

## 4 Which firms cooperate?

In this chapter we ask which sort of firms are most likely to form cooperative arrangements and which are not (Sections 4.2 and 4.3). For example, are large firms more likely to cooperate than small firms, or do high performing firms dominate the group of cooperating firms? These questions can also be posed for firms in different industries and states.

The inter-relationship between firm characteristics and the existence of cooperative arrangements can provide an indirect link between cooperation and firm performance. In Chapter 3 we suggested that the nature of a firms products may affect whether it cooperates. For example, we expect that firms with highly complex products will forge more cooperative relationships. Other important factors were predicted to be the rate of technological innovation, cost of product failure, importance of reputation and level of tailoring of product to individual customer needs. This chapter tests these hypotheses.

It must be emphasised that businesses are complex, multifaceted entities. Trying to distinguish the set of characteristics explaining why firms establish, or fail to establish linkages is difficult. For example, older firms tend to be larger. Larger firms tend to have more complex forms of ownership. But which of these factors drives their cooperative urge? To overcome these difficulties, results from modelling are used in Section 4.3 to confirm the partial analyses of the survey data and also to provide comparisons with information in other studies. More information on the use of these models is contained in Appendix A.

### 4.1 Overview

We summarise the incidence of cooperation for different types of firms in Table 4.1. We present the detail later in the chapter.

Apart from specific firm characteristics (examined in Section 4.2) there are some more general factors which may influence whether a firm is in a cooperative arrangement. These are the industry in which the firm operates, the state in which it is located and whether it is located in a metropolitan or regional area.

**Table 4.1 Which firms cooperate, by various characteristics (a)**

<i>Characteristic</i>	<i>Number of respondent firms</i>	<i>Per cent of firms cooperating</i>	<i>Difference from average (b)</i>
All firms	1286	41 <sup>(c)</sup>	–
<b>Industry</b>			
Clothing and footwear	291	32	A
Engineering	578	41	D
IT&T	131	54	A
Sci/med	122	48	B
Food	156	39	D
<b>Exporters</b>			
Exporter	358	54	A
Non-exporter	768	35	A
<b>Size (employees)</b>			
Micro	459	36	A
Small	230	44	A
Medium	254	43	C
Large	76	63	A
<b>Technology</b>			
Low	287	32	A
Medium	552	40	D
High	386	50	A
<b>Performance</b>			
High	85	50	A
Low	91	35	D
<b>State</b>			
NSW	448	40	D
VIC	408	42	D
QLD	153	37	D
SA	118	38	D
WA	93	48	B
<b>Product</b>			
Further processing	255	37	C
Capital equipment	222	57	A
Consumer goods	761	38	D
<b>Age</b>			
Young	202	47	A
Established	611	40	D
Mature	371	42	D
<b>Ownership</b>			
Unincorporated	75	31	A
Australian private	1032	41	D
Australian public	30	60	A
Australian subsidiary	14	50	D
Foreign subsidiary	35	60	A
Foreign owned	24	58	A

- Notes:(a) These are listed in a rough order of importance of each characteristic's influence on a firm's propensity to cooperate. The definitions of each group are included in the glossary.
- (b) A = significantly different from the average at the 95% level of significance; B = 90-94%; C = 80-89%; D = below the 80% level of significance.
- (c) We report the survey response of 41 per cent – rather than the bias adjusted figure of one-third. We do this because we did not have reliable information to adjust for bias for sub-groups of firms.

Source: BIE survey

### 4.1.1 Industries

Table 4.2 provides information on the number of responses to the survey received from firms in the five industries sampled by the BIE.

**Table 4.2 Survey responses by industry**

	<i>Clothing and footwear</i>	<i>Engineering</i>	<i>IT&amp;T</i>	<i>Scientific and medical</i>	<i>Food</i>	<i>Total<sup>(a)</sup></i>
Cooperating firms	94	237	68	58	65	525
Non-cooperating firms	197	341	63	64	91	761
Total	291	578	131	122	156	1286

Notes: (a) Not all firms could be placed in one of the five industries.

Source: BIE survey

Industries can shape firms. A central question is: do different industries have different degrees of cooperation among member firms? Blackburn (1993) for example, in his analysis of two surveys of small businesses in the services sector in the United Kingdom, found that the industry effects were important in understanding a firm's links to the wider environment. However, the AMC (1994) found:

“...there is no significant relationship between industry sector and the implementation of best manufacturing practices [one of which is inter-firm cooperation] and the achievement of their related outcomes. In fact the variation in practices and outcomes within each industry sector is greater than the variation across sectors.”

Given this uncertainty we sought to discover why some industries tend to have more cooperating firms. We found that the IT&T industry has significantly higher, and the Clothing and footwear industry significantly lower, proportions of cooperating firms than that observed in the total survey population (Table 4.1). The Scientific and medical industry also has a higher level of cooperation than can be expected on average.

The high level of business cooperation in the IT&T industry may reflect the emerging demand for IT solutions (Standard and Poor 1993). Each IT firm provides only part of a complex whole. The products themselves are often tailored to customers' specific needs and have a high after sales component, thus requiring close contact with customers and providing greater opportunities for cooperation. This is a rapidly developing industry and so there may also be a greater need to keep abreast of new technology and developments both in Australia and overseas. Business cooperation can provide the vehicle for these requirements. The Scientific and medical industry shares many of these features.

Conversely in the Clothing and footwear industry, the low level of business cooperation can perhaps be partially explained by an historical tendency towards secrecy in order to protect design advantages. Clothing and footwear manufacturers do, however, have some level of dealings with suppliers and customers to ensure smooth production.

To allow for this variation in the cooperative stance of industries we compare the firm characteristics examined in Section 4.2 on an industry-by-industry basis, as well as overall.

### **4.1.2 States**

When firms were broken down by state there is a significant difference in the proportion of firms cooperating in Western Australia (48 per cent of firms involved in linkages), from that in the overall population (41 per cent). However no highly significant difference is found in any other state (Table 4.1).

Western Australian firms rely strongly on each other as they are isolated from the bulk of the firms which are on the eastern seaboard. This is demonstrated by the fact that 71 per cent of Western Australian firms have their most important cooperative arrangements with a local company (same town or same state), whereas only 52 per cent of firms in other Australian states have their key linkage with local companies. These differences may also be partially due to variations in the industry focus of various states.

We found a greater concentration of:

- Clothing and footwear firms in Victoria;
- Food industry firms in SA and WA; and
- IT&T firms in Queensland and WA.

Since cooperation varies by industry, some of the differences in the level of cooperation at the state level may really reflect underlying industrial structure more than a real locational difference. This makes it necessary to consider the interaction between state and industry in the following analyses.

### **4.1.3 Metropolitan and regional firms**

It could be conjectured that metropolitan firms have greater opportunities to cooperate with other firms than do regional firms due to the large number of businesses nearby. On the other hand, it can also be argued that regional firms may make a greater effort to link with other firms to overcome any disadvantages they suffer due to their location.

In fact there is no significant difference between the proportion of firms cooperating in these two groups. For this reason the metropolitan/regional split will be ignored in the remainder of this chapter.

## **4.2 Characteristics of cooperating and non-cooperating firms**

We now test whether the incidence of cooperation varies in firms with different characteristics (see Chapter 3 for the rationale). These characteristics are the size and age of the firm, its level of exports, performance (measured by turnover growth rate), type of product, the product's technology content (low, medium or high), level of competition in the market (low, medium or high), ownership, competitive advantages and constraints.

### 4.2.1 Firm size

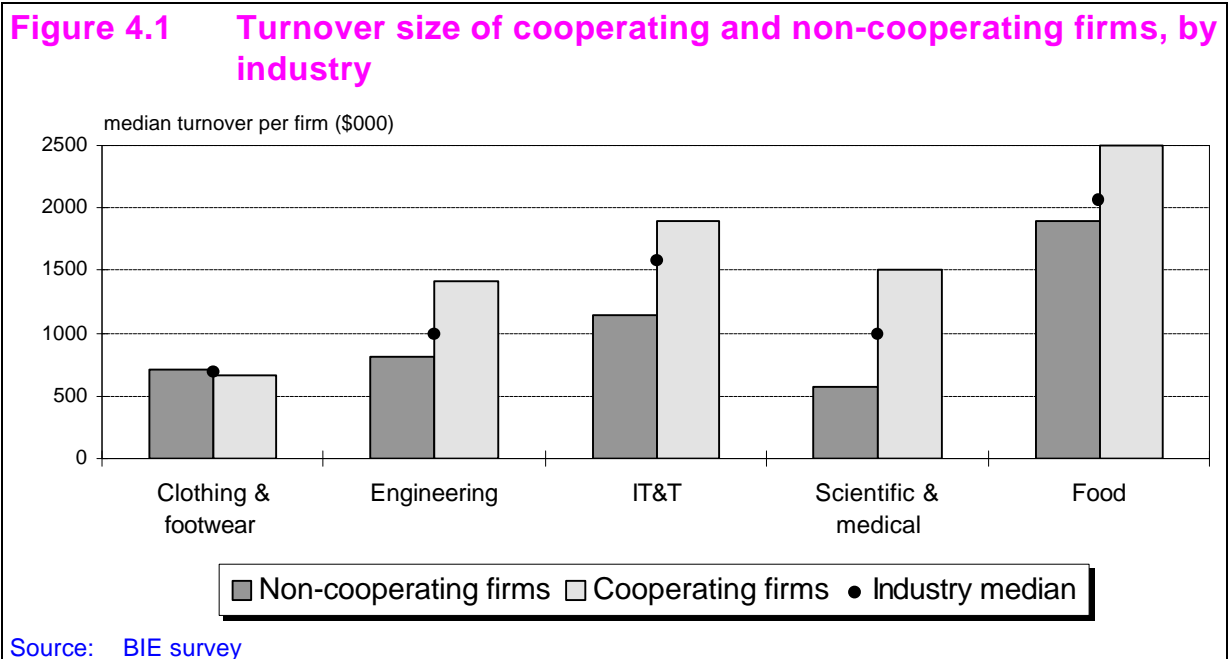
Interviews with firms suggested that larger firms<sup>1</sup> more easily attract partners because they offer greater technological and managerial capabilities. Larger firms can also spread the fixed costs of cooperation over greater resources and have more time available for networking.

Chapter 3 put forward the hypothesis that firms with big transactions (and therefore often larger firms) could be expected to make more use of cooperative arrangements. Additionally large firms are probably more likely than small firms to employ people trained in management and so more knowledgeable of management techniques, such as business cooperation.

Previous research backs up the opinion that large firms have a greater propensity to cooperate. BIE (1994b) found that very large firms commonly use outsourcing (changing the supply of goods and services from internal production to purchasing from external sources) to lower costs. From this position it is a small step to develop cooperative arrangements. AMC (1994) found that the larger employers in their surveyed group of firms were marginally more likely to implement best practice programs, part of which involves cooperating with others.

What about the flip side? Are there reasons why small firms are *less* likely to form business arrangements? MacMillan et al (1990) found small business owners reluctant to seek outside advice and assistance. Blackburn (1993) also found small firms kept business contacts, owners of other businesses, and customers and suppliers at a distance when resolving critical problems so as not to damage their reputation or lose face. However, linkages still provide advantages to small firms by allowing them to be more focussed on a core group of activities.

The data from this study shows a significantly lower level of cooperation in micro (very small) firms (Table 4.1). As expected, large firms have a much higher propensity to cooperate.



<sup>1</sup> Firm size can be measured in a variety of ways and in this study both employment level and average annual turnover are used. These two tend to move together.

This higher tendency for cooperation among larger firms is preserved at the industry level – and is especially marked in the Food industry (Figure 4.1). The mixture of very large, vertically integrated companies (including some multinationals) and micro firms, may account for this diversity in the level of cooperation between large and small firms in that particular industry.

We find large gaps between the median turnover of cooperating and non-cooperating firms in the IT&T and the Scientific and medical industries. This points to difficulties that small firms in these industries may encounter in trying to enter cooperative business arrangements. These are very much research and design based industries. Small firms can find it hard to be noticed by other companies.

The size effect is particularly conspicuous for Victoria. This reflects the high proportion of Clothing and footwear firms in Victoria - these have a lower level of cooperation and are also generally smaller in size.

### 4.2.2 Age of firm

There is a debate as to whether cooperative business arrangements are more common, or more important, in younger or older firms. Birley, Cromie and Myers (1991) found that older firms relied no more heavily on business contacts than did younger firms. Smallbone et al (1992) found only about half of mature businesses had sought outside assistance over a ten year period.

The average age of firms in the BIE study does not vary greatly between the cooperating and non-cooperating firms. The average year of commencement of operations was 1972 in both cases.

When we divided firms into three age categories – 5 years or younger, 6-24 years, and older than 25 years – we discovered that a slightly higher proportion of younger firms have cooperative business arrangements<sup>2</sup>(Table 4.1). This may be because younger firms are less self-sufficient, or have formed at a time when increasing emphasis is being put on business cooperation by other firms.

It is hard to tell whether age really has much impact on the likelihood of cooperation because it is confounded by:

- **size effects.** Young firms are mainly small, while mature firms are larger; and
- **industry effects.** The average age of firms varies greatly by industry. Those in the IT&T industry are the youngest (16 years on average), while the Food industry contains the oldest firms (31 years on average). We found that when the age of cooperating and non-cooperating firms is compared *within* an industry, there are no significant differences.

There is a lesson in all this. Associations that appear valid on the surface can vanish when deeper analysis is undertaken. So it is with age. What we originally took to be a reliable age effect disappears when we account for industry effects.

### 4.2.3 High and low performance firms

The top 20 per cent of firms in terms of turnover growth rate in the BIE study have been categorised as high performance firms. Of these, 50 per cent are cooperating firms (Table 4.1). This is significantly higher than

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<sup>2</sup> The relevant survey question asked firms what cooperative business arrangements they currently have. This causes a bias against cooperation by very young firms, say less than one year old, as there is a certain lead time needed to develop a cooperative arrangement which these firms have not had. For this reason the level of cooperation by young firms is most likely underestimated.

the 41 per cent level of cooperating firms in the whole firm population. Of the low performance firms only 35 per cent are cooperating firms<sup>3</sup>.

Large firms are less likely to have rapid growth than micro firms. Recording a growth rate of 100 per cent is easier with a turnover of \$10 000 than \$1 million. However, surprisingly, the only difference in the size structure of firms classed as having high and low growth rates is that low performers are more heavily slanted towards micro firms (see Section 4.2.1). This reinforces the lower level of cooperation expected for low growth firms.

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<sup>3</sup> There could be a problem with this analysis due to the movement of firms between the two snapshot groups - cooperating and non-cooperating firms - during the period for which growth is calculated. However, the large differences in the average growth rate of these two groups suggest that movement would need to be extensive to influence the findings adversely.

Of course, this correlation does not imply that cooperation necessarily *causes* the high growth. After all:

- low growth firms may cooperate less because prospective partners want to form relationships with more dynamic firms; and
- high growth firms have the managerial competence and resources to form cooperative arrangements<sup>4</sup>.

#### 4.2.4 Exporters and non-exporters

Recently there has been much emphasis by the Government to increase and diversify Australian exports. Two AMC and McKinsey reports, *Emerging Exporters* (1993) and *Wealth of Ideas* (1994), have concentrated on small and medium manufacturers and their rapidly increasing involvement in export markets. Central to these reports is the idea that linkages with other firms provide a spur to improved export performance, as well as access to diverse information and ideas.

Our data confirm a relationship between export propensity and cooperation:

- non-cooperating firms have an export propensity of 4.3 per cent compared to 14.3 per cent for cooperating firms;
- in interviews with the BIE, firms saw cooperation as a vital strategy for accessing export markets (Box 4.1);
- the relationship still holds *within* industries. For all five industries, exporters are more likely to cooperate than non-exporters; and
- the relationship largely holds *within* states – with exporters likely to cooperate more than non-exporters in all states except WA.

#### 4.2.5 Product type

In Chapter 3 the hypothesis was proposed that firms which tailor their goods for particular customers are more likely to have cooperative arrangements. The BIE survey asked firms to classify their predominant output as either being sold on to other firms for further processing, sold as capital equipment, or sold to distributors or final consumers.

##### Box 4.1 Cooperation – providing a foundation for growth

*Diemould Tooling Pty Ltd is a South Australian engineering firm employing 35 people. Much of Diemould's work comes from the South Australian car industry, an industry that regularly has its ups and downs. This causes major problems for Diemould in terms of staffing, capital investment and so on. To diversify its activities and provide a more stable flow of work, Diemould is looking for work in other states and overseas.*

<sup>4</sup> Two other studies have examined the relationship between firm growth/performance and the presence of cooperative arrangements. AMC and McKinsey (1994) found high growth emerging exporters are more likely than other firms to pursue joint initiatives, especially those formed for innovation. In their study high growth firms are those with total revenues over \$10 million and export growth more than twice their industry average.

Additionally, the AMC's *Leading the Way* (1994) scored firms on their approach to best practice, of which the formation of cooperative business arrangements are one form. It is through working with, and learning from, other firms that best practice is achieved. It was found that in Australia the top scoring 20 per cent of firms, had higher sales growth (4 per cent) than the lowest scoring 20 per cent (a decline of 0.5 per cent).



*The company tried exporting a few years ago, but the cost and difficulties it faced in doing so proved too much for a single firm to face. Now Diemould is in a network with four other engineering firms to crack the export market.*

*The five firms share the costs of developing export markets and most importantly, can offer a complete package of services, with the customer only needing to deal with a single company. The companies jointly undertake production, share capital equipment and work together to improve quality and both production and management skills. They even jointly fund a program to keep employees up to speed with technological developments in their industry (which they could not afford on an individual basis).*

*Through working with others, Diemould plans to raise its exporting activity from currently negligible levels to around 50 per cent of earnings in the coming years; and at the same time provide a more stable foundation on which to grow.*

Source: BIE interview

Those firms which produced capital goods are significantly more likely to be involved in a cooperative arrangement (57 per cent in a cooperative arrangement) than expected from the all firms average level of cooperation<sup>5</sup> (Table 4.1). The close relationship between production of capital goods and higher levels of cooperative arrangements may be due to the fact that these are complex goods which often incorporate modifications to suit the client. This is fertile ground for inter-firm cooperation.

#### **4.2.6 Technology content**

In Chapter 3 we suggested that factors such as complexity, high monitoring costs, large single transactions and the need for feedback would propel high technology firms towards cooperation.

The study found that nearly 50 per cent of firms with a high technology product are in cooperative business arrangements, compared with only 32 per cent with low technology products<sup>6</sup> (Table 4.1). Anecdotal evidence also suggested a link between technology and business cooperation (Box 4.2).

The technology content of industries varies enormously. But in each industry we still find that cooperating firms tend to be more high tech than non-cooperating ones (Figure 4.2).

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<sup>5</sup> These results still hold when we take account of possible industry or state effects.

<sup>6</sup> Definitions of high, medium and low technology firms are contained in the glossary.

#### Box 4.2 High technology – high cooperation

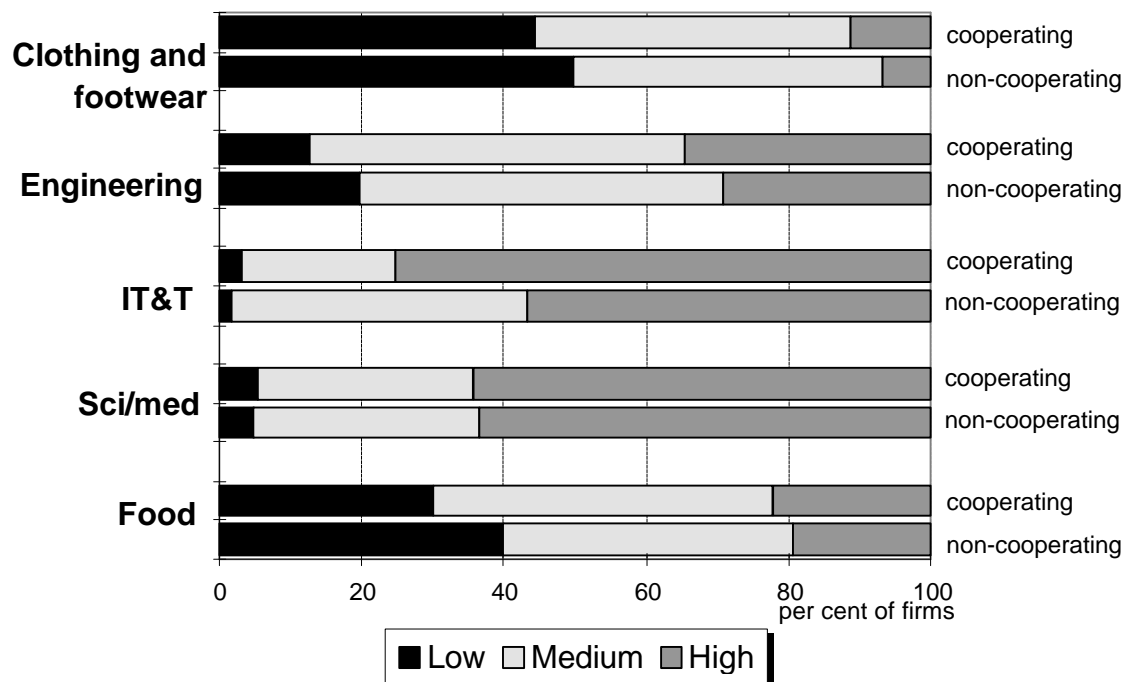
*Pan Bio was formed in 1988 and its products include high technology test kits for serological diagnosis. Technologies include ELISA and rapid single test devices. Agricultural biotechnology diagnostics are a new area for the company. Around 15 per cent of revenue is from exports, and this is the most rapidly growing segment of business.*

*Pan Bio has strong R&D links with overseas companies and local research institutions. The typical international network is with European and US biotechnology manufacturers. In the Asian region Pan Bio provides marketing and distribution for not only its own products but also services other international manufacturers.*

*Most networking is done through travel initially as it is important to build up personal relationships. Follow up is by fax and phone and periodic visits.*

Source: BIE interview

**Figure 4.2 Technology content of product by industry and cooperation status**



Source: BIE survey

#### 4.2.7 Ownership

The form of ownership may influence whether or not a firm becomes involved in cooperative business arrangements. More complex forms of ownership may provide a firm with increased opportunities to work with other firms – the management team is larger and has more time to devote to building up relationships with other firms. A large management team provides more personal contacts in other firms. Our face-to-face interviews revealed this to be a common factor in initiating cooperative business arrangements. More complex ownership forms often involve other firms in the actual ownership of the firm (for example parent

companies). This indirectly allows more cooperative arrangements to be developed by providing a good reputation, the use of pre-existing contacts, and indeed, increased use of best practices (AMC 1994). Finally, these companies are more likely to have a strategic plan aimed at long term growth, of which the formation of beneficial linkages is frequently a part.

Do firms with more complex forms of ownership cooperate more with other firms? It appears so.

Unincorporated firms (6 per cent of respondents) have a strong trend towards independent operation with nearly 70 per cent claiming no involvement in cooperative business arrangements. There is some correlation here with the size of firms, as unincorporated firms tend to be small, both in terms of employees (a mean of 7 employees) and turnover (\$1.5 million mean). As discussed above, smaller firms are less likely to be involved in inter-firm cooperation.

The opposite is true for those with more complex forms of ownership (public companies, subsidiary companies, and foreign-owned companies). They have a tendency towards forming cooperative arrangements (on average 56 per cent) and also tend to be larger in terms of both turnover (a mean of \$8.5 million) and number of employees (a mean of 33).

Inter-industry and state comparisons are not possible as the sample sizes are too small for some ownership categories to allow any meaningful conclusions to be drawn. Unless all the interacting influences are modelled (Section 4.3) we find it hard to decipher whether it is the influence of firm size or the form of ownership which affects involvement in inter-firm arrangements.

#### **4.2.8 Competition**

Over 65 per cent of respondents regarded the level of competition in the market place as high. There is no significant difference between the responses of those involved in inter-firm cooperation and those not; even on an industry or state basis. Only 5.4 per cent of firms believe there is little competition in their market. Using this information we find no connection between the level of competition and the incidence of business cooperation<sup>7</sup>.

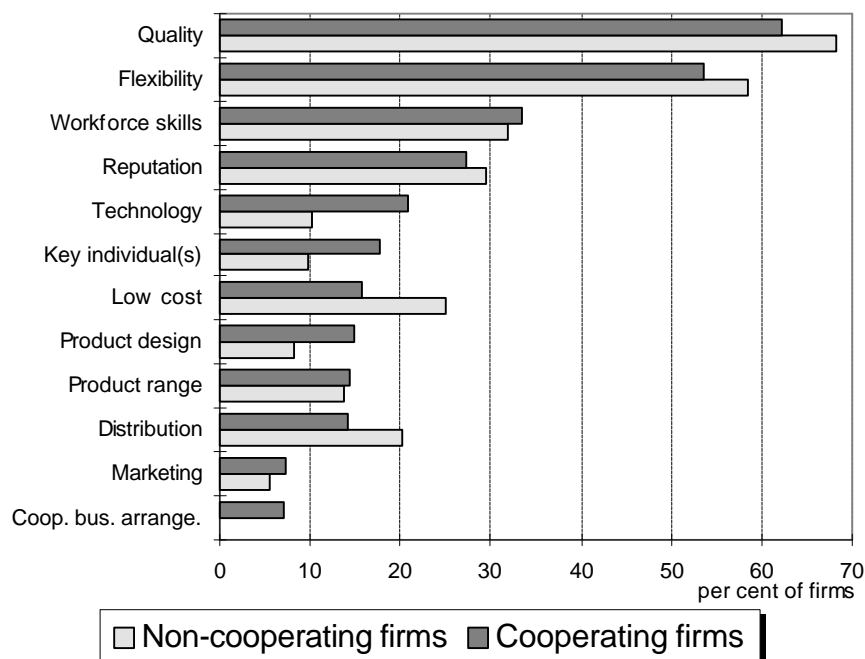
#### **4.2.9 Competitive advantages**

A firm's competitive advantages drive its market position. Respondents to the BIE survey were asked to rank the top three competitive advantages of their firm (Figure 4.3). For all firms, across all industries and states, the most common four competitive advantages are quality of products/services, flexibility in meeting customer needs, skills of workforce/expertise, and prestigious brand/good reputation. The ordering is fairly similar whether firms are involved in cooperative relationships or not, differing only in the mid rankings. Results are also in accordance with Buttery (1993) and AMC (1994). Firms already involved in cooperative business arrangements are more likely to see technology/good ideas, product design, and key individuals, and, of course, their cooperative business arrangements as sources of competitive advantage.

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<sup>7</sup> However, it may be that our question on the extent of competition failed to adequately discriminate between different degrees of competition.

**Figure 4.3 Firms' competitive advantages, ranked as top three**



Source: BIE survey

The similarity of competitive advantages raises doubts, for not all firms can be competing on the basis of an advantage in the same area. Firms may perceive themselves as having an advantage in an area where they do not. This would possibly hamper firms in forming successful cooperative relationships as they do not recognise their true strengths and possibly weaknesses.

Firms rank cooperative arrangements last – in fact only 7 per cent of firms listed ‘cooperative arrangements in which your firm is involved’ as one of their top three competitive advantages. Even in the relatively cooperative industries, such as IT&T and Scientific and medical, cooperative business arrangements are no more highly ranked. But this is not surprising as cooperative arrangements are primarily tools which allow firms to better exploit other competitive advantages.<sup>8</sup>

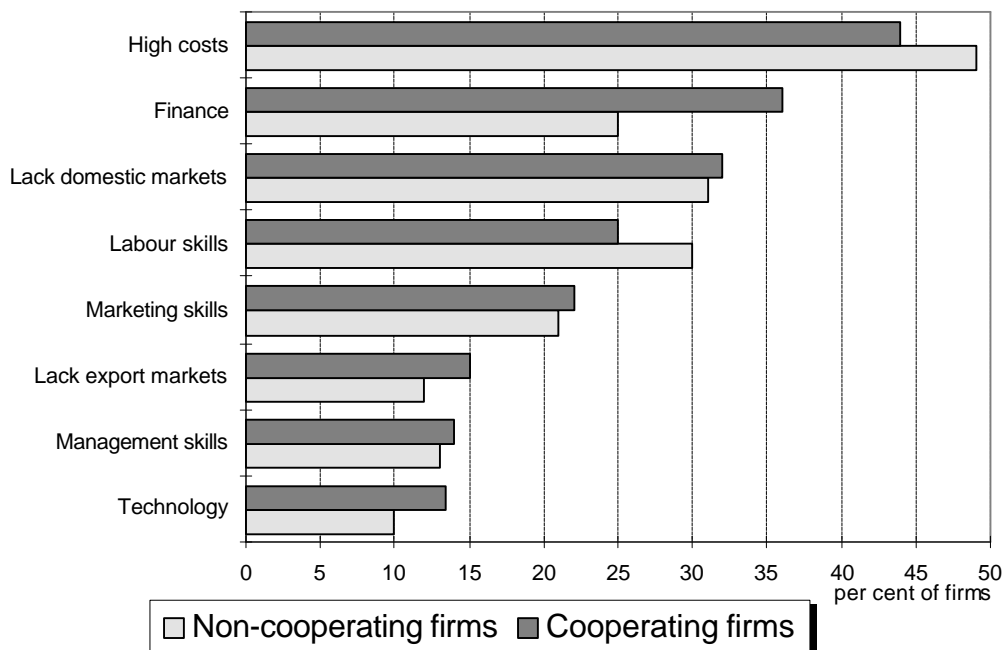
#### 4.2.10 Constraints

There is a large body of work which argues that cooperative business arrangements are formed to overcome limits to, and constraints on, firm growth or performance (Bosworth 1990; Barber, Metcalf and Porteus 1990; Ashton Business School 1991).

If this argument holds we would expect a significant relationship between constraints and a firm's involvement in linkages. In fact this does not occur.

Cooperating and non-cooperating firms both nominate the same areas – high costs, access to finance, lack of domestic markets, and labour skills – as the greatest constraints on their performance (Figure 4.4).

<sup>8</sup> The issue of how firms use business cooperation to exploit their competitive advantages is addressed in Chapter 7.

**Figure 4.4 Constraints on firm performance, ranked top three**

Source: BIE survey

However, a higher proportion of cooperating firms note access to finance as a constraint on their performance. This is perhaps not surprising given that financial constraints most adversely affect fast growing or high technology firms where cooperation is more likely. In total, 37 per cent of cooperating firms see access to finance as a critical constraint on their firm's performance.

BIE (1994a) notes that small innovative firms suffered from both supply and demand side constraints in the operation of financial markets. Our study also found some smaller firms, particularly those with new products or services, have had difficulty accessing finance. For example one firm commented:

*"Although our company has the technical know-how and has developed a product we can not obtain any finance to go into production. Lending institutions want security not a product and as a result we have been forced to look at manufacturing the product overseas, or even selling the technology."* (BIE survey)

To overcome these problems, some firms have approached financing through cooperative arrangements.

### 4.3 Modelling analysis

The information presented in this chapter begs one further question. Firms are identified by a bundle of characteristics. For example, a large firm may be older, have a complex form of ownership, but not be involved in the export market. Its size suggests that it would cooperate, but its lack of exports make this less likely – which factor exerts the strongest influence? The inter-relationships of firm characteristics can be examined by using a model relating cooperation to a range of firm characteristics.

The model results are more robust than the partial analysis as they take into account the interaction between different variables (firm characteristics), whereas a partial analysis looks at only two variables in isolation from all others. Thus a partial analysis of individual survey findings may sometimes give misleading results.

This is what we found, for example, when we looked at whether age and cooperation were correlated. Partial results provide a useful basic test for hypotheses but, where possible, they should be compared with the results from a more sophisticated model.

The model results (presented in Appendix A) suggest:

- firms in the Clothing and footwear industry are less likely to cooperate (no other industry effects were found);
- firms in WA are significantly more likely to cooperate;
- the bigger the firm (either turnover or employees) the more likely they are to cooperate;
- turnover growth is *not* a significant factor determining cooperation;
- firms producing capital goods are more likely to cooperate;
- firms which derive a competitive advantage from key individuals, or from technology/good ideas, are more likely to cooperate; and
- firms facing finance constraints have a higher probability of being cooperative.

## 4.4 Summary

Firms without cooperative arrangements form a substantial proportion of Australian industry. Government policies and programs aimed at increasing inter-firm cooperation are not reaching or affecting these firms. Using particular characteristic signs to identify these in a population of firms can allow better targeting of both policies and programs and may even provide information on factors inhibiting firms from entering cooperative business arrangements.

There are five firm characteristics that appear to be strongly associated with cooperating firms. Cooperating firms tend to be larger in size, have a high level of performance, be exporters, produce a high technology output and also produce capital goods. The survey data appears to uphold the predictions of Chapter 3 that cooperating firms would tend to be larger and produce a complex output.

This is not to suggest that firms without one or more of these characteristics will either not cooperate or be unsuccessful in any cooperation they do undertake. Rather, it shows that although all firms can use cooperative arrangements as part of their business strategy, certain firms will tend to do this more often. It is important to recognise too that it is not necessarily a failing of a firm if it is not in a cooperative business relationship with other firms. However, as later chapters highlight, it could well be a lost opportunity for the firm.

The following chapter extends this examination of firms with particular characteristics by determining if there is any pattern to a firm's choice of certain forms of cooperative arrangements.

