thus, assuming that $p_f > \frac{\partial c(q, \hat{y})}{\partial q}$ and $q_f^*(p_f, \hat{x}, \hat{y}) > 0$ (which implies that $p_f > \frac{\partial c(q, \hat{y})}{\partial q}$ (see Figure 1)), then $\frac{\partial x(p_f, \hat{x}, \hat{y})}{\partial p_f} > 0$.

Consequently, a series of conditions can be found which are sufficient for changes in demand, supply and p_f to affect the export behavior of the firm in the way described in chapter one. These conditions are:

a. $q_f^*(p_f, \hat{x}, \hat{y}) > 0$ ----- this assumption implies that $Q^*(p_f, \hat{x}, \hat{y}) > q_x$ $(= D^{-1}(p_f, \hat{x}))$, which in turn implies that $p_f > \frac{\partial c(q, \hat{y})}{\partial q}$.

b. $D(q_h^*(\hat{x}, \hat{y}), \hat{x}) > p_f$ ------- that is, the profit maximizing domestic price for the nonexporting case should be greater than p_f, the foreign price level.

c. $\frac{\partial D(q_h^*(\hat{x}, \hat{y}), \hat{x})}{\partial x_i} > 0$ ------- that is, the profit maximizing domestic price level for the nonexporting case increases as demand increases.

d. $\left| + \frac{1}{\varepsilon|_{q=q_h^*}} \right| < \frac{p_f}{D(q_h^*(\hat{x}, \hat{y}), \hat{x})}$ ------ where $\varepsilon = \frac{p}{q} \cdot \frac{\partial q}{\partial p}$.
Note that $\varepsilon < -1$ $(\Rightarrow \varepsilon < 0)$ and $\frac{p_f}{D(q_h^*(\hat{x}, \hat{y}), \hat{x})} < 1$ (Given "b" above).

e. $\frac{\partial c(q, \hat{y})}{\partial y_j} < 0$ -------- that is, increases in supply imply that cost has been reduced for any given level of output.

Assumptions b, c, and e appear to be reasonable ones to make for most situations. Assumption a is troublesome since it limits analysis to cases in which the marginal cost and domestic demand curves intersect below p_f. The problem here appears to be related to changes in producers surplus for the exporting case, since this assumption is used in all three cases (change in demand, change in supply, and change in p_f to ensure that area HGC changes properly. Further analysis of this point is beyond the scope of this paper.

Assumption d appears to be *ad hoc*. There is no obvious reason why it should be assumed to hold. Assumption d implies that the less elastic the domestic demand curve, and the closer is p_f to $D(q_h^*(\hat{x}, \hat{y}), \hat{x})$, the more likely it is that an increase in supply will increase exporter surplus. Thus, it implies that this model may be best suited to industries with relatively inelastic demand. It is also very suitable in cases where international marketing, shipping, and trade barrier costs are low, since then p_f and $D(q_h^*(\hat{x}, \hat{y}), \hat{x})$ are likely to be relatively close to each other. Hence, when the foreign market under consideration is relatively close to the home country, assumption d may not be unreasonable for most industries.

Given that conditions a through e hold then, it is clear that exporter surplus will decrease as domestic demand increases, that it will increase as firm supply increases, and that it will increase as p_f increases. Moreover, it can be argued that firms become more likely to export as exporter surplus increases and

less likely to export as exporter surplus decreases. As noted on pages 5-7, it can be expected that if $X > 0$, then the firm will export and if $X < 0$ the firm will not export.

In reality however, it must be acknowledged that a firm will never know what its precise level of X is. But, it is reasonable to suppose that the higher that X is, the more apparent it will be to the firm that it is profitable to export, and that there will be more and more pressure for it to export. Similarly, the lower X is the less attractive exporting becomes and hence the less likely it becomes that the firm will see exporting as profitable. In other words, it can be said that $\lim_{X \to 0}$ prob(firm will export) = 0.5, $\lim_{X \to -\infty}$ prob(firm will export) = 0, and $\lim_{X \to \infty}$ prob(firm will export) = 1.

Thus, firms should exhibit higher levels of export activity as exporter surplus increases and lower levels of export activity as exporter surplus falls. In this way, export behavior is directly affected by changes in exporter surplus, and hence by changes in supply, domestic demand, and p_f.

APPENDIX 2

INTRODUCTORY LETTER MAILED WITH QUESTIONNAIRE

October 1, 1993

President
XYZ Lumber Company
P.O. Box 000
Anytown

Dear Sir or Madam,

I am an American graduate student at Massey University doing research on New Zealand's lumber industry. In particular, I am studying how various factors related to firm size may also be related to exporting. As part of my work, I am conducting telephone interviews of lumber mill managers, and I would be most grateful if I could have the opportunity to speak with you or another member of your staff. The questions that I will ask relate to a variety of aspects of your firm's operations, including exporting, the size of your firm, what products your firm produces, and the education and experience of your firm's staff. For your convenience, I have enclosed a copy of the questionnaire I plan to use. **All information given will remain confidential.** No individual responses will be published. All responses will be aggregated, and only these results will be made public.

I will telephone your firm within the next week or so to schedule an interview time and to answer any questions which you may have regarding the questionnaire or this survey. I would be most appreciative of any help you can give me.

Sincerely,

Michael Craw
Development Studies
Massey University

Anton Meister
Professor
Agricultural Economics
Massey University

APPENDIX 3

SURVEY QUESTIONNAIRE

Survey Questionnaire
Firm Size and Export Orientation Survey
of the New Zealand Lumber Industry
Drafted September 28, 1993
by Michael Craw
Massey University

This questionnaire has been designed for use in a telephone survey testing various hypotheses on the relationship between firm size and exporting in New Zealand's lumber industry. As with most questionnaires, some questions may appear to be irrelevant. However, each question has been inserted with a particular research objective in mind, and every effort has been made to keep the questionnaire as short as possible.

Within a week or so of receiving this questionnaire, I will telephone your firm to schedule a time when I may go through this questionnaire with you. If you have any questions or comments about this survey, I will be happy to discuss them with you at that time.

It is my hope that all questions will be answered by all respondents. If, however, you are unable or unwilling to answer any of the questions, your replies to the others will still be greatly valued. If there are some questions which you cannot answer precisely -- for example, in question 9, about the grades of lumber which your firm produced in 1992 -- please give estimates where you can do so with reasonable confidence, but otherwise do not answer.

Remember that your answers will remain absolutely confidential and will not be associated with your identity at any stage.

Basic Data

1. Name of firm:

2. Address:

3. Name and position of person interviewed:

4. Contact telephone number:

Questionnaire

5. What was your firm's level of total sales in 1992 (in NZ$s)?

NZ$_____

6. a. Excluding woodchips and other wastewood, what was your firm's sales level of softwood lumber in 1992 (in NZ$s)?

NZ$_____

b. Of hardwood lumber?

NZ$_____

7. a. How many people are employed by your firm?

b. Of these, how many are employed in management-level positions?

8. a. Does your firm currently export?

yes_____ no_____

b. If yes, how much softwood lumber (excluding woodchips and other wastewood) did your firm export in 1992 (in NZ$s)?

NZ$_____

How much hardwood lumber (excluding woodchips and other wastewood)?

NZ$_____

9. What grades of lumber does your firm typically produce, and what percentage of lumber output did each represent in 1992?

Softwood grades	% softwood lumber output	Hardwood grades (please specify)	% hardwood lumber output
a. No. 1 clears	a.		
b. No. 2 clears	b.		
c. No. 1 cuttings	c.		
d. Factory	d.		
e. F8	e.		
f. F5 or No. 1 framing	f.		
g. F4 or No. 2 framing	g.		
h. Box framing	h.		
i. Board grades	i.		
j. Ungraded	j.		
k. Other (please specify):	k.		

10. a. Approximately what was your firm's at-mill cost for producing one cubic meter of softwood lumber in 1992? (Skip if your firm does not produce softwood lumber)

b. Approximately what was your firm's at-mill cost for producing one cubic meter of hardwood lumber in 1992? (Skip if your firm does not produce hardwood lumber)

11. Which of the following legal structures describes your firm?

a. Sole proprietorship

b. Partnership

c. Corporation

d. Cooperative

e. Government-owned enterprise

f. Other (please specify):

12. Is your firm owned entirely by New Zealanders?

yes_____ no_____

13. a. Of the managers in your firm, how many have at least twenty years of experience in the lumber industry?

b. How many have a university degree?

c. How many have studied a foreign language (i.e. a language other than English and Maori)?

d. How many have studied or lived abroad for more than three months?

e. How many read a foreign news or business publication on a regular basis?

14. How many years of experience does your firm's chief executive officer have in the lumber industry?

15. Does your firm's chief executive officer have a university or polytechnic degree?

yes_____ no_____

16. Approximately how many times in the past five years have managers in your firm travelled abroad?

17. How many employees in your firm deal with marketing?

18. Which of the following characterizes the bounds of the geographical area in which your firm presently sells its product within New Zealand:

a. do not sell in New Zealand

b. immediate locality

c. entire district (e.g. Manawatu)

d. several districts

e. entire nation

19. What is your personal outlook for your firm's overall prospects for the next two years?

a. excellent

b. good

c. average

d. poor

e. dismal

20. Does your firm currently have any plans to expand your market or introduce a new product within the next 12 months?

yes_____ no_____

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