

Are Diamonds a Country's Best Friend? A Critique of Porter's Theory of National Competition as Applied to Canada, New Zealand and Australia

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1. Introduction

Michael Porter's latest book, *The Competitive Advantage of Nations* (1990), is one of the most widely read and recognised works on management and national competitiveness in Australia, as well as in many other countries. Surprisingly however, the book has not been subjected to extensive and exhaustive academic critique.¹ The purpose of this paper is to contribute to such a critique. We review not only the original study but also in particular its applications to New Zealand and Canada, as described in *Upgrading New Zealand's Competitive Advantage* (1991) and *Canada at the Crossroads* (1991). We also discuss the validity and relevance of these ideas for Australia. Our findings are not encouraging. We see the theory as one with limited application and not well supported by the evidence from the two country case studies.

Porter's book, *The Competitive Advantage of Nations* (1990a), and its summary in the *Harvard Business Review* (1990b), are taken as the source of the formal statement of the theory. The two works cited above, on New Zealand and Canada, are the references for the application of the theory to two relatively small economies dependent on resource-based exports. The authors use the Australian Manufacturing Council's recent reports—*The Global Challenge* (1990) and *Going International* (1992)—to extend the arguments to the Australian economy. The recent applications are used as quasi-tests of the generalisability of Porter's

1. Exceptions include Grant (1991), Hannah and Williamson (1990), Rugman (1991, 1992) and Scobie (1991).

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framework. His initial study examines cases from ten countries, which are predominantly mature, manufacturing-based economies. We show that there are problems in extending the initial findings to resource-based and relatively less mature economies.

In the first section of the essay, we briefly present Porter's theory of diamonds and national competitive advantage. In addition to his espoused formal theory, we identify and articulate the underlying implicit argument that characterises his work on this subject. We then, in the second section, examine the research methodology used by Porter in the Canadian and New Zealand studies, and the implications of these two quasi-tests for the theory's validity and generalisability. A clear mismatch is evident between the empirical findings and the theoretical framework elucidated in Porter's book and the *Harvard Business Review* article on the one hand, and the case studies conducted in New Zealand and Canada on the other: both countries have virtually no strong diamonds. Nor does Porter's theory provide insights into the dynamics by which diamonds can be developed in economies that are not already heavily industrialised.

In the final section, we consider the possible application of Porter's theory to the Australian economy. Here we encounter similar problems relating to the predominance of resource-based exports. But the Australian experience also highlights another issue. *The Global Challenge* identified that most of Australia's internationally successful manufacturing firms do not export. *Going International* showed that this is primarily a function of industry. International competition in less traded industries typically takes a multi-domestic form, with goods produced in small to medium scale plants in the location in which they are to be sold. Investment from the home country in overseas operations is, therefore, a better indicator of international competitiveness for these industries than exports. But as the New Zealand and Canadian applications of the theory highlight, while Porter writes about both exports and overseas investment, the empirical focus is solely on exports, and therefore the highly traded goods sectors. Thus, there is no empirical evidence for firms in less traded goods, and they are not considered in the Canadian and New Zealand contexts, although both countries have major firms which take this structure. Given the theory's inability to offer insights for resource-based or multi-domestic industries, and its lack of rigorous attention to the dynamics of creating successful firms, or even diamonds, we conclude that Porter's framework does not form an adequate basis on which to formulate policy recommendations for the Australian economy.

2. The Theory

2.1 Espoused Theory

We begin with a synopsis of Porter's theory as stated in *The Competitive Advantage of Nations*. He starts with the perspective that the changing character of world trade is governed by a new set of dynamics. Success in

international competition is now driven by competitive advantage in advanced industries, rather than the ability to exploit the comparative advantage of inherited endowments of factor production. Since knowledge intensive industries now support a high and rising standard of living, innovation, in the broadest sense, has become vital to success.

Creating competitive advantage in sophisticated industries demands improvement and innovation—finding better ways to compete and exploiting them globally, and relentlessly upgrading the firm’s products and processes. Nations succeed in industries if their national circumstances provide an environment that supports this sort of behaviour (Porter 1990a, p.67).

Four determinants, which interact together in a diamond, are the forces that provide the pressures, incentives and capabilities for firms to undertake such improvement and innovation. These four determinants are: (1) factor conditions; (2) demand conditions; (3) related and supporting industries; and (4) firm strategy structure and rivalry. The theory strongly emphasises that they must exist in close proximity to each other. “Competitive advantage is created and sustained through a highly localised process” (Porter 1990b, p.74).

Individually, and as a system, these four determinants create the context within which a nation’s firms are created and compete. This diamond is mutually reinforcing. In more sophisticated industries, competitive advantage rarely results from only one determinant. Usually, advantages in all four domains combine to create self-reinforcing conditions in which a nation’s firms succeed internationally—the co-location of a critical mass of favourable conditions is needed to achieve and sustain competitive success in advanced industries. But competitive advantage in simple or resource intensive industries, and in the standardised, lower-technology segments of more advanced industries does not need advantages in the entire diamond. Factor costs are often decisive in these industries.

Foreign competitors operating from outside a nation can sometimes duplicate one advantage or another, but the system is hard to penetrate from another home base. Not surprisingly, the process of building is often protracted, but once in place, it allows the entire national industry to progress faster than foreign rivals. The four determinants can also reinforce each other negatively. For example, poor investments in human resources combined with a high cost of capital can lead to short term investment horizons that cause firms not to invest in building more sophisticated advantages.

Ultimately, nations tend to succeed in those industries in which the home environment is the most challenging and dynamic. The microeconomic environment prods and stimulates firms to upgrade and widen the advantages critical to success in that industry. No nation’s environment has the requirements for success in every industry.

Because of the centrality of the four determinants of the industry diamond to Porter's theory, they are briefly summarised here.

2.1.1 Factor Conditions Factors are either basic or advanced, generalised or specialised. The most significant and sustainable competitive advantage results when the specialised and advanced factors needed to compete in a particular industry are present. Basic or generalised factors are easier to replicate and, therefore, are rarely sources of sustainable competitive advantage. Not only are the specialised factor sources of competitive advantage created rather than inherited, but they can even be created in response to selective inherited disadvantages, which can generate competitive success by prodding firms to innovate. Here, Porter is essentially making a Ricardian style argument, but one built around knowledge and technology rather than labour and land. Furthermore, those with abundant basic resources are often wasteful, while those with limited resources often use them efficiently.

2.1.2 Demand Conditions The nature of home demand is the major factor influencing how companies perceive and respond to buyers' needs. Global success is likely if the home segment is more sophisticated and demanding than it is in any other country, for example where a national passion exists. In these circumstances, home demand gives companies a clear or early picture of emerging buyer needs. The size of home demand, while important in some circumstances, proves far less significant than its character. True, large home demand does give economies of scale in the domestic market, but small domestic demand may simply force companies to explore foreign markets at an earlier stage in their development. But although firms can selectively tap into superior demand conditions in a foreign market by using a global strategy, that provides no unique advantage and is more often aimed at overcoming a deficiency in local demand conditions.

2.1.3 Related and Supporting Industries These are industries that share common technologies, inputs, distribution channels, customers or activities, or provide products that are complementary. World class related industries can provide sources of technology, ideas, individuals and potential competitors, all of which can be advantages in international competition. Similarly, supporting industries often deliver the most cost effective or highest quality input in an efficient and sometimes preferential way. The advantage created by close working relationships is critically important. Suppliers and end users located near each other can take advantage of short lines of communication, a quick and constant flow of information, and a continuing exchange of ideas and innovations.

It follows that nations are typically competitive in industries where clusters of related and supporting industries are geographically concentrated, making the interactions closer and more dynamic. It is difficult to have the same level of interaction with foreign companies. The spawning and upgrading of new firms and industries that occur in clusters of local industries are less likely to occur if the nation relies heavily on foreign-supplier and related industries.

2.1.4 Firm Strategy, Structure and Rivalry A nation's social norms and attitudes towards business influence the way firms are organised and managed, and are often reflected in government policy. The socio-political environment tends to have a distinct impact on the kinds of industries in which a nation achieves international preëminence. Nations will probably succeed in industries where the strategies, structures and practices favoured by the national environment are well suited to competition in the industry.

In addition, the nature of competition and domestic rivalry has a fundamental impact on the international competitiveness of a nation's firms. Local rivals provide a powerful stimulus to the creation and persistence of competitive advantage. Competition with firms in foreign markets is not a substitute for competing with domestic rivals. Domestic competition automatically cancels any shared advantages that derive from being in the home nation and forces companies to move beyond those basic advantages to create more sustainable advantages.

Two other factors, chance events and government, can influence each determinant for better or for worse. Chance events can create discontinuities that allow shifts in competitive position, while government can influence and be influenced by each of the four determinants either positively or negatively. In general, "government's proper rôle is to push and challenge its industry to advance, not provide 'help' so industry can avoid it" (Porter 1990a, p.30).

Finally, Porter's model also includes a dynamic process of four stages of national competitive development: factor-driven, investment-driven, innovation-driven and wealth-driven. The first three involve "successive upgrading of a nation's competitive advantages and will normally be associated with progressively rising economic prosperity". The fourth stage "is one of drift and ultimately decline" (Porter 1990a, p.546). The specific rôle of government is, in turn, stage dependent. While government's direct influence is greatest in the factor- and investment-driven stages (Porter 1990a, p.671), firms are increasingly the prime movers as the nation moves to the innovation-driven stage (Porter 1990a, p.672). Thus, in the investment driven stage, government "must usually take the lead in making investments to create and upgrade factors, though firms must begin to play a growing rôle as well" (Porter 1990a, p.1). By contrast, its rôle in the innovation-driven phase is "markedly different from the previous one. The impetus to innovate . . . must come largely from the private sector . . . government's efforts are best spent in indirect ways" (Porter 1990a, pp.555-556).

2.2 Implicit Theory

Porter's theory, however, extends beyond the formal espoused theory as described above. Lying behind the diamond framework is an implicit theoretical construct that should be made explicit because of its pervasive influence on the model's scope and causal explanations. The core concept underpinning Porter's familiar diamond is the centrality of innovation to sustained performance. Thus, the theory addresses in different ways, and at different levels, questions about what makes

innovation sustainable and whether it will be sustained in the same place. In this, he assumes that a prime mover already exists, and provides the grit around which the pearl forms. Reading behind the words, it appears that Porter essentially identifies two critical forces on firms: pressure and proximity.

Pressure is the key driver of innovation, and, therefore, of performance. In Porter's world, firms are portrayed as reactive and unable to overcome inertia and vested interest. A fundamental characteristic is that they perform (i.e., continuously upgrade factors and innovate) only under pressure: "to succeed, innovation usually requires pressure, necessity, and even adversity: the fear of loss often proves more powerful than the hope of gain" (Porter 1990*b*, p.76). Hence, the model relies on pressure being generated in as many points in the diamond as possible. So, for example, disadvantages create pressure to find improved ways of competing—as if the signs on factors are reversed: good factors (cheap, abundant) make you lazy; only problems (e.g., cost, availability) provide the pressure that makes you innovative. In addition, the more sophisticated the demand, the more pressure it places on firms, while related industries and the cluster itself also create pressure to perform and innovate. Finally, rivalry is perhaps most critical for generating pressure, and for Porter it is only domestic rivalry that really counts.

Proximity further intensifies the pressure on firms. Porter's theory emphasises domestic rivalry, local clusters, and physical neighbourhoods. The explicit theory statement on proximity is presented in terms of information—it "increases the concentration of information, and thus the likelihood of its being noticed and acted upon" (Porter 1990*a*, p.157). As well as increasing the speed with which information flows within the national industry, and innovations diffuse, it also "tends to limit the spread of information outside because communication takes forms (such as face-to-face contact) which leak out only slowly" (Porter 1990*a*, p.157). Thus, the theory appears to blend together loosely Simon type "bounded rationality" with transaction cost theory (only Italians understand Italians) and a psychological model of salience/fixation (as in the eyeball-to-eyeball sports analogies). "Active feuds between domestic rivals are common, and often associated with an internationally successful national industry" (Porter 1990*a*, p.9). Not only is domestic rivalry desirable, but the benefits are even stronger if concentrated within a region, or a city (Porter 1990*a*, p.120). "Rivals located close together will tend to be jealous and emotional competitors" (Porter 1990*a*, p.157). By far the most effective form of pressure is your twin brother down the street: "domestic rivals fight not only for market share but . . . more generally, for 'bragging rights'" (Porter 1990*a*, p.9).

These two factors—pressure and proximity—thus answer most of the questions about innovation that appear to strike Porter as critical. The flavour of the prevailing implicit model is, therefore, somewhat Malthusian in its language about stimulus and punishment.

The process of modifying strategy frequently involves . . . unsettling, sometimes wrenching, organizational adjustments . . . The behavior required

to sustain advantage, then, is in many respects an unnatural act for established firms . . . Few companies make significant improvements and strategy changes voluntarily; most are forced to. The pressure to change is more often environmental than internal (Porter 1990a, p.52).

Put alternatively, “the best managers always run a little scared” (Porter 1990b, p.75). Inevitably, this view influences Porter’s perceptions of the proper rôle of government—to prod the recalcitrants. It stands in contrast to the alternative Austrian perspective in which firms, or at least some firms, are actively seeking opportunities, looking to generate and capture rents and wealth. Competition as a process is driven by such factors as search, energy and emulation.

Industries that draw on advanced technologies and sophisticated capital equipment can form a national manufacturing core. Given Porter’s preoccupation with innovation, these are favoured and emphasised in his analyses. Resources are assumed to be commodities whose only contribution can be as a source of upgrading to more innovative, technologically driven industries (i.e., machinery and equipment, or more advanced processing of inputs). This issue becomes highly salient for Canada and New Zealand, which both depend heavily on relatively unprocessed resource exports, and also applies to Australia.

These implicit values also influence another aspect of the theory, relating to the way international firms are characterised as either global or multi-domestic. The two key notions underlying the categorisation appear to be locus of production, which can be either concentrated or dispersed, and a less well specified concept of interaction between markets—whether what happens in Country A is important to the same firm’s operations in Country B. This can be set out in matrix form, as we have done in Figure 1.

The matrix highlights that Porter focuses primarily on two possible outcomes. He assumes that firms either concentrate, and have a global strategy, or disperse and are multi-domestic. Global configurations typically involve export, while dispersing activities involves overseas direct investment. Learning occurs most easily for global firms because all their activities are concentrated in one location and information can flow readily (Porter 1990a, pp.57–59). Multi-domestics in Porter’s world have few opportunities for intra-firm learning because their subsidiaries in different national markets are geographically dispersed, and, he asserts, because they are a collection of separate national operations that have little in common (Porter 1990a, p.58). Porter also implies that dispersed, or multi-domestic, operations contribute little to national economic performance—either for the headquarters nation, or for host countries. This issue assumes particular significance given the pattern of Australia’s successful international firms which capitalise on intra-firm learning within a multi-domestic structure. As we discuss in the final section of this paper, their experience appears to contradict these assumptions.

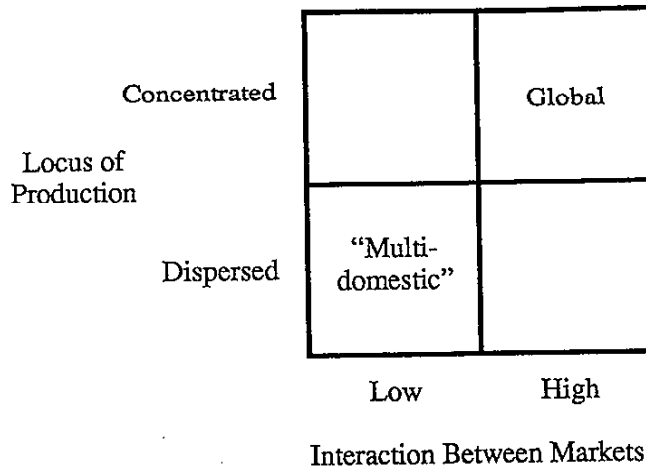


Figure 1

Porter's Categorisation of Global Firms

3. The New Zealand and Canadian Case Studies

Having outlined Porter's explicit framework and the implicit assumptions that underpin the model, we turn next to the two recent applications—New Zealand and Canada—treating them as quasi-tests of the theory. Specifically, we ask whether the evidence of the case analyses provides support for the validity and generalisability of the diamond, and find that it does not. One of the most telling and interesting findings in this context is that New Zealand and Canada have virtually no strong diamonds. In each case, however, Porter neither explicitly notes this absence nor deals with its impact on the theory. These issues are considered here, under the headings of methodology and testing the theory.

3.1 Methodology

The New Zealand and Canadian studies both use the same methodology as that adopted for the parent work. A microeconomic, industry-level analysis that concentrates on each nation's export industries provides a barometer of the strengths and weaknesses of the entire economy, and a mechanism for identifying the key leverage points and constraints in the economy. Productivity and upgrading to more advanced industries and segments form the key indicators of economic performance. Porter chooses the traded sector for a number of reasons: because it is a large and increasingly important portion of the economies of all developed nations; because of its increasing impact on the national income of most nations; and because it provides a window into the relative performance of national

economies, since it is where firms and many nations compete and can thus be compared (Crocombe, Enright and Porter, 1991, p.16; Porter 1991a, pp.12–13). He explicitly notes that examination of the non-traded sector does not provide the same opportunity for assessing the performance of a nation's firms and institutions in direct competition with those of other nations (Crocombe, Enright and Porter, 1991, p.17).

The national studies both begin with a detailed analysis of the country's economic statistics. Then a selection of industries in which New Zealand or Canada have a disproportionate share of world trade is studied in detail, although only four of these are discussed comprehensively in each report. Analysis from the others is synthesised into a general discussion of the overall health of the nation's diamonds. A country is defined as having a disproportionate share if its share of world exports in a particular industry exceeds its share of total world economy exports in that year (0.3% for New Zealand and 5.1% for Canada). Finally, both studies undertake a detailed audit of the national institutional and public policy environment, to assess its impact on the competitiveness of national firms. Each concludes with a set of recommendations to government and firms.

The fact base for New Zealand consists of twenty industries,² which together accounted for 85% of 1989 export earnings (\$18.4 billion total). Ten of the industries studied are traditional resource-based exports, which comprised 76% of exports from all twenty industries, and 64% of New Zealand's total 1989 exports. The other ten studied are dubbed "emerging" industries. Many of these contribute little to New Zealand's export revenue—they accounted for only 2.5% of export income from the industries studied and 2.1% of New Zealand's total 1989 exports. Electric fencing, for instance, which is one of the four case studies reported in full, and presented as a manufacturing success, generated only \$30 million in exports. But this group of industries was of particular interest to Porter because they are not resource-based, and use "advanced" technologies, which he interprets as evidence of upgrading.

The 25 industries studied for Canada represented a significantly lower proportion of export revenue—approximately 37% of total 1989 exports.³ This primarily reflects the exclusion of most resource-based and foreign-owned manufacturing exports from the study. Porter notes that an effort was made to represent all main Canadian exporting sectors: processed and unprocessed natural resource industries; manufacturing and service industries; industries with a high degree of both foreign and domestic ownership; and some that are significant to particular regions of the country.

2. Eighteen are listed in Table 1. The other two are "manufacturing" and "education". Porter apparently did not assess the competitiveness of these two broad industry groups (Figure 48).

3. These industries are listed in Table 2.

One way to understand the relationship between Porter's methodology and his emphasis in making policy recommendations is to use a matrix such as the one in Figure 2. Revealed competitive advantage, as measured by relative competitiveness of national exports in that industry forms the horizontal axis, and structural conditions creating competitive advantage, or diamonds, form the vertical axis.

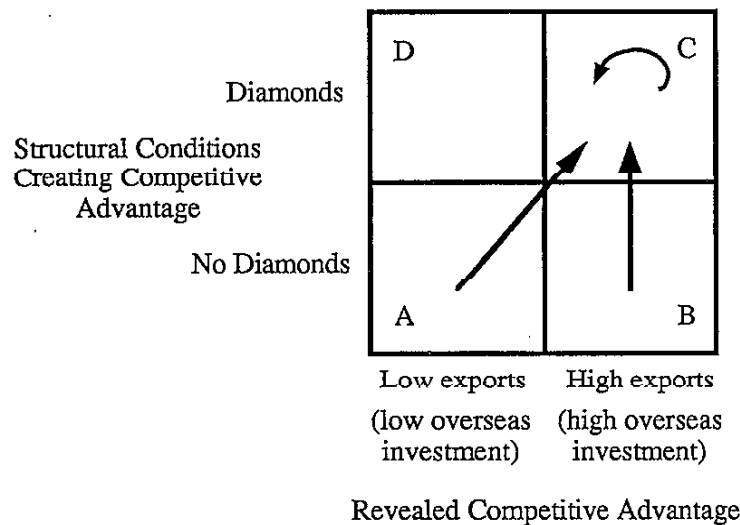


Figure 2

Policy Options Implicit in Porter's Model

Porter's three types of policy recommendations can then be shown as efforts to move industries from one quadrant to another. For instance, developing successful exporters by creating strong diamonds involves moving industries from quadrant A (low exports/no diamonds) to quadrant C (high exports/strong diamonds). One of the arrows traces that path. The second type of recommendation typically made by Porter is illustrated by the arrow that moves from quadrant B to quadrant C. It involves making sure that industries which already have high exports but not strong diamonds (quadrant B) be "supported" by developing those diamonds—in other words, moved up to quadrant C. Finally, where industries are already in the quadrant C, with high exports and strong diamonds, they should be reinforced. This is represented by the looped arrow. While Porter's policy recommendations flow from identifying the quadrant an industry currently occupies, and assume that quadrant C is the goal, they offer little guidance about how to move to this point.

Porter's choice of methodology brings with it two sets of problems that are a direct result of that choice, first in undertaking an analysis of successful industries

and nations as the basis for identifying causes for their success, and second in using the case study method.

Studies of successful entities, be they firms, industries or nations, suffer from well-recognised validity threats. Of these, the lack of a control group is probably the most important. In the case of Porter's ten nation study for *The Competitive Advantage of Nations*, this applies at both the industry and national level. His focus was on the link between international competitiveness, as measured by exports, and the existence and strength of diamonds, and he therefore examined exporting industries. Therefore, although Porter set out to provide advice in his two later reports, we can nevertheless treat the Canadian and New Zealand case studies as quasi-tests of the theory. Both provide examples of relatively new, resource-based economies, in contrast with mainly older and industrialised economies he originally studied.

In addition, the matrix in Figure 2 highlights one of the principal threats to Porter's findings. In starting with successful exporters, and then identifying their common characteristics, namely the presence of diamonds, Porter does not use a hypothesis testing methodology. If his initial studies had looked at a more representative industry sample that included, for instance, some non-exporting industries or firms (quadrants A and D), the hypothesis that strong diamonds exist in strong export industries could have been tested. But his selection methodology, which predominantly identifies industries in quadrant C, means that tests of these hypotheses, or the implication that quadrants B and D only exist as transitional states, are not possible.

This is not simply an academic preoccupation with theoretical rigour. The industries that Porter's approach omits—those in quadrants B and D—include at a minimum all resource-based activity, and most overseas investment by firms in less traded sectors, despite Porter's admission that overseas investment is important (Porter 1990a, p.25). Although he talks about the significance of overseas investment and operations, all the reported data in his analyses are for exports. But these other sets of industries are arguably the most relevant for both New Zealand and Canada, and as we will discuss later, also for Australia, if only because most of their existing firms operate in these areas. The theory, as conceived and applied, therefore, emerges as most relevant to mature, manufacturing-based economies.

Validity threats arising from the bias in Porter's selection of cases to be studied occur at the national level as well as for industries. His theory implicitly suggests a causal relationship between the existence of strong diamonds and strong national economic performance, although this mechanism is not explicitly articulated. New Zealand appears to be a confirming, or non-contradictory, case. Porter concludes that the economy has not performed well, and almost sets off to look for evidence of the lack of upgrading industries and diamonds. He finds the pattern he expects. We argue in the next section, however, that the evidence, which he accepted as confirming his hypothesis, actually suggests that he may be

explaining the wrong phenomenon. Specifically, small and isolated or peripheral economies may face different problems from non-isolated, mature manufacturing-based ones.

On the other hand, the Canadian data provide strong prima facie evidence against the hypothesised link between diamonds and strong economic performance. Canada's economy has clearly performed well over a long period, even though most of its export revenue comes from resource-based industries supplemented by the activity of foreign-owned, rather than domestic manufacturing firms. One of Porter's responses to this apparent disconfirming evidence is to downplay the performance: "Over the 1980s, Canada's economy performed quite well" (Porter 1991a, p.6)—where "quite well" includes second highest real economic growth between 1983 and 1989 of the seven leading industrial nations (G7). Another of his responses is to assert that this performance is fragile because it does not rest on constantly upgrading (i.e., innovative), domestically owned manufacturing industries and sectors—or strong diamonds. In other words, faced with contradictory empirical evidence, Porter concludes that reality must be about to change, to fall in line with the theory. Thus, New Zealand and Canada demonstrate two different things. The evidence of New Zealand does not disprove the hypothesised link between national economic performance and diamonds, but does suggest that other issues may be the critical ones, while the Canadian evidence provides a more direct threat.

The second methodological problem stems from the attempt to generalise from a few particular cases. Moreover, the cases are not described using a consistent framework and objective measures wherever possible. Such case studies, used as the basis for drawing inductive conclusions, do not necessarily readily generalise. Porter finds that the new cases, of New Zealand and Canada, do not fit his inductive conclusions. He responds by providing another level of inductive analysis, without returning to reexamine the original ten national case studies. One example is that the New Zealand study applies the industry structure framework from Porter's earlier work, *Competitive Strategy* (1980), to supplement the application of the diamond (Crocombe, Enright and Porter, 1991, p.51). Then in the dairy study in the New Zealand analysis, for instance, both frameworks are intertwined (Crocombe, Enright and Porter, 1991, pp.58–71). Thus, as more studies are carried out, the model is extended and complicated, rather than sharpened and made more powerful. The result is a sequentially more complex world, instead of a parsimonious and powerful one. As a result, the recommendations that follow the analyses are less and less grounded in the data.

Similarly, Porter's work is weakened by his methodology in which many categorisations are subjective and descriptive. For instance, whether domestic demand anticipates demand in other nations is judged ex post. Nor are there any clear or articulated measures for strength of elements of a diamond—on what basis is a demand condition judged to be strong, medium or weak? For example, no attempt was made to find any sort of uniform indicators of "sophisticated

demand”: why New Zealand farmers are more sophisticated than German, or Swiss or Australian farmers is never explained, only asserted, and the extent of their sophistication is not ranked in any way.

3.2 *Testing the Theory*

In terms of evaluating Porter’s framework, Canada and New Zealand provide useful “tests” of the diamond theory in their similarity in terms of being primarily resource-based, and relatively small economies, and their contrast as proximate economies—Canada neighbours a large market, while New Zealand is distant from any large market. Neither study provides empirical evidence in support of the theory. In this context, the most telling evidence on the basic application of the model appears in Tables 1 and 2, which set out the relative strengths of diamonds in the industries selected for study from among the successful exporters. They clearly show that neither Canada nor New Zealand has any complete diamonds, taking into account either the four main conditions, or the two supplementary elements Porter also reports of the rôle of government and the rôle of chance.

Let us look first at the Table 1, adapted from Porter’s Figure 48 (Crocombe, Enright and Porter, 1991, p.96). This presents the eighteen successful New Zealand exporters studied. The black circles indicate that an element of the diamond is strong, the grey circles represent a moderate influence and the hollow circles show low influence. The industries had been grouped into factor or demand driven. We have further grouped them into the additional categories Porter used for New Zealand of traditional, growing and emerging (Crocombe, Enright and Porter, 1991, p.96, Figure 47).⁴ It is worth commenting again on the fact that the ten industries identified as emerging (i.e., half of the industries studied), together accounted for only 2% (\$400 million) of total New Zealand exports in 1989, with software exports comprising \$100 million of that amount. Electric fencing, cited as a success, had export earnings of \$30 million—over 50% of world exports, in an industry whose global production totalled only \$200 million in that year.

Porter himself notes that very few New Zealand industries have developed multiple sources of competitive advantage. This is an understatement. Table 1 shows that only one of the industries studied (yachts) has at least three of the four main elements of the diamond effectively in place. Even among the five demand-based industries (construction, electric fences, engineering consulting, software, yachts), which one would expect to exhibit a high influence in at least two of the diamond elements, only two (yachts and electric fences) show high influence for any of these four elements.

4. Two of the industries studied, manufacturing and education, were not reported in his Figure 48.

Table 1

Sources of International Competitiveness in Selected New Zealand Industries

	Factor Conditions	Demand Conditions	Related & Supporting	Strat, Str, Rivalry	Rôle of Govt	Rôle of Chance
<i>Factor Driven</i>						
Traditional						
Dairy	●	-	⊗	-	-	⊗
Meat	●	-	○	○	○	○
Tourism	●	○	○	○	○	⊗
Wool	●	-	○	○	○	-
Growing						
Apples	●	-	○	○	-	⊗
Fishing	●	-	-	○	○	●
Forest Products	●	-	-	○	●	●
Kiwifruit	●	-	○	○	○	●
Emerging						
Cut Flowers	●	-	-	-	-	-
Deer	●	-	⊗	-	-	⊗
Goats	●	-	⊗	-	-	⊗
Methanol	●	-	-	-	●	●
Wine	●	-	-	○	-	-
<i>Demand Driven</i>						
Growing						
Construction	⊗	⊗	○	○	⊗	○
Emerging						
Electric Fences	⊗	●	●	⊗	⊗	⊗
Eng. Consulting	⊗	⊗	○	○	⊗	○
Software	⊗	○	○	○	-	●
Yachts	●	●	⊗	●	-	●

Legend: ● high; ⊗ moderate; ○ low; - no influence.

Source: Adapted from Crocombe, Enright and Porter, 1991, p. 96, Figure 48.

Table 2

Sources of International Competitiveness in Selected Canadian Industries

	Factor Conditions	Demand Conditions	Related & Supporting	Strat, Str, Rivalry	Rôle of Govt	Rôle of Chance
<i>Resource-Based</i>						
Newsprint	●	○	○	○	○	--
Market Pulp	●	○	○	○	○	--
Nickel	●	○	⊗	⊗	●	--
Aluminium	●	○	⊗	○	⊗	●
Atlantic Groundfish	●	○	⊗	○	negat.	--
Styrene	●	⊗	⊗	○	○	--
Electricity	●	⊗	●	⊗	●	--
Beef Processing	⊗	⊗	○	○	⊗	--
Manufactured Housing	●	⊗	○	○	⊗	--
<i>Market-Access Based</i>						
Auto Parts	○	○	○	○	●	--
Auto Assembly	○	○	○	○	●	--
Pulp & Paper Equipment	○	○	⊗	○	○	--
<i>Innovation-Driven</i>						
Ice Skates	⊗	●	●	●	○	--
Urban Rail	⊗	⊗	⊗	○	⊗	⊗
Flight Simulators	⊗	○	○	⊗	○	--
Ind. Explosives	⊗	●	⊗	⊗	●	--
Commuter Aircraft	⊗	⊗	⊗	○	⊗	⊗
Central Office Switches	●	●	⊗	●	⊗	⊗
Geophysical Contracting	●	⊗	●	●	●	--
Consulting Eng	⊗	●	○	●	●	--
Whisky	⊗	○	○	⊗	⊗	●
Life Insurance	⊗	⊗	○	●	●	--
Human Biologicals	⊗	○	○	○	⊗	⊗
<i>Other</i>						
Waste Mgt	⊗	⊗	○	○	○	⊗
Radiation Therapy Equip.	⊗	○	●	○	●	--

Legend: ● high; ⊗ moderate; ○ low; -- no influence.

Source: Adapted from Porter and the Monitor Company, 1991a, p. 140, Figure 5.1.

The successful Canadian exporters show a similar pattern, summarised in Table 2, based on Porter's Figure 5.1 (Porter 1991a, p.140). The twenty-five industries are grouped into four additional categories that Porter identified for Canada: resource-based, market-access based, innovation-driven and other. What evidence is there that the successful export industries are driven by the diamond? Table 2 shows that in the eleven innovation-driven industries, only three (ice skates, central office switches and geophysical contracting) are "high" on at least three of the four main elements of the diamond. If the two additional elements of government and chance are included, then a fourth (consulting engineering) has three elements of the six in place.

The basic application of the theory captured in these two Tables shows then that neither New Zealand nor Canada have any diamonds. Unfortunately, a similar test is difficult to apply to nations cited in the parent work, which sets out the study and theory development in more detail. Two conclusions can be drawn from this empirical finding: either both New Zealand and Canada are in dire economic straits because they lack these industry patterns, or the diamond does not apply to all national economies. While New Zealand's economic performance has not been strong, that is not the case for Canada. As the study reports, its long term economic performance by any number of indicators has been strong and improving, without specific indications of marked decline in prospect. Porter's cautionary comments about complacency, and the probable negative effects of the lack of diamonds are simply assertions. There is little evidence that the lack of diamonds has been damaging. One would have to conclude that if Canadian industry were a test of the diamond, the theory would fail.

Additionally, as we suggested in the preceding section, the evidence of New Zealand may suggest more about the costs of isolation and size, than about Porter's diamond theory. A small domestic market in combination with physical isolation may just mean that any successful firms will inevitably migrate. On the one hand, Porter deals with the problems associated with a small domestic market by recommending use of international markets. With electric fencing, for example, he notes that "the small size of the New Zealand market for electric fences and the intense rivalry among local firms has made building an export business an imperative" (Crocombe, Enright and Porter, 1991, p.85). But on the other, he acknowledges that successful New Zealand companies in advanced industries have moved their headquarters domicile. For example, Glaxo, one of the world's leading pharmaceutical companies, was founded in New Zealand in the 1920s, but eventually made its United Kingdom branch the head office. "The U.K. offered a larger, more advanced market and a superior research environment. The New Zealand branch is now a subsidiary that serves the local market" (Crocombe, Enright and Porter, 1991, p.153). And in the case of the software industry, while "Kiwi ingenuity" and determined entrepreneurs have given local companies a foothold in the global industry, these have not been enough to hold some successful companies in New Zealand. "Pressures to remain close to the

international customer base, pools of skilled personnel and innovation in technology made being headquartered in New Zealand increasingly problematic” (Crocombe, Enright and Porter, 1991, p.92). “FACT and PAXUS, two promising New Zealand companies, have moved their headquarters overseas. Inadequate supplies of software professionals, limited finance and a lack of leading-edge demand all contributed to their departure” (Crocombe, Enright and Porter, 1991, p.153). Arguably, Porter is simply recognising a process of migration out of small economies. The evidence begs the question that Porter does not address—won’t size always be an issue in a small domestic market, geographically isolated from most of the world’s large and sophisticated customer bases?

At the extreme, the most pessimistic conclusion from this may be that there is not a winning game for small isolated economies. Porter quite explicitly states in other contexts that size of the domestic market is not an issue, and claims that small size has not been a problem for Switzerland, for example. But Switzerland, which directly borders densely and largely populated nations of similar living standard is not an appropriate comparison. Nor are any of the original ten nations studied. In fact, when faced with the evidence and reality of New Zealand’s extremely small, and isolated, economy, he steps backwards on the proximity requirement. The report concludes that small size is a constraint that can be overcome by international trade: “New Zealand cannot rely solely on the domestic base to increase its standard of living” (Crocombe, Enright and Porter, 1991, p.38). And “. . . the small size of the New Zealand market means that a successful product quickly saturates the local market. Firms that seek significant growth have to expand into international markets” (Crocombe, Enright and Porter, 1991, p.91). But he has argued elsewhere that using elements of another nation’s diamond, such as demand, is not a long term strategy for national competitive advantage. In Zealand’s case though, he does not explain how or why firms would bring their global headquarters back home, when home is such a small, isolated market.

How then does Porter deal with these apparent contradictions to the theory? One mechanism that allows him to sidestep the apparent contradictions is his approach to the case studies, and their relationship with the recommendations. This relationship is at best, weak. Crudely put, in each of the two national studies, the case analyses are sandwiched between the theory statement and a set of generalised recommendations. While the summary analysis of the four determinants in each nation is related to the explicit diamond theory, the four New Zealand case studies reported in full are more historical descriptions of the industry’s development than theory driven analysis based on empirical evidence. More importantly, the recommendations bear little relation to findings about the New Zealand diamond. Most derive directly from the theory as formally set out in his major study. In a sense, they could have been written without any detailed study of or case analysis in New Zealand. Many of the recommendations that appear to be related to the empirical findings about New Zealand draw more on traditional macroeconomic theory and Porter’s conviction that the rôle of

government is to demand and challenge, not to nurture and support. They are characterised by the “pressure” model of motivation that Porter has implicitly adopted, rather than an analysis of industry diamonds. So, for example, the report notes:

... the laudable and proper desire to provide for all of society’s members has resulted in a social-welfare system that has unnecessarily limited incentives for individuals to save or upgrade their skills and has outstripped the nation’s ability to fund it (Crocombe, Enright and Porter, 1991, p.150).

It is easy to sympathise with such a statement, but far more difficult to find empirical support from the test of the theory.

In order to deal with the preponderance of resource-based New Zealand and Canadian industries, Porter draws on relatively peripheral elements of his major work. While these industries are discussed, they are not central to the theory. For the most part, his assumptions about them and their potential contribution to national economies are not well developed concepts that have been integrated into the diamond framework. Thus, although these allegedly “factor-driven” resource industries are referred to often in the parent work, Porter’s treatment of them oscillates. For instance, he acknowledges that “a nation with unusually abundant natural resources for its size, however, can enjoy high national income despite a position in the factor-driven stage” (Porter 1990a, p.564) but adds, “though it is not likely to be sustainable indefinitely” (Porter 1990a, p.564). No detailed evidence or rigorous analysis is offered in support of this assertion, which appears often throughout *The Competitive Advantage of Nations*. Nor is it clearly established that they are indeed driven by basic factor advantage. Elsewhere, Porter acknowledges that attempts to group industries to reflect different determinants of competitive success are problematic, and notes that “the problem with such generalisations is that technological change and the globalization of strategy have blurred the boundaries ... nearly every industry in the 1980s is knowledge intensive. Traditional industries ... are being revolutionized” (Porter 1990a, p.7, fn.39). This is echoed in the New Zealand study where he notes that their dairy industry does provide growth opportunities in some markets and segments, and makes the general observation that the further the product is from a commodity item, the higher the margin and the lower the volatility in prices (Crocombe, Enright and Porter, 1991, p.63).⁵ As we discuss in more detail in the next section about Australia, many resources are no longer commodities. Since resource-based industries are central to the existing configuration of both the New Zealand and Canadian economies, this failure to do other than make frequent, but conflicting assertions about them is a liability.

In the case of Canada, Porter deals with apparent contradictions to his theory in a number of different ways. For resource-based industries, for instance, which comprise the bulk of Canadian exports, he says that one can succeed in these with only one of the elements—basic factor conditions, and basic, rather than advanced ones, in place. An alternative explanation, weakly staying with Porter's framework, might be that since these industries usually have highly competitive international markets, the required demand characteristics of the diamond are globally dispersed, rather than concentrated within one nation, such as Canada. Rivalry also exists, but again, globally.

But if elements of the diamond do not need to be co-located for resource-based industries, then the same may be true for other industries. For example, if it is possible to access demand in a market with foreign competitors, then access to that market may be a perfect substitute for domestic rivalry. If the diamond is not local, then the entire edifice becomes unstable.

So then, not only are the data that appear in Table 2 not proof of Porter's theory, but the evidence of Canadian industry also does not inform decisions about what government policy should be. In applying the theory to Canada, Porter is effectively saying the government has to create domestic rivalry where none exists. The consequences of this are that he begins relaxing the requirements of the diamond—either by finding rivals, formally or by international bench marking, or by using demand conditions elsewhere (Porter 1991a, pp.364, 370).

In this, however, he appears equivocal about the U.S. market for Canadian industry. On the one hand, he recommends its use, albeit with caveats:

In recent years, a number of initiatives . . . promise to have a positive effect. The Canada-United States Free Trade Agreement, which has been a powerful catalyst in favour of competitiveness, will strengthen competition in the domestic market and spur more Canadian firms to participate in international markets (Porter 1991b, p.60; Porter 1991a, pp.322–323).

The geographic locus of competitive advantage can cross national borders. In the case of Canada, the relevant arena of competitive advantage for a particular industry may encompass adjacent parts of the United States . . . it makes sense for Canadian firms to reach into the United States diamond to strengthen their competitive position or overcome weakness in the Canadian diamond. . . But . . . firms can only take advantage of the United States diamond selectively. Basic factors and demand are easiest to access. In contrast, industry-specific infrastructure, a highly skilled workforce, and certain types of supplier and customer relationships are difficult for a country's firms—including Canada's—to source at a distance (Porter 1991a, pp.78–80; Porter 1991b, pp.31–32).

5. This analysis of the New Zealand dairy industry has been called into question (Spring 1992).

Despite . . . proximity to the United States, Canadian industries have not typically been driven by demanding domestic customers to seek higher-order competitive advantages. Canadian buyers are rarely at the leading edge in demanding innovative consumer goods. They are also reluctant—at least compared to American consumers—to voice complaints or to utilize consumer advocacy agencies to pressure providers of goods and services to enhance their products (Porter 1991*b*, p.52; Porter 1991*a*, pp.226–227).

At the same time, he seems to consider the United States market a weak demand/rivalry element, and not part of the global market:

Competing globally means competing beyond North America (Porter 1991*a*, p.370).

Most industries—particularly outside of the resource sector—that do export are oriented primarily to the United States rather than to broader global markets. Because of this inward focus, many Canadian firms . . . have not felt the pressure from world class competitors or extremely demanding buyers to improve productivity or produce higher value products (Porter 1991*a*, p.143).

Canada's rich natural resource endowments, its proximity to the U.S., and a history of insulation from international competition have combined to allow Canadian industry to achieve an enviable economic performance (Porter 1991*a*, p.3).

Although Porter is critical of the current performance of U.S. firms, he does say that they have been successful. But as these excerpts illustrate, he equivocates about why Americans, who have been demanding buyers from American firms become careless when buying from the Canadians. The crucial issue may be access for Canadian firms (although he does not explain why trade from Toronto to Chicago must be less effective than trade between Los Angeles and Chicago). Alternatively, the problem has its genesis in the poor quality of the American diamond. Elsewhere, he does recognise that there will often be rivals and demand elsewhere in the world, and that these can make a contribution to competitiveness. For example, in the study of the printing industry, he writes: “The successful Swiss firm, Witag, was a defacto part of the German cluster” (Porter 1990*a*, p.194). Essentially, however, in the case of Canada, he equates “localised” with “domestic”, without establishing how or why that is the case.⁶ Language about domestic diamonds is necessary for a theory of national competitive advantage, but most of his argumentation about localised clusters deals with regional

6. Rugman (1991, 1992) takes issue with Porter's definition of Canadian rather than North American diamonds for Canadian firms.

concentration, rather than the effect of geographically arbitrary national boundaries.

Both studies, therefore, have raised substantive questions about Porter's theory of the diamond that call into doubt whether the theory really is one of the competitive advantage of nations. At best, its scope is considerably more limited and specific. The theory may usefully explain competitive advantage in manufacturing of traded goods for which large scale plants are required. The theory does not adequately explain how such industries might be created where they are not already in place. Nor has it been validated with respect to small economies or resource industries. Finally, the linkage between the theory and government policy is not obvious.

4. The Australian Case

Given the application of Porter's framework to New Zealand and Canada, what might be expected were it to be used in a study of Australia? To answer this question, we begin by mapping types of successful Australian firms onto Figure 2, which we used to interpret Porter's other studies. We repeat that figure here, as Figure 3, for ease of reference, with the horizontal axis modified to include overseas investment with exports.

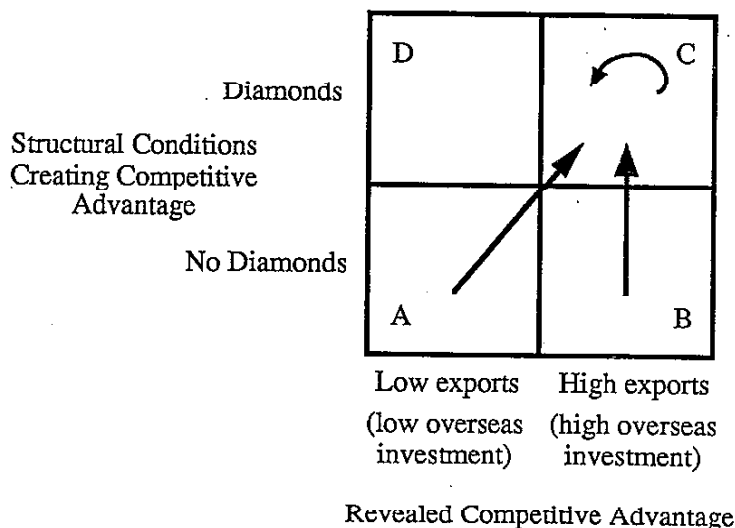


Figure 3

Policy Options Implicit in Porter's Model

Porter's theory focuses on firms and industries that export a significant portion of their output, since it provides a "unique window" into the sources of national economic prosperity (Porter 1991a, p.17, Crocombe, Enright and Porter, 1991a, p.16). The traded sector "... has particular leverage for productivity growth, especially in smaller and mid-sized countries ... In addition, the traded sector is where firms from a multiplicity of countries compete" (Porter 1991b, p.9). Accordingly, the cases Porter selected for detailed study in terms of the diamond are predominantly export oriented firms or industries. In *The Competitive Advantage of Nations*, these tended to be manufacturing firms with significant export sales. But both New Zealand and Canada unavoidably included a higher proportion of resource-based industries. More importantly, both had no industries in quadrant C of the matrix shown in Figure 3.

What would be the situation for Australia? Who are the large exporters that would form the basis of a Porter-style analysis of national competitive advantage? Australia's fifty key export industries, using Porter's methodology for determining export competitiveness, are ranked in an appendix to the New Zealand study (Crocombe, Enright and Porter, 1991, pp.189–190). All of these are resource-based. This points to a significant side-effect of Porter's disproportionate share measure. Even competitive manufacturing firms in a country with a strong resource base, like Australia, will tend to have disproportionately low exports as a statistical artefact. Nevertheless, a lower hurdle would not substantially alter the pattern of Australian firms in terms of the matrix. As with Canada and New Zealand, there would be few, if any firms or industries in quadrant C. Most Australian export industries would fall into quadrant B—resource-based firms, which have high exports but weak domestic diamonds.

At the same time, this export-based approach applied in Australia's case would fail to identify an important group of highly successful internationally competitive Australian manufacturing firms. These are the multi-domestics⁷—organisations which compete by locating small to medium sized production facilities in the markets in which they sell, rather than by exporting. A recent study (Yetton, Davis and Swan, 1992) identified that most of these firms compete in less traded industries such as building products or specialised food ingredients, in which overseas production is the predominant form of global competition. Thus, while they have high levels of overseas direct investment and overseas sales, their export levels are necessarily low.

Given this configuration of existing Australian firms and industries, how would Porter's policy recommendations apply? The first—to sustain firms in quadrant C by sustaining their diamonds—would not be relevant for Australia,

7. We use this term in a different sense from that employed by Porter.

given the lack of firms in this segment. But his recommendation that firms in quadrant A—low exports/weak diamonds—be moved to quadrant C is potentially more helpful. Therefore the light his work would shed on the development of emerging or latent exporters is examined below. We also discuss the usefulness of his paradigm for what he treats as the two deviant cases—resources and multi-domestics—as well as the implications of these two groups for the theory.

4.1 Emergents

There is a conventional view that the dynamic path of internationally competitive firms takes the following route. A firm begins with a distinctive competitive advantage, performs well and grows in the domestic market. At this stage, it is often an import substitutor. It then becomes an opportunistic exporter, typically operating overseas through sales agents in other countries. Exports are used to absorb any over-capacity but would not disrupt supply to domestic customers. As it continues to grow, the firm becomes a strategic exporter, producing specifically to service overseas markets. The final step in this progression to becoming a multinational enterprise (MNE) is to establish production locations in other countries—either as a regional export centre or to service particular markets that may, for instance, be inaccessible because of tariff or other barriers. [This model in part underpins Porter's claim that foreign production usually occurs together with a high level of exports (Porter 1990a, p.740).] This conventional view would be consistent with moving from quadrant A (low exports/weak diamonds) to quadrant C. But the sequence of development is unclear. Does the initial domestic success create a diamond, or does that emerge later, after exports are well established? In other words, does the path from quadrant A to C pass through quadrant B or D? Porter seems silent on the subject. Although we might infer from case studies (e.g., Italian tiles) that the initial prime mover gains a window of time, how it will use that to best advantage is unclear. Hence, government's rôle is also unclear.

Porter's works, however, say little about either the dynamics of creating a diamond, or which type of firms might seed it, how they might emerge, or their subsequent pattern of growth, and the factors vital for that (Porter 1990a, pp.407, 122–123). The theory as explained and applied focuses on how the four determinants operate as a virtuous cycle, but offers little insight into strategies for triggering or guiding the process. As few as six pages are devoted to this issue (Porter 1990a, p.675ff). Most deal with qualifications and difficulties rather than providing positive or actionable recommendations. One of the clearest conclusions is that the challenge is daunting for developing nations or those wishing to upgrade.

This highlights the weakness of Porter's failure to have a theory of firm development. In particular, he does not address how to ensure that more new firms emerge in those upgrading industries, or deal with how to ensure that more of those emergent firms become strategic exporters. Since relatively little is written

or known about how to achieve either of these objectives, or how to accelerate either process, contribution to this area would have been extremely valuable. Importantly, for Australia, for instance, Porter does not address whether government policies to reinforce a diamond constitute efforts to have a higher percentage of firms move along the hypothesised trajectory, or to speed up that process. Importantly, none of the recommendations in the New Zealand or Canadian studies directly refers to the creation of new firms. Nor is the potential of foreign firms to contribute to upgrading an economy dealt with comprehensively. The possibility of using them in a development strategy is acknowledged, but the treatment is again disappointingly brief for nations such as Australia which do not have a three hundred year old industrialised economy that needs revitalising, but have one that must grow from a different base (Porter 1990a, pp.678–681).

Instead of a theory of the development of firms, Porter provides two, much more generalised, views of the dynamics that drive the formation of new firms. One is the stage model of national competitive development, from factor-driven to investment-driven, then innovation-driven and finally wealth-driven. But although Porter's view of the rôle of government is stage driven, in the sense that the appropriate policies differ according to which of his four phases of economic development the nation is in, it is not clear where he would place Australia, or Canada or New Zealand in that historic process. This is partly because he is both normatively and descriptively equivocal about the sequence of this development. Empirical support for the four-stage model is not provided. If however, Australia and Canada are in the factor-driven stage, and are two of the wealthiest countries in the world, and have been for the past eighty years, then how can Porter realistically describe the benefits of that stage as ephemeral? Had his original study included more nations that are not older industrialised economies, his theory might have grappled with this issue.

The other view Porter advances is the progressive development of the diamond. One version, illustrated for the Italian Ski Boot industry, shows an industry beginning with a related industry, in this case hiking boots, and then moving to exploit factor and demand conditions (Porter 1990a, p.163, Figures 4–8). But later, he illustrates that the development of the diamond usually parallels the four stages, i.e., from factors to investments to customer-driven innovation (Porter 1990a, p.547). Neither can be readily translated into specific policies. The lack of clarity and consistency on development of new firms raises the deeper concern that Porter has little to offer an economy such as Australia on this subject. He would undoubtedly claim that the lack of firms in quadrant C is a sign of a poorly performing economy, but his prescriptions do not adequately address or deal with the problems and issues this conclusion raises.

4.2 Resource-based Industries

As noted earlier, resource-based industries mainly fall into quadrant B of Figure 3, with high exports but weak or no diamonds. Where a nation's resource industry has a diamond with related and supporting industries, such as capital equipment suppliers, it is usually because that nation was active in that industry in the nineteenth century. Consequently, it is naïve to suggest that a New Zealand pulp and paper machinery manufacturer could create a stronger diamond by developing a local equipment supply capacity, since this would involve head-to-head competition with a well-established Swedish, Finnish or American equipment supplier. Effectively, then, most resource-based industries in countries that are not already industrialised will be found in quadrant B. This is potentially a problem for the theory, but Porter simply implies that the industries themselves are not worthwhile. For a conclusion that carries such major implications for a resource-based economy like Australia's, or Canada's and New Zealand's, its premises are disturbingly unexamined in Porter's works.

To an extent, this is not surprising since none of the countries in *The Competitive Advantage of Nations* has a resource-based export economy. Instead, most rely heavily on global manufacturing for which the home base is critical in terms of economies of scale and scope, as well as marketing and product design. Exports from this home base are significant. Although few resource-based industries were studied, Porter nevertheless draws the conclusion that these are unattractive industries, and does not revise or examine it in either the New Zealand or Canadian studies.

He argues that advanced factors (digital data equipment, engineers, research centres) are most critical to competitive advantage, while the importance of basic factors (natural resources, climate, location) "has been undermined by either their diminished necessity, their widening availability or ready access . . . on international markets" (Porter 1990a, p.77). In reaching this conclusion, Porter appears to assume that resource-based industries are in the same category as low technology or low skill industries, in the sense that both depend on basic factors (Porter 1990a, p.77). He argues that not only are the returns on these basic factors low, irrespective of their location, but that competitive advantage in such industries is also unsustainable because "global competitors can easily circumvent" the basic factors on which they depend (Porter 1990a, pp.72–73).

The classification of resource-based industries with those characterised by low technology and skills is, however, tenuous. In Australia, mineral prospecting and extractive techniques are frequently highly specialised, and dependent on advanced technologies. Nor are returns on these natural resources uniformly low. By focusing on exports, Porter ignores returns to shareholders and other measures of wealth creation. On these measures, resource-based industries have been successful in Australia over long time periods. While firms producing products which can be classified as commodities may offer minimal returns, that does not apply where the resource product is differentiated, either in terms of quality or

suitability for specific applications. This phenomenon occurs across a whole range of natural resource industries, from coal to wheat. For example, with the increasing sophistication of firing technologies, which require specific and reliable performance, coal is no longer a commodity, but a differentiated product, for which all grades do not have ready substitutes. And for their part, pasta manufacturers will pay a premium for product with a particular gluten content, and will not accept substitutes.

Porter seems to imply either that resource-based firms are not innovative or, that if they are, innovations will focus on process, not product differentiation, and will be easily emulated. Embedded in his definition of innovation is an assumption about cycle times, particularly in comparison with those of competitors. Short time frames between each new development are implicitly critical. The time scale of innovation is not, however, constant across industries. The experience of Australia's large and successful mineral resource firms suggests time scales in a number of these industries are significantly longer than in manufacturing, as a consequence of the technology itself. For example, to go from exploration to production may take fifteen years. Moreover, the investment then made tends to be in long-lived specialised assets. The option to retool dramatically and incrementally upgrade is not available for these assets in the way much innovation and learning occur in manufacturing plants. Instead, learning is embedded in large-scale technical change and tends therefore to be more periodic and discontinuous. In these industries, one key learning mechanism is size—by being large enough to build one pot-line a year in aluminium smelting somewhere around the world, for instance. Time scales in industries characterised by technologies of this nature are long enough that a five- or even ten-year perspective (Porter's typical perspective) would yield little evidence of innovation. Nevertheless, it would still have been occurring in that industry's terms.

Thus, Porter's dismissal of the resource-based industries as a potential source of competitive advantage appears unwarranted. In addition, if Porter is wrong about resources, then his prescription—to “de-emphasise, quit, move downstream”—may be quite damaging. An alternative might be to “grow in areas of strength, build on cost, location and supply advantages”. The focus then shifts to how Australian firms can expand or otherwise improve performance of their resource-based businesses. While some of the supposed limitations on Australian firms are controlled by government (environmental policies, ports, infrastructure), others within the control of the firm may well surface from a study that does not begin with a bias against resources. For example, marketing, joint venturing with customers, and gaining control over logistics world-wide may emerge as critical issues.

4.3 Other Forms: Multi-Domestics

The existence of this group of Australian firms, and their distinctive internationalising characteristics, was identified in a recent study by Pappas,

Carter, Evans and Koop/Telesis (1990) for the Australian Manufacturing Council. It found that there were a number of successful international manufacturing firms in Australia, but the paradox was that these firms did not export much. They also therefore would not be seen in Porter's window into the sources of national economic prosperity.

Nor is this type of successful Australian international firm covered by Porter's theory. The paradox of manufacturing firms that are internationally competitive but do not export raises the issue of whether Porter's theory is inadequate or incomplete, or whether there is something strange about Australian firms. Closer analysis of these successful manufacturing firms, undertaken by Yetton, Davis and Swan (1992) in a subsequent study to examine this issue, revealed that they operate mainly in the less traded sectors, for which overseas investment rather than exports, is a better mechanism of international competition.

In the way we have represented Porter in Figure 3, these firms lie in quadrant A, with low exports and no diamonds. Their industry characteristics around international competition suggest that these firms are not latent exporters, so policy efforts that treat them as such, and aim to shift them to quadrant C would be misdirected and wasted. Porter does not recognise or make this point, but it is highly significant for formulating Australian industry policy.

It is worth noting here that in the principal work, and the Canadian study, Porter does occasionally refer to overseas investment, together with exports, as an indicator of international competitive success. But throughout that work and in the applications of the theory to both New Zealand and Canada, only export figures are reported or used as the critical test of international competitiveness. When, however, we extend the two-by-two analysis schematised in Figure 2, to include high exports and/or high overseas investment as measures of competitiveness, as shown in Figure 3, then the multi-domestics, like the resource companies, lie in quadrant B—high overseas investment (and low exports) without the presence of home-based diamonds.

As we reported earlier, Porter also uses the term multi-domestic, but differently. For him, multi-domestic international competition means that

competition in each nation (or small group of nations) is essentially independent. In the extreme case of a multi-domestic industry, there is no issue of national advantage or international competitiveness . . . Foreign ownership [in these less traded industries] will tend to be largely passive and involve only modest control from central headquarters (Porter 1990a, pp.53–54).

The evidence of the global success of Australian multi-domestics, and of the key rôle headquarters plays in coördinating and controlling these firms' globally dispersed operations, brings Porter's assertions about and tendency to dismiss this form of international competition into question. It would seem, on the basis of evidence relating to the actual operations of Australian resource-based firms and multi-domestics (presented below), that the usefulness and completeness of the

theory are questionable.

Australia's top manufacturing multi-domestics are among the world's most successful firms in their own markets, but meet none of Porter's requirements for global industries as the "battleground on which firms from different nations compete in ways that significantly affect national economic prosperity" (Porter 1990a, p.54). Most are in less traded industries and operate small to medium scale plants in multiple locations, across many different countries. Home base is not the only research, production or learning site, and may not be the key site. Much learning occurs by frequently building new plants, or by acquisition and bringing them to best practice. In that context, we would argue that Porter's dismissal of the "multi-domestics" missed a central issue, because he limits himself to interaction between markets (e.g., the common brand) and overlooks other forms of interaction within the firm.

The diamonds and their emphasis on home base implicitly assume that competitively useful learning can only occur domestically. Multi-domestics provide an example of the ability to capture learning across different locations, and provide internal competition. Why is that less effective than external competition? Rivalry for Porter is limited to inter-firm rivalry, but for multi-domestics, in which there are multiple operations for similar products using similar processes, intra-firm rivalry can operate highly effectively. It can be done in a way that maximises learning, being assertive and creative, rather than aggressive and defensive.

There is also an unstated but strong assumption that big, single point production domestic plants are the foundation of national competitive advantage—Boeing is the answer. As such, most multi-domestics are not the optimal strategy, and are mainly adjustments to work around trade or other barriers (Porter 1990a, pp.57–58). Indeed, it may be that Porter ignores this group because they appear to offer few benefits to the headquarter's national economy. His dislike of this form is evident:

... many Swedish, Swiss, and American multinationals moved abroad before World War II when trade barriers as well as transport costs were more significant, one reason they often have widely dispersed activities compared to Japanese or German firms in the same industry. A dispersed configuration is frequently hard to integrate and consolidate in one place, because local country managers desire to retain power and autonomy. The inability to shift to more concentrated and coördinated strategies necessary for competitive advantage is one reason why firms lose advantage in some industries (Porter 1990a, p.58).

These words contain an implicit cry of "come home America's multi-domestics". But the relevance of this concern for Australia is less than compelling, given that Australia's multi-domestics are not engaged in large scale traded goods production.

At the same time, Porter's failure to examine multi-domestics seriously, or therefore recognise them as an effective form of global competition, is understandable from an American perspective. For any U.S. multi-domestic, the

domestic division will be sufficiently large that it makes sense to regard that and global headquarters as synonymous. In Australia, however, this is not the case since the firm's domestic market will inevitably be degrees of magnitude smaller than overseas ones. In a sense, Porter's discounting of overseas operations and investment is the greatest weakness of his theory about the centrality of physical proximity for effective learning and innovation. Although he recognises that you can create some competitive advantage by dispersing activities, all his empirical methodology relies only on exports.

Emphasis on domestic market conditions can only be problematic for small, isolated economies such as Australia. Exporting firms with large scale home-base plants will simply not evolve in, or be sustained primarily by, such an environment. Nevertheless, the experience of Australia's multi-domestics provides evidence that alternative firm structures and strategies can form the basis of international competitive advantage. It shows that transfer of learning can occur effectively between multiple locations, and need not be sourced from the home base. The critical issue appears to be the capacity of the firm over time to capture and embed the learning, rather than the constancy of location in which it first occurs. Their experience suggests there is a sustainable way to tap into the market demand determinants of foreign diamonds.

There is also some evidence that a portfolio of plants allows multdomestics actively to balance the weakness in some national diamonds (in their industry) with strengths drawn selectively from other, and not necessarily Australian, diamonds. So, for instance, a Japanese firm may be used to source state-of-the-art technology, and an Australian plant to provide the competition for operations in a third country where the industry is still fragmented and the level of competition low.

The experience here also indicates that while firm size may be comparable across industries, plant scale size is not. That is determined instead partly by technology, where in some instances there are no increasing returns to scale beyond a relatively low point, and partly by degree of tradeability of the product and local market density. Multi-domestics tend to develop in those industries where medium-scale plant size predominates. In these industries, the implicit Porter view of a large domestic plant in which are concentrated all the strategically important activities and learning is not appropriate. While Australia is unlikely to develop firms in Porter's global industries, other forms of competitive advantage may be sustainable.

In a sense, these two types of firms or industries—resources and multi-domestics—which are deviant cases in Porter's context, and therefore largely unexamined, are the most crucial for Australia. They also highlight difficulties with one of the notions central to the diamond framework—proximity. One could argue that all of the diamond conditions exist globally for the large, and particularly mineral, resource based industries. For example, rivalry is no less intense for being dispersed around the globe, customers no less demanding, and the firms themselves no less responsive or innovative. For their part, multi-domestics

call into doubt the central proximity notion. In their case, the diamond exists intra firm, for all that it is geographically dispersed. The distinctive competence and competitive advantage of such firms is built in large part on their ability to turn the apparent competitive disadvantages of geographic distances and less traded goods into a source of advantage.

5. Conclusion

Our review of the application of Porter's ideas to Canada, New Zealand and Australia leads us to three conclusions and one puzzle. The first conclusion is that Porter has not articulated a theory of national competitive advantage. Rather, it is a theory about the competitive advantage of firms and industries within nations, though even the emphasis on nations (physical proximity) is progressively watered down. Second, the theory is not proven, either in the original work or subsequent studies. The absence of proof may be the result of study designs that emphasise description over validation. But where tests (albeit weak ones) of the theory are possible, as in Tables 1 and 2, the data does not support the theory. Third, the theory is not complete in two key respects. It does not adequately deal with dynamics, i.e., how new successful firms emerge and what might be done to encourage this, and it misdescribes or omits important types of firms such as those in non-traded sectors and resources. Put another way, Porter could be seen as promoting a theory for refocusing American or European firms on the essentials of global manufacturing in or near large markets, given that many of the ingredients of the diamond are already in place for them.

The puzzle is a simple one: why has the work been so popular with policy makers and industry groups? In preparing this review, we were surprised by the lack of serious comprehensive critical work on Porter's theory by other scholars. Perhaps part of the answer is in the apparent neatness of the diamond as offering a generic solution for the problem all managers and governments would like to be able to solve—how to generate and keep strong firms that contribute to economic growth. In this respect the theory may be seen as a global version of *In Search of Excellence* (1982), and while it draws attention to previously under-emphasised aspects of competitiveness, it may well suffer a similar fate as a general theory of success.

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